Syllabus

Communication procedures

- If you have a question regarding class administration or missing class, then please email the professor.
- If you have a question about a specific assignment, how an assignment was graded, or your grade tabulations, then please email the TAs/graders.
- If you have a question about theoretical course content, or assignment specifications, do NOT email, but instead, you should either:
    1. Come to the office hours of the professor or the TA. This option is guaranteed to at least get you an attempt at an answer.
    2. Post your question in the discussion forum in Canvas, which is monitored by the graders and the professor (with no guarantees about answers being provided, though we very much try). I encourage students to help others in the forum, with the exception that it would not be wise to post or copy code or assignment answers in the discussion forum.
- If you have a debugging or related question about your programming assignments, then attend either the TA's or professor's office hours. It is not feasible to fairly and equally satisfy all requests for programming or debugging help via email. Specifically, do not send your code to the TA or professor and expect that it is reasonable for them to debug it for you. Hint: this means you should plan to do your assignments early, to get debugging help if needed during office hours.

Professor

Dr. Taylor
http://cs.mst.edu/facultystaffandfacilities/facultydirectory/

Course website

The course website is hosted here, at:
https://web.mst.edu/~taylorpat/

Office hours and programming help

Here are some good sources of tutoring-style help in the class:

1. Professor

Please feel free to come to my office hours, either during scheduled times or by appointment. If you are having trouble, this can be very helpful!

- In the Lounge (Comp Sci room 212)
  - Times:
    - Wednesday 4-5 pm
    - Friday 3-4:30 pm
- Or by appointment (in CS 341)

2. TA

Our grader, Mr. Jasam <mnqnd at mst dot edu>, will hold hours in the Lounge (Comp Sci room 212) on Thursdays from TIME:TIME pm. He is available for help with programming homework, and for questions regarding grading.

Class/teaching evaluation and improvement

Please let me know what you like about the class and how it can be improved!

Course description

The course will familiarize students with the application of computational methods to the biological sciences broadly, as viewed from both perspectives. We will introduce problems in molecular, structural, morphological, neurological, epidemiological, biomedical, and biodiversity informatics. We will explore principles, algorithms, tools, and software to address those problems.

Prerequisite

- A grade of "C" or better in both one of Bio Sci 1113 or Bio Sci 1213 and one of Comp Sci 1570 and Comp Sci 1580 or Comp Sci 1971 and Comp Sci 1981.
- For a refresher or introduction to Python3 and scientific computing, see:

    - For beginners
        - http://greenteapress.com/thinkpython2/thinkpython2.pdf
            - (Data science remix: https://www.py4e.com/book)
        - http://files.swaroopch.com/python/byte_of_python.pdf
        - https://swcarpentry.github.io/python-novice-inflammation/
    - For those who are already experienced programmers
        - https://docs.python.org/3/tutorial
        - http://www.scipy-lectures.org/
- For a refresher on bash scripting, see:
    - https://swcarpentry.github.io/shell-novice/
    - http://www.linuxcommand.org/lc3_learning_the_shell.php
- For an introduction to databases and SQL, see
    - https://swcarpentry.github.io/sql-novice-survey/
- For a refresher on genome biology:
    - https://www.ncbi.nlm.nih.gov/books/NBK21128/

Course goals

"As gold which one cannot spend will make no person rich, so knowledge which one cannot apply will make no person wise." -- Samuel Johnson. As this quote suggests, the primary goal of this course is to provide you broad familiarity with methods commonly employed both in many real-world applications, and also those which are used for more advanced methods. The secondary goal of the class is to practice actually implementing these methods, both to assist understanding, and also to increase retention.

Textbooks

Required

1. Introduction to Applied Bioinformatics - Greg Caporaso
    - http://readiab.org/book/0.1.3/
    - Cost: Free and open
2. Network Science - Albert-László Barabási
    - http://networksciencebook.com

    - Cost: Free and open
3. Genomes, 2nd edition. Terence A Brown.
    - https://www.ncbi.nlm.nih.gov/books/NBK21128/
    - Cost: Free and open

Optional

4. Bio-star Handbook (Bio* Handbook) - Istvan Albert
    - Optional (better for Biologists who would like to learn some practical tools)
    - https://www.biostarhandbook.com/
    - Cost: $25 for student edition

Attendance

- Attendance will be taken directly the first week and indirectly after.
    - We will use stochastic sampling methods in class to take attendance
- Missing classes will greatly diminish your chances for getting a good grade in this class.
- If you miss more than 5 classes, we may drop you from the class.

Technical and programming assignments

- These will start the second or third week of the semester
- You should expect around 1 technical assignment every 1.5 weeks
- These will generally be due Tuesday night at 23:59, with some exceptions
- Published experimental studies in the fields of research in cognitive psychology and education have shown that frequent (rather than sparse) recall, is both more effective for learning, retention, and synthesis, and also encourages frequent smaller bouts of studying, rather than cramming.

You can develop and test your assignments using class virtual machine (Detailed in Content), or the department Linux systems either in the lounge/lab, or remotely:
http://itrss.mst.edu/linux-support/
http://itrss.mst.edu/linux-support/user-

documentation/

How to ssh into the department's IT Linux systems:
$ ssh yourlogin@rcnnxcs213.managed.mst.edu

- where nn = computer number

Grading

You will be graded based on assignments, projects, homework, and other miscellaneous activities. We reserve the right to factor in points for attendance related performance.

Assignment grading

Technical assignments will be graded (on a scale from 0 to 100) primarily on their correctness. Complete and correct output for every test input case is necessary for a full score.

- A non-compiling, non-running, or crashing (Seg-fault, core dump, etc) program or script will receive a score of 10.

If a program compiles and runs, then points will be deducted for each incorrect test case output. Points may also be deducted for:

- Missing name
- Incorrectly formatted output. (Presentation Error)
- Memory Leaks
- Specific types of inefficiency
- File format issues

It is expected that all of your work runs correctly in the specified Linux environment we are working with in class, in the exact manner we specify in the assignment description. If you were contracted to write code for a job, and it ran on your computer, but not your employer's as they needed, your work would be considered a failure. In that light, you are also responsible for submitting all text and source files encoded UTF-8, Unix delimited.

After grading any given assignment, if the assignment appeared to be too difficult for the class, we may normalize to the top student's performance (the student with the highest point rank will get a 100% / A). This can, by definition, only help your grade.

Overall grading

We grade using the following procedure (percentages for each category may change slightly):

- 100 points for each technical assignment
- 150 points for the final project
- Any miscellaneous points

Your final grade = percent of possible points above
Your letter grade = standard S&T letter-percentile mapping:

A : [90.00 - 100] %
B : [80.00 - 90) %
C : [70.00 - 80) %
D : [60.00 - 70) %
F : < 60 %

Grades will not be rounded; for example, if you have a 79.9, that is a C.

View your grades

You can check your grades on Canvas: http://canvas.mst.edu/

Makeup and late work

- No technical assignment re-submission is allowed, except on the first assignment under limited circumstances.
- Late submissions will not be accepted. It would be wise to account for something unexpected popping up last minute, so try to finish early.
- If you have an S&T-acceptable documented reason (i.e., illness, death in the family, etc) for missing **in-class** events, please see the professor to discuss potential re-scheduling or accommodation.

Academic honesty

You're here to learn and better yourself! Write all your work in your own words, and write your own code. Do not copy-paste (plagiarize) from any source. If you are not sure, err on the side of caution and do your work independently. Occasional infrequent help from a friend when your are really stuck may be reasonable, though if that "help" is frequent enough that your collaboration results in almost identical code, it was too much collaboration

for an assignment intended to be independent work (which all are unless explicitly assigned as group work).

If you are found to be engaging in any form of academic dishonesty, the most severe penalties permitted by the university will be enacted. Incidences will typically result in grades of 0 for the respective course components, as well as notification of the student's advisor, the student's department chair, and the campus undergraduate studies office. Further academic sanctions may be imposed as well in accordance with university regulations (http://academicsupport.mst.edu/academicintegrity/). Those who allow others to copy their work are also committing plagiarism and will be subjected to the same procedures.

The Honor Code can be found at this link: http://stuco.mst.edu/honor-code/. Page 30 of the Student Academic Regulations handbook describes the student standard of conduct relative to the University of Missouri System's Collected Rules and Regulations section 200.010, and offers descriptions of academic dishonesty including cheating, plagiarism or sabotage (http://registrar.mst.edu/academicregs/index.html).

We check your assignments against each other with software that is VERY good at detecting similarities and differences between any text files, including your source files. These methods are difficult, if not impossible to trick. Please do not try to copy-paste, share sources directly, or write all your code in a group or pair for individual assignments; you will not like the consequences!

Attempting to deceive attendance checking procedures is considered academic dishonesty for ALL parties involved. For example, do not submit someone else's pre-lab or lab assignment for them because they are not attending class.

Burns & McDonnell Student Success Center

The Student Success Center is a centralized location designed for students to visit and feel comfortable about utilizing the campus resources available. The Student Success Center was developed as a

campus wide initiative to foster a sense of responsibility and self-directedness to all S&T students by providing peer mentors, caring staff, and approachable faculty and administrators who are student centered and supportive of student success. Visit the SSC at 198 Toomey Hall; 573-341-7596; success@mst.edu; web: http://studentsuccess.mst.edu/

Accessibility and Accommodations

If you have a documented disability and would like accommodations in this course, please facillitate providing documentation to the professor as early as possible in the semester. Disability Support Services staff will need to send a letter to the professor specifying the accommodation you will need. It is the university's goal that learning experiences be as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, please contact Student Disability Services at (573) 341-6655, sdsmst@mst.edu, visit http://dss.mst.edu/ for information, or go to mineraccess.mst.edu to initiate the accommodation process. Please be aware that any accessible tables and chairs in this room should remain available for students who find that standard classroom seating is not usable.

Title IX

Missouri University of Science and Technology is committed to the safety and well-being of all members of its community. US Federal Law Title IX states that no member of the university community shall, on the basis of sex, be excluded from participation in, or be denied benefits of, or be subjected to discrimination under any education program or activity. Furthermore, in accordance with Title IX guidelines from the US Office of Civil Rights, Missouri S&T requires that all faculty and staff members report, to the Missouri S&T Title IX Coordinator, any notice of sexual harassment, abuse, and/or violence (including personal relational abuse, relational/domestic violence, and stalking) disclosed through communication including but not limited to direct conversation, email, social media, classroom papers and homework exercises. Missouri S&T's Title IX Coordinator is interim chief diversity officer Neil Outar. Contact him (naoutar@mst.edu;

(573) 341-6038; Temporary Facility A-1200 N. Pine Street) to report Title IX violations. To learn more about Title IX resources and reporting options (confidential and non-confidential) available to Missouri S&T students, staff, and faculty, please visit http://titleix.mst.edu.

Classroom Egress Maps

http://designconstruction.mst.edu/floorplan/

Backlinks: Index:Bioinformatics