# B573- Programming for Science Informatics
Spring 2018
Thursday, 6:00 pm – 8:40 pm
IT 155

**Instructor**

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**Office Hours**

Monday, 3:30pm-5:30pm

**Course site**

– http://canvas.iu.edu
– Distribution of all materials
– Updates and announcements
– Should be accessible if you have IU ID and registered for the course

**Course description & objectives**

Bioinformatics, a rapidly evolving discipline, is the application of computational tools and techniques to the management and analysis of biological data. This course aims to provide training in a wide variety of programming techniques widely adopted in bioinformatics. In this course, we will cover the basics of programming in multiple languages that have been helpful in understanding and analyzing biological datasets. Lectures will be a combination of biological problems and computation techniques, which is achieved through demonstration of sample computational biological tasks. This course will include Linux, R, and Perl to help students lay a solid foundation in Linux based administrations, statistical data analysis, and biological data management.

The instructor will give introductory lectures on each of these programming languages, with sample biological applications demonstrated. A final project will be given including paper reading, topic discussion, application development and demonstration and submission of the project report. At the end of this course, students are expected to gain basic skills of programming and to have the ability of independently performing analysis on most biological datasets available to us.

Software: Linux operating system, R and Perl

**Textbook**:

– None
– Lecture notes will be distributed via course website
– Additional readings will be sent out if needed.

**Reading (referred books):**

– C. Gibas & P. Jambeck, "Developing Bioinformatics Computer Skills" O'Reilly, 2001.
– J. Tisdall, "Beginning Perl for Bioinformatics," O'Reilly 2001.
– C. Bessant, I. Shadforth & D. Oakley, "Building Bioinformatics Solutions: with Perl, R and MySQL", Oxford University Press 2009
– B.S. Everitt & T. Hothorn, "A Handbook of Statistical Analyses Using R", Chapman & Hall/CRC 2006

**Assignments**:

– Three assignments: each with a small programming project
– Final project: (read a series of papers, tackle a research problem, present the papers, demonstrate the project and write-up a short report – work in groups up to a maximum of two members per group)

**Grading**:

– Attendance (10%)
– Midterm (20%)
– Assignments (30%)
– Final presentation and project (40%)

**Expectations/Guidelines/Policies:**

– **Attendance**: Attendance and punctuality is expected and will count as 10% of final points. Participation in class discussion is encouraged and may be awarded for up to 5% bonus points.
– **Late Policy**: Late assignments after the due date will still be accepted, with 10% penalty points per day.
– **Cell phone**: Cell phones are allowed in the class as long as they are muted. Phone call and messaging are prohibited and will be penalized through your attendance points.
– **Plagiarism**: Collaboration and help between yourselves are encouraged. Plagiarism from one another or from Internet is strictly prohibited. *Assignments and codes will be checked for plagiarism irregularly.*
– **Check emails and canvas regularly as all announcements and news will be sent by canvas message.**

**Grading Scale**

A+ (93-100%), A (88-92), B (80-87%), C (60-79%) [Tentative]

**Evaluation criteria:**

Attendance (10%)

- – All students are required to sign the attendance sheet at the beginning of class.
- – Being late and not showing up will be penalized.
- – Active participation in class discussion is encouraged and may be awarded with up to 5% bonus points.

Midterm (20%)

Assignments (30%)

- – A total of three programming assignments (30%)
- – One assignment each on Perl, R and MySQL (available from on course website)
- – All codes submitted should be carefully double-checked to be functional.
- – Projects with plagiarism or not functional codes will be counted as zero.

Final project (40%)

- – Will be evaluated for 40% of the total points
- – Guest lectures will be arranged in the middle of the semester to help provide possible topics.
- – Final projects are encouraged in the individual basis, but allow up to 2 students in a group if needed.
- – After choosing a topic, each group will read and present several project-related papers, and demonstrate their project at the end of the semester. A short report is also required.
- – Presentation of the project would be towards the end of the semester and will be evaluated as a group.
- – Paper presentation would count 10% and project demonstration/report would be 30%.
- – Any questions regarding the projects should be directed to jingyan@iupui.edu.

**Grading rubrics**

Assignments

|  | Excellent-A | Good-B | Poor-C |
|---|---|---|---|
| **Code clarity** | Functional code; Code is clean; Efficient implementation; | Functional code; Code is clean; Less efficient; | Code not function well; Not efficient; Many useless code; |

Final project

| | Excellent-A | Good-B | Poor-C |
|---|---|---|---|
| **Paper presentation** | Well-rehearsed with smooth delivery; Clear research question; Thorough review of existing work; | Fair smooth delivery; Have a research question but not too clear; Some review of existing work; | Delivery not smooth; Research question not identified; Few review of existing work; |
| **Project presentation** | Well-rehearsed with smooth delivery; All contents included in slides, from introduction, method, results and discussion. | Rehearsed with fairly smooth delivery; Include most contents. | Delivery not smooth; Many contents missed. |
| **Writing** | Writing and graphics are nearly error free; Consistent font and margin; Content is well organized using headings and bulleted list. | A few writing and writing errors; Consistent font and margin; Content is not very well organized but can still follow. | Careless writing and with many spelling errors; Inconsistent font and margin; Content hard to follow. |
| **Content** | Hits on almost all contents, including introduction, methods, results and discussion; Demonstrate results with tables and graphs. | Hits on most key points; Demonstrate results with few tables or graphs; Briefly discussed the results. | Hits on a portion of content; Results without any tables or graphs. |

**General rules/notes:**

"Children are not permitted to attend class with parents, guardians, or childcare providers. This conduct has the effect of unreasonably interfering with an individual's work or academic performance creating an offensive learning environment."

"A student must not violate course rules as contained in a course syllabus, which are rationally related to the content of the course or to the enhancement of the learning process in the course." [Code of Student Rights, Responsibilities, and Conduct, page 29]