CS-5045
Computation for the Life Sciences
Fall 2003

Essential information.

Instructor	Adrian Sandu
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Office	632 McBryde Hall.
Lecture	Mon–Wed 2:30–3:45, 200 Norris Hall
Office hours	Mon. 10:00–12:00
Web Page	http://people.cs.vt.edu/~asandu/Courses/CS5045/CS5045.html

Prerequisites.

Graduate standing in a life sciences department or permission of the instructor, and previous coursework in genetics, molecular biology, and cell biology. The course is not open to graduate students in computer science.

Textbooks.

- *Beginning Perl for Bioinformatics.* James Tisdall, O'Reilly, 2001.

- *A Practical Introduction to Data Structures and Algorithms.* 2nd edition. Clifford A. Shaffer, Prentice Hall, 2001.

Books on Library Reserve.

- *Linux: the textbook.* Syed Mansoor Sarwar. QA76.76 O63 S35545 2002.

- *Learning Perl.* Randal L. Schwartz and Tom Phoenix. 3rd ed. Sebastopol, CA : O'Reilly, c2001. QA76.73 P225 S39 2001.

- *Perl by Example.* Quigley, Ellie. 3rd ed. Upper Saddle River, NJ : Prentice Hall, 2002. QA76.73 P22 Q53 2002.

About the course.

The course developes the background needed by graduate students pursuing the bioinformatics option or the Ph.D. in Genetics, Bioinformatics, and Computational Biology but not having a computer sceince background. Fundamentals of computer science discussed and practiced include Linux, data, and the importance of command line interface; the Perl programming language; program design, implementation, and testing; basic data structures, algorithms, and algorithm analysis.

Grading.

The grade will be based on

- Homework assignments and Programming projects: 14 (weekly) at about 50 points each;

- Exams: 3 at about 100 points each.

The total maximum is 1000 points.

Each homework must be prepared with Latex or other word processing system, and handed in in class on the due date or emailed to the instructor as a PDF file prepared by Adobe Distiller no later than 5pm on the due date. For programming assignments the source code, and input and output files must be submitted by email to the instructor.

Assignments are due at 5:00 PM on the due date. No points will be given for late assignments.

Disclaimer.

Some information given to you in class may supersede the information in this syllabus or on the web page.

Ethics.

The Honor Code applies. All work submitted must be student own's. Students may solicit help only from the instructor.

Disabilities.

Please let me know if you have a disability which requires special arrangements.

Topics.

Week 01	Introduction to computation for bioinformatics.
Week 01–02	Introduction to Linux: logging in, the command line, pipes, text editing.
Week 03	Introduction to Perl: the Perl interpreter, running Perl, make, scalar data and variables.
Week 04	Perl: standard input/output/error, control structures, programming strategies.
Week 05	Perl: subroutines, the debugger.
Week 06	Perl: arrays, lexical scoping, random mutations.
Week 07	Perl: hashes, regular expressions.
Week 08	Perl: parsing with regular expressions; GenBank.
Week 09	Perl: parsing PDB files.
Week 10–15	Data structures, algorithms, and algorithm analysis; examples using Perl.