

Syllabus
BIIN200: Bioinformatics I
Fall 2005
Call #1226

<http://www.mscs.mu.edu/~cstruble/biin200.php>

Instructor: Craig A. Struble, Ph.D.

Office: 369 Cudahy Hall
Office Hours: 5:45–7:00 p.m. MTu, 3:00–4:00 p.m. WTh and by appointment.
Phone: (414)288-3783
Email: craig.struble@marquette.edu

Class Meets: 4:20–5:35 p.m., TuTh, CU 137

Overview

This course provides an introduction to bioinformatics with a focus on fundamental bioinformatic problems, the tools used to compute solutions to those problems, and the theory upon which those tools are based.

Learning Objectives

Students completing this class should be able to

- Access, retrieve, and analyze bioinformatic data available from several bioinformatic databases;
- Assess the quality of bioinformatic data available from the internet;
- Use standard bioinformatic tools to answer specific biological questions;
- Understand the theories used to build the tools and their relationship to biology;
- Critically assess solutions to bioinformatic problems.

Students completing this class are **not** expected to be able to

- Develop new bioinformatic tools to solve biological problems;
- Construct databases storing large quantities of biologically related data;
- Integrate standard bioinformatic tools to solve a larger biological problem.

Students who would like to be able to do any of the above are encouraged to take BIIN201 Bioinformatics II, where topics supporting these skills will be covered.

Topics Covered

Bioinformatic databases, mining bioinformatic data, basic molecular biology, pairwise sequence alignment, multiple sequence alignment, gene prediction, gene expression data analysis, phylogenetics, RNA structure prediction, protein structure prediction, comparative genomics, proteomics

Prerequisites

BIOL004, CHEM024 are corequisites, and COSC066 or consent of the instructor

Textbook and References

Required

- David W. Mount, *Bioinformatics: Sequence and Genome Analysis*, 2nd edition, Cold Spring Harbor Laboratory, 2004, ISBN 0-87969-687-7.

Optional

Additional reference material will be available on the course web site, placed on reserve in the library, or available in the Bistro lab.

Facilities

All students in BIIN200 will have access to the Bistro Lab, a laboratory dedicated to bioinformatics and biomathematics study, which is located in Cudahy 368 at Marquette University. The laboratory is outfitted with the software used in this course as well as additional bioinformatics resources you can use in your studies.

All students should attend the Bistro lab orientation, which will be held during the first two weeks of classes.

Grading

Your grade will consist of the following components, weighted as shown:

Homework Exercises	15%
Lab Notebooks	25%
Final Report	20%
Midterm Exam	15%
Final Exam	20%
Intangibles	5%

This semester, I will be using the following grading scale to assign letter grades. I recommend reading Dr. Struble's *grading philosophy*, which is available on his web site, to understand why we have chosen the following grading scale. Grades for each assignment, exam, etc. will be curved to fit this grading scale.

Range	Letter Grade
[90–100]	A
[80–90)	AB
[70–80)	B
[60–70)	BC
[50–60)	C
[40–50)	CD
[30–40)	D
[0–30)	F

Writing Expectations

Good writing skills are essential for effective communication of your ideas. All work submitted in this class is expected to be in well written English.

All written work should contain citations to referenced papers, web sites, books, etc. It is not acceptable to quote or paraphrase web sites, textbooks, papers, or other sources without proper citation. **Failure to properly cite your sources is plagiarism and will result in a 0 for the assignment. Repeated offenses may result in failing the course.** For examples of acceptable citation style, look at articles from journals and magazines such as Bioinformatics, Nature, Science, etc.

If you are not confident in your ability to write English well, you should seek help from the Ott Memorial Writing Center. Visit <http://www.marquette.edu/writingcenter/> for more information.

Homework Exercises

During the semester, homework exercises will be assigned at the end of several lectures. Exercises are intended to be short (1–2 hours) and thought provoking.

Written solutions are due at the beginning of the next lecture after being assigned. Bring one copy for me and one copy for you. I will assign one of four grades to the assignment – 25 (F), 55 (C), 75 (B), 95 (A) – based on the quality of the attempt you made at solving the assignment. Your overall average will make up 2/3 of your homework grade (i.e., 10% of the overall course grade).

Each student will present the solution to 2 homework exercises. You will be given 5 to 10 minutes to present your solution (depending on the exercise). You will be evaluated on your presentation skills and ability to solve your assigned exercise correctly. These presentations makes up the other 1/3 of your homework grade (i.e., 5% of the overall course grade).

Bioinformatic Exploration

Students will be assigned to groups to perform a bioinformatic exploration of a collection of sequences. The instructor will provide an initial collection of biological sequence data, and the goal of the exploration is to utilize the tools and techniques discussed in class to learn everything possible about the sequences. At the end of the semester, each group will submit a detailed report of the methods used and results found about their sequences.

The final report is due on Thursday, December 8.

During the course of the semester, students are required to maintain a lab notebook of their progress on the project. The lab notebook contains steps taken, results obtained, and observations made by the student. Each page in the lab notebook is dated to indicate when work was accomplished. The instructor will review these lab notebooks regularly, and students are required to bring them to every lecture for the possibility of review.

In addition to individual lab notebooks, groups are required to maintain an ongoing project binder, with draft sections of their final project report. The drafts should consolidate the observations made by individual students in a group. This should be updated every 2–3 weeks. The instructor may request to see the group binder at any time during the semester. Reviews of the group binder form part of the lab notebook grade.

Guidelines for the lab notebooks, group notebooks, and final report will be available on the course web site.

Because the exploration is a group exercise, each student will perform an evaluation of themselves and other members of their group. Several evaluations will be performed throughout the semester to provide feedback about ongoing performance. This peer feedback will be used as part of each student's grade for the final report.

Exams

There will be one midterm and one final exam. Questions may be posed in any form, such as short answer, multiple choice, or computational problems. The final exam will be comprehensive, but may emphasize the material covered after the midterm exam. The dates and times for the midterm and final exam are shown below.

Exam	Date and time
Midterm	Thursday, October 27
Final	Tuesday, December 13, 3:30–5:30 p.m.

Intangibles

A small portion of your grade consists of items not easily measured and categorized. These include things like class participation, meetings with the instructor, keeping up with the reading, etc.

Late Policy

Assigned work in this course must be turned in by the beginning of lecture on the specified due date. After the beginning of lecture is considered late and will not be accepted.

Attendance Policy

While attendance at lecture is optional, it has been my experience that there is a direct correlation between attendance and the overall grade received in this course. If you miss class, you are responsible for finding out what you missed from a classmate, including notes and assignments. Requests from absent students for notes or for meetings to discuss what was missed will be ignored. Absences on days when lab notebooks are reviewed will result in one fewer lab notebook observation for grading (i.e., the remaining observations will be averaged together, meaning each observation is worth more). Absences on days when an exam or homework presentation is scheduled must be accompanied by official documentation in order to make up the work or exam.

Academic Honesty

All students are expected to adhere to the standards of student conduct as described in the *Community Expectations* section of the Marquette student handbook.

Homework exercises and exams are intended to reflect individual effort in the course. Students may discuss assignments in a general way; i.e., discussing the *nature* of the assignment or providing clarifications. Sharing source code, pseudo-code, program outputs, analysis results or solutions to homework exercises is strictly prohibited, unless otherwise stated.

You are **ENCOURAGED** to refer to outside material such as journals, web pages, and books. Do not feel guilty about using outside material; just make sure that you cite your references. Furthermore, you must write your solutions in your own words. It is not acceptable to directly copy material from another source. **Failure to properly cite your references may result in a charge of plagiarism. Give proper credit where credit is due!**