

CSC 5098: Computer Science for Bioscientists

Spring 2004

Instructor:

Title:	Computer Science for Bioscientists
Course:	CSC 5098
Section:	001
Call Number:	12979
Credits:	3.0
Lecture:	Monday and Wednesday, 5:30-6:45 p.m., room KC 212
URL:	http://carbon.cudenver.edu/~wmunsil/CSC5098/
Instructor:	Dr. Wes Munsil
Office Hours:	Monday and Wednesday, 4:00-5:15 p.m., NC2404B
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Catalog Data:

Provides a broad but detailed overview of the field to graduate students in the biosciences, with emphasis on web technologies, programming languages, algorithms, and database systems.

Textbook:

There is no assigned textbook for this class. Bibliographic references and handouts will be available as the course progresses.

Course Objectives:

Computing and computation are impinging on the professional lives of bioscientists to a greater extent every year. From the World Wide Web to the laboratory, from sophisticated information search and retrieval to “black box” data analysis, the bioscientist relies more and more on technologies with which he or she may have little familiarity or true understanding.

The objective of CSC 5098 is to ground graduate students in the biosciences in the relevant fundamentals of the exciting field of computer science. The intent is to improve their ability to choose, understand, evaluate, and use the essential technologies that will be such an important part of their professional lives. The course takes a “full circle” approach, beginning with a study of web-based tools available from the National Center for Biotechnology Information (NCBI), using that study to motivate “drilling down” into the underlying technologies, and finally resurfacing into the web world through a study of pattern matching techniques.

The course is not available for credit to computer science graduate students.

Topics:

NCBI resources
 BLASTing the human genome
 The World Wide Web
 Programming languages
 Data structures
 Algorithms
 Logic
 Relational databases
 Data analysis
 Data mining
 Formal languages
 Pattern matching
 Genetic algorithms

Course Outline:

Session	Date	Topic	Reading	Assignments	Criteria a-m
1	1/19	Holiday—no class			abcek
2	1/21	Course overview			abcek
3	1/26	NCBI resources			abcek
4	1/28	WWW overview; SAQ 1		HW 1	abcek
5	2/2	Web technologies			abcek
6	2/4	Web technologies		HW 1 due	abcek
7	2/9	Web services			abcek
8	2/11	Web services; SAQ 2		HW 2	abcek
9	2/16	Programming language overview			abcek
10	2/18	Assembly language		HW 2 due	abcek
11	2/23	BioPerl			abcek
12	2/25	Java; SAQ 3		HW 3	abcek
13	3/1	Data structures			abcek
14	3/3	Data structures		HW 3 due	abcek
15	3/8	Midterm review			abcek
16	3/10	Midterm Exam			abcek
17	3/15	Spring break—no class			abcek
18	3/17	Spring break—no class			abcek
19	3/22	Algorithms		Project	abcek

20	3/24	Algorithms; SAQ 4		HW 4	abcek
21	3/29	Logic			abcek
22	3/31	Logic		HW 4 due	abcek
23	4/5	Relational theory			abcek
24	4/7	SQL; SAQ 5		HW 5	abcek
25	4/12	Databases			abcek
26	4/14	Databases		HW 5 due	abcek
27	4/19	Data analysis			abcek
28	4/21	Data mining; SAQ 6		HW 6	abcek
29	4/26	Formal language theory			abcek
30	4/28	Pattern matching		HW 6 due	abcek
31	5/3	Pattern matching			abcek
32	5/5	Final review		Project due	abcek
	5/10	Final Exam			

The following courses are the prerequisites for this course (according to the most recent catalog):

None (but knowledge of some programming language is helpful)

and the following courses are the co-requisites for this course:

Not applicable

Note: *Each student must sign and return the attached Prerequisites Agreement form to receive any credit for any assignment or exam. If this form is not returned by the beginning of the 2nd week, the student will be administratively dropped from the course.*

Grading Policy:

If the Prerequisite Agreement form is turned in, the grading policy for the course will be as follows:

Homework	20%	A	(90%, 100%]
Midterm	20%	B	(80%, 90%]
Final	35%	C	(70%, 80%]
Project	25%	D	(60%, 70%]

CSE policy on cheating : The penalty for cheating—wherever or whenever the cheating is determined to have occurred—is failure of the course. You need to read the policy on cheating at www.cse.cudenver.edu. Although collaboration is expected and encouraged,

all work submitted for a grade must be recognizably the original and individual work of the submitter.

Other Requirements:

In addition to the required homework and tests, a variety of self-assessment quizzes will be given in class throughout the semester. These will be discussed in class but not graded; their purpose is to help each student understand the degree of his or her growing mastery of the material.

Students will be responsible for implementing a class project, details of which will be given on March 22. The preferred implementation language is Java; the use of other languages will not be forbidden, but will require advance approval of the instructor. A free version of Java 1.4 for any of several platforms can be downloaded from Sun's web site.

The Course Outline above is aggressive, and assumes we will cover the entire planned subject matter in the course. Events may show this to be impossible. In that case, the Course Outline will undergo revision. The current version of this syllabus will always be available from the course web site, to which students should refer regularly to look for such revisions, as well as announcements, details of homework assignments, information about "snow day" cancellations, and the like.

Late homework assignments will not be accepted. Each student's single lowest homework score (which would be zero, in the case of a late assignment) will be discarded before computing the student's final grade for the course. Late projects will not be accepted—note that this rule, in conjunction with the above Grading Policy, means that any student who fails to turn in the project by the due date can get no better than a C for the course. Exams will be given in class; students who find they will be unavoidably absent on an exam day must make prior arrangements with the instructor for taking a make-up exam.

PowerPoint slides for each lecture will be available from the course web site after the lecture. Students should view this as a convenience only; it does not relieve them of their responsibility for taking notes during lectures as required by their individual study styles.