

**Foothill College  
Computer, Technology & Information Systems Division  
COIN81 Introduction to Bioinformatics  
Spring Quarter, 2009**

**Course Information: 5 units, taught online and hybrid Wednesday evening in 4004 (TBA)**

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**Web: <http://fgamedia.org/faculty/rdcormia/COIN81/>**

**Office hours: 4129 by appointment (650) 949-7456**

Welcome to COIN81, Introduction to bioinformatics, and bioinformatics tools and databases. This course is taught online / hybrid in Spring Qtr. 2009. This course is intended to provide an introduction to bioinformatics tools, databases, and techniques available through the World Wide Web. Students should have a background that includes molecular biology, and especially awareness of sequence comparisons as a technique for establishing similarities in protein homology, function, and first approach structure prediction. You should be comfortable navigating the Web.

This course follows a path that introduces bioinformatics databases, including a thorough tour of NCBI, followed by protein resources in EMBL. Scenario based projects and a web quest test your ability to effectively use genomic and proteomic resources. The second half of the course introduces Biology Workbench, a tool hosted by UCSD, and emphasis on working within a "problem domain". In the final third of the course, you will work on genomic, proteomic, and viral projects, culminating in a discussion of systems biology, synthetic biology, and digital cells.

This course can be completed in 12 weeks five to ten hours of effort, including becoming familiar with databases, papers and current research in bioinformatics. The textbook, [Bioinformatics for Dummies](#), is really quite fun to read, and offers a gentle guide to bioinformatics databases and techniques. Students are welcome to send email as required before enrollment to see if this course is right for you.

There are five assignments in this class, and tentatively, one midterm (or a final project), that are described and linked from the [assignments](#) page. Each assignment focuses on a key area, and roughly corresponds to NCBI, genomics, proteomics, phylogeny, and metabolic pathways. There are two "open book / open Web" midterms.

Grading is by cumulative points. Each assignment is worth 20 points (1<sup>st</sup> is 30), and the final is worth 25 points. Total points possible in the course are 125 - 150.

A = 135 - 150 points B= 120- 134 points C= 105 - 119 points D= 90 - 104 points

F = 50 to 90 points. (Please withdraw prior to Week 8 if required)

**Assignments** – Assignments are due in 2 to 3 week intervals - some take longer, some take less. All assignments have due dates with a 2 week open window (grace period). No assignments can be submitted after June 28<sup>th</sup>, and there are no incompletes possible for this class. Stay on task and ask for help as required. Assignments may be turned in through ETUDES, as text, and if they include graphics, by attachments in email. Please limit file size to about 1 –2 Mbytes, and zip large attachments.

**Casual lectures** - will be held on Wednesday evenings at the Krause Center for Innovation (KCI) in room 4004 from roughly 6:00 p.m. to 8:00 p.m. All are welcome, including colleagues and guests, but please let me know ahead of time if you are inviting more than two people to attend. Online students are encouraged to attend, especially for demonstrations of the software tools.

**Textbooks** - I am recommending two or three books depending on your biology and computer science background. [Bioinformatics for Dummies](#) is great for all students, and is the "official" book for this course. [Bioinformatics Computing](#) from Prentice Hall adds a little more technical explanation to these tools. For the technically gifted or those desiring more of a CIS perspective, [Sequence Analysis in a Nutshell](#) by Darryl Leon is a great book. I own all three, and all add a piece of the puzzle in learning your way around these Internet resources. The course will follow Bioinformatics for Dummies the closest, so please try to read that book cover to cover.

### **Schedule:**

Week 1: Tour of bioinformatic databases on the Web  
Week 2: Tour of NCBI resources – Intro to BLAST  
Week 3: BLAST and GenBank - NCBI data model  
Week 4: Introduction to protein resources and Swiss-Prot  
Week 5: PIR and Pfam, Protein structure prediction and Swiss-Model, Cn3D  
Week 6: UCSD Biology Workbench (HIV mutation, and HIV and Prion evolution).  
Week 7: UCSD Biology Workbench (SARS and Avian Influenza)  
Week 8: SNPs and Haplotypes  
Week 9: Gene expression and microarrays  
Week 10: Systems biology and metabolic pathways  
Week 11: Synthetic biology and digital cells  
Week 12: BioPerl and XML

**My philosophy:** I have a strong philosophy about "individual outcomes". While I am your "expert guide" through this subject, this field is growing exponentially, and no one would sanely consider himself or herself an "expert". I will create a learning environment to help you learn as much as possible about Web based bioinformatics tools databases, and methods, but ultimately you will weave your own path through this material. Choose a target gene, protein, or disease carefully, and the course will be quite a lot of fun!

**My background** – I am originally a biochemist, working at Dow Chemical and Syntex before moving into materials science and failure analysis. For roughly a decade my career included business development and marketing, but science was always my true love. In 1994 I decided to pursue a career in education and the Internet, and after several wild rides in e-commerce, I joined Foothill College full-time in 2001. Returning to bioinformatics is the natural intersection of biochemistry and Internet technologies. I completed the UCSC extension Certificate in Bioinformatics in December 2003, and in 2004, began teaching Informatics, the first course in a new certificate at Foothill College.

**Office Hours** – In spring quarter 2009 the hybrid (casual) lecture will serve as office hours, in addition to (nearly) seven day a week email and ETUDES-NG private message support. **Please (always) put COIN81 in the subject line of all email correspondence.** You may also call me at 650.949.7456. (My office is room 4129).