

**BME 110L / BIOL 181L**

## **Computational Biology Tools**

[www.soe.ucsc.edu/classes/bme110/Winter09](http://www.soe.ucsc.edu/classes/bme110/Winter09)

- Introductory Remarks and Overview
  - **who**
  - **why**
  - **what**
  - **how**
- Logistics and infrastructural/technical things
  - **when**
  - **by what means**
- Reading for next class (if you have the B4D book already):
  - Chp 1 and 14 (for today - common sense)
  - Chp 2 and 3 (for the next topic: Genome DBs)

**BME 110L / BIOL 181L**

## **Who**

- Instructor: Dietlind Gerloff ([gerloff@soe.ucsc.edu](mailto:gerloff@soe.ucsc.edu))  
Physical Sciences Building 320
- TA: Grant Thiltgen ([thiltgen@soe.ucsc.edu](mailto:thiltgen@soe.ucsc.edu))



- + various tutors, occasionally, during hands-on sessions
- + sometimes guest lecturers (second half of course)

**BME 110L / BIOL 181L**  
**Why and What:**  
**Applied Bioinformatics for Beginners**

**Course Aim:**

To get you trained enough to use the wealth of publicly available WWW-resources on your own at basic level.

- so you can take advantage of the things on offer
- are familiar with a few common/main sites from where to start
- acquire the skills to cope with previously unseen sites
- are aware of the potential pitfalls with DIY-bioinformatics

**Not:**

- to turn you into bioinformaticians
- to cover all WWW-resources there are out there
- to be so challenging and selective that you'll all fail!

**BME 110L / BIOL 181L**  
**What**  
**Three levels of Bioinformatics skills**

**User of Tools:**

- not missing out on straightforward and free resources
- basic understanding of how the tools work but not in detail
- (should!) restrict him/herself to highly reliable/accurate tools

**Advanced User of Tools:**

- applied bioinformatics researcher (full-time)
- understands the underlying algorithms and consequences
- can work with sub-confident results and difficult interpretation

**Developer of Tools:**

- responsible for all the good, the bad, and the ugly...

## BME 110L / BIOL 181L What for? User Intentions...

### Retrieve things from databases:

- sequences, literature, information... (other people's results)

### Apply a computer program to your own data:

- e.g. retrieve homologous sequences via a www-server
- typically predictive, or for visualization

### Making pretty pictures:

- for publications, reports, posters, presentations...
- that's OK, not all our motives must be super-scientific & academic 😊

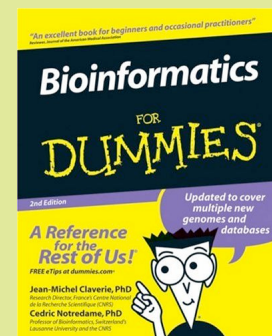


## BME 110L / BIOL 181L Book Choices

### • For the “default” student (most of you):

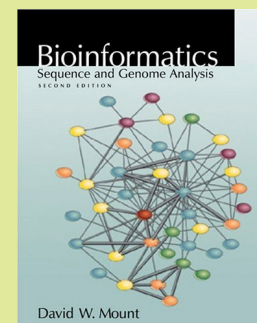
- no/little prior experience
- no further interest in bioinformatics (methodology, algorithms)

- usually course reading/chapters will refer to this book (B4D)



### • For those with a bit higher ambitions:

- prior experience & interested in methods
- interested in a bioinformatics minor (BIOL) or, of course, major (BME110)



## BME 110L / BIOL 181L

### Specific Topics

#### Databases:

- DNA/RNA/protein sequences and structures
- Accompanying information (literature etc)
- Genomics and functional genomics sites & perspective
- Visual tools (e.g. UCSC Genome Browser)

#### Sequence Analysis:

- Some tools for biological lab work (e.g. PCR primer design)
- WWW-server sites for similarity searching and alignment
- Prediction servers (e.g. motifs, secondary structure)
- A rough idea of how they are trying to accomplish their task

#### Practical issues (very important):

- Annotation / predictions - can I trust them?
- How to report results from dynamic resources
- How to make/export graphs + pretty pictures

## BME 110L / BIOL 181L

### How

#### Regular Course hours:

- Lectures + Demo + in-class exercises  
always bring your laptops with you (need wireless access)

#### Additional Section (mandatory):

- hands-on completely, for in-class exercises and/or homework
- TA and tutor help available to “debug” you + tell you more
- time: poll set the time to 6-7:30pm on Thu - starting Jan 8
- location: Social Sciences I-135 (iMac computer lab)

#### Assignments and Course Grade:

- four “home work” problem sets; due 1 or 2 weeks later (40%)
- mid-term exam on Feb 12 (20%)
- final exam on Mar 18 (Wed, 4-7) (30%)
- in-course participation, attendance etc (10%)

## BME 110L / BIOL 181L

### Today

**Twelve “Commandments” of WWW-research:**  
~ Chp 14 in “Bioinformatics for Dummies” (B4D)

#### **Additional/Individual House Keeping:**

- sign-up sheet
- permission codes (if you couldn't enrol online)
- does everyone have a laptop? Get an anti-slide snippet!
- **can everyone access the internet?** (“DLG's time\_machine”)

#### **Technical Notes:**

- WWW-site has only gone up recently - sorry!
- Submission of homework will be via WebCT (in construction)
- **Homework is due by beginning of class on due date (if class)!**
- First homework to be assigned Jan 13, due Jan 20 (easy)
- TA office hours: Wed 10-12 + by arrangement
- **Please enrol/disenrol electronically**