

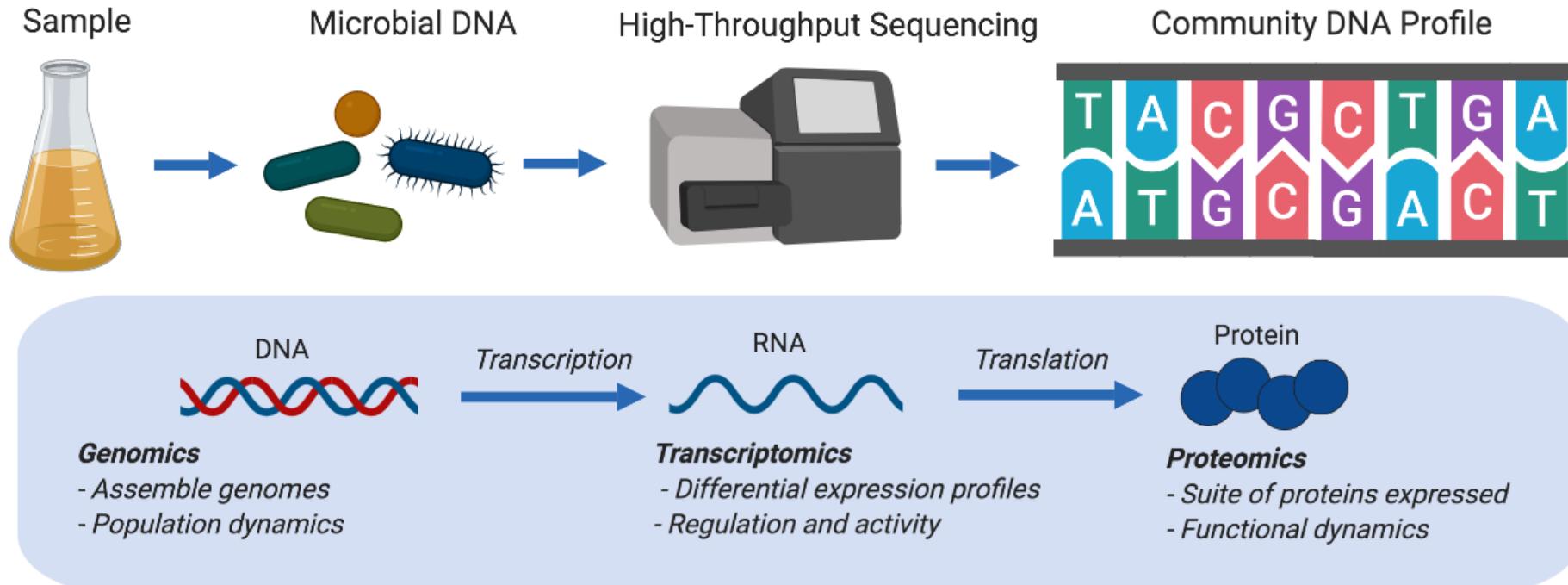
Computational Resources @ UW-Madison

Elizabeth McDaniel

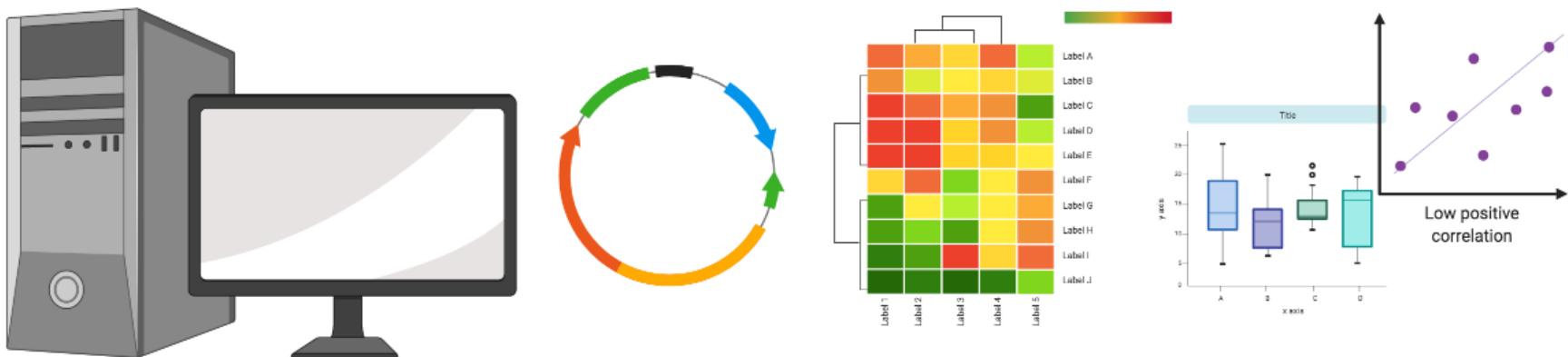
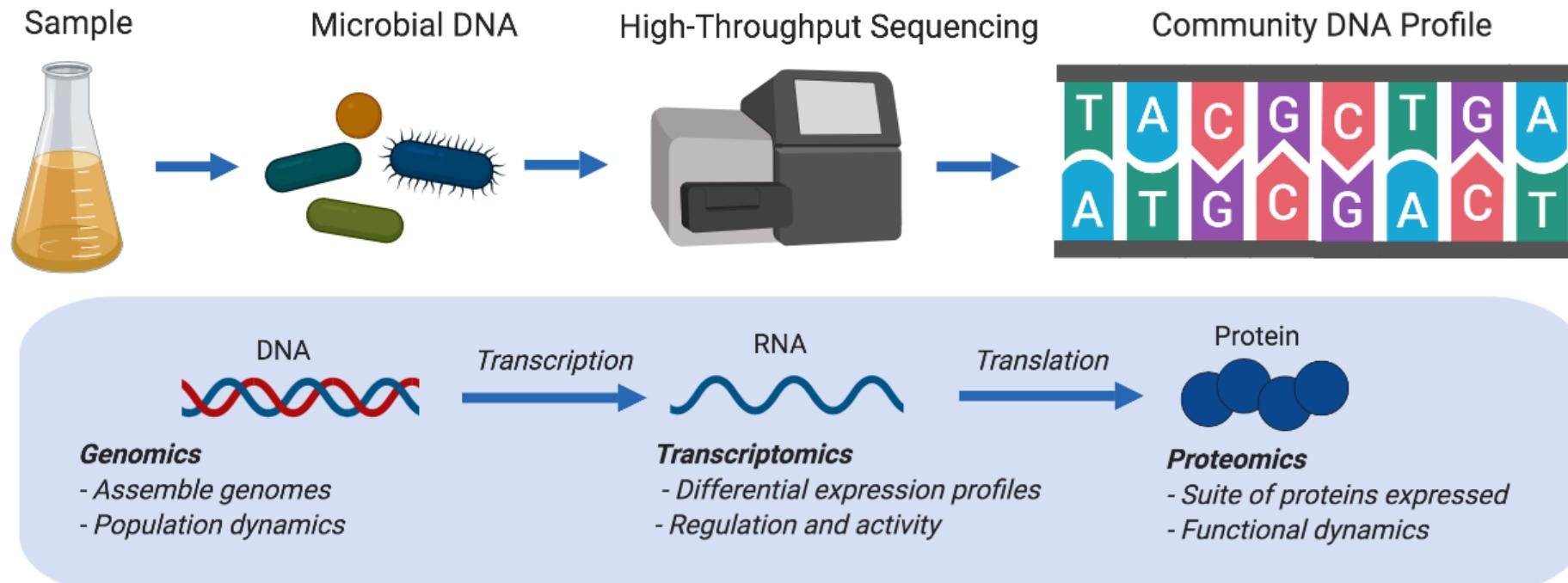
2019-08-27

MDTP Orientation

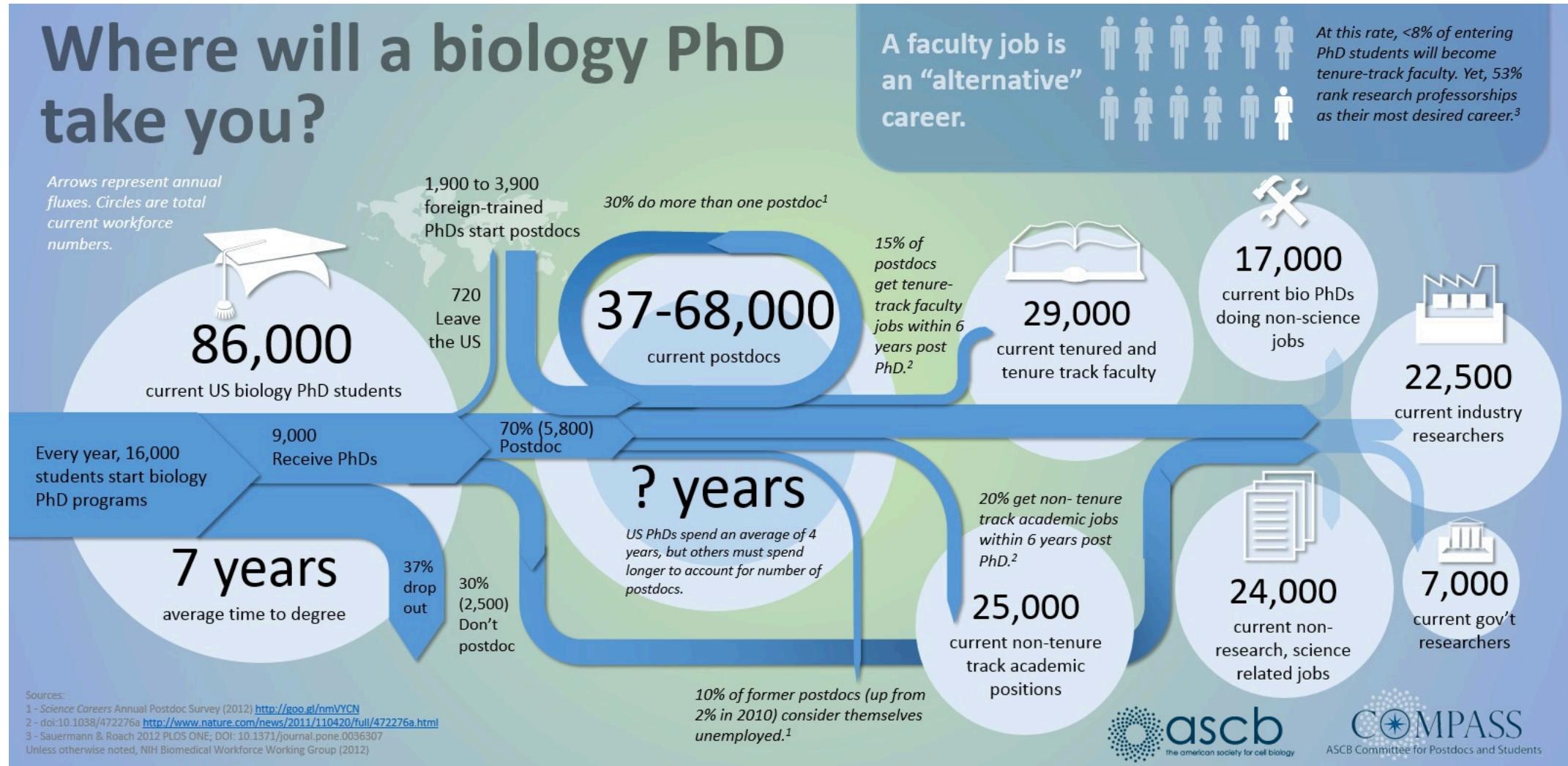
Why should I learn computational skills?



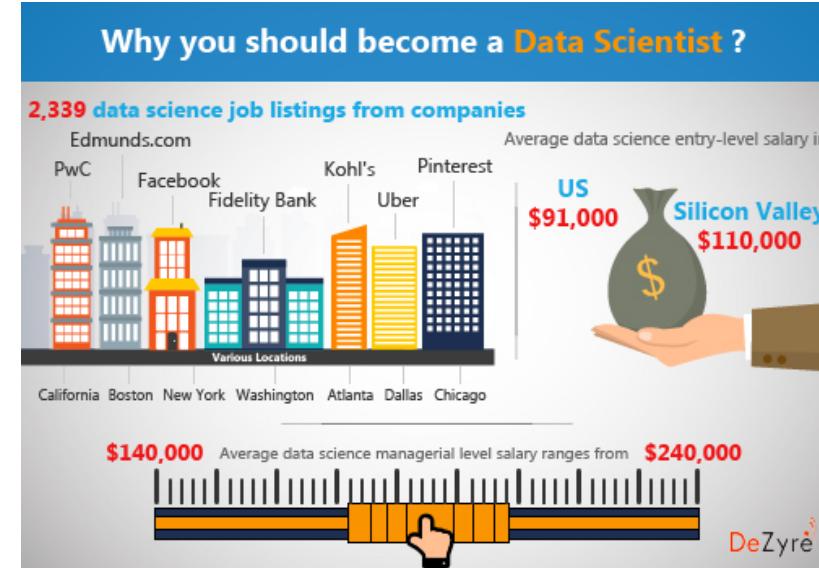
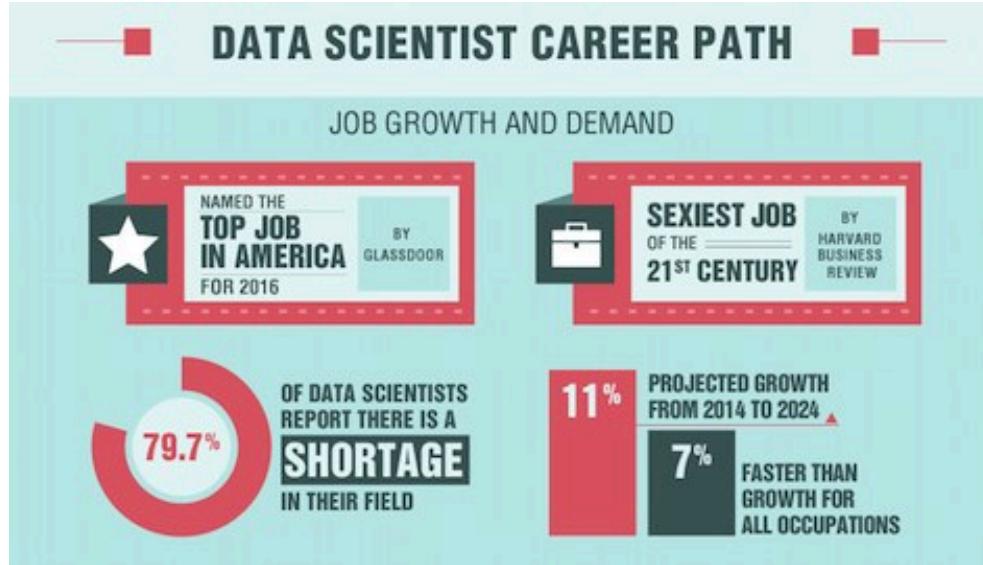
Why should I learn computational skills?



Why should I learn computational skills?



Why should I learn computational skills?



- Data science/computational skills are highly transferrable and sought after
- Era of “big-data” in personalized medicine, microbiome therapeutics, & genomics start-ups
- Government agencies rely on data analysts for public health programs & energy applications



How can I learn computational skills?

Method of Learning	Pros	Cons
Formal coursework	<ul style="list-style-type: none">Formal education on programming language	<ul style="list-style-type: none">HomeworkClasses don't address relevant skills/workflows
Programming Books	<ul style="list-style-type: none">Learn at your own pace	<ul style="list-style-type: none">\$\$\$Requires self-motivation
Online courses	<ul style="list-style-type: none">Learn at your own paceLearn in your PJs	<ul style="list-style-type: none">Sometimes \$\$\$
Locally-held workshops	<ul style="list-style-type: none">Usually free or low costGives you transferrable and useable skills immediately	<ul style="list-style-type: none">Held during certain times of the year
Study groups/communities of practice	<ul style="list-style-type: none">Discuss with others doing similar work how to perform common analyses	<ul style="list-style-type: none">Not a formal class with learning objectives
Campus Core Services/Libraries/Hubs	<ul style="list-style-type: none">Weekly office hours for specific helpMake connections to other campus resources	<ul style="list-style-type: none">Sometimes consultation requires \$\$\$

Formal Coursework @ UW-Madison

- **MICROBIO 657:** Bioinformatics for Microbiologists
 - Spring Semester, Garret Suen (possibly not offered in 2020)
- **STATS 679:** Computing Tools for Data Analytics
 - Fall Semester, Cecil Ane
- **BMI 541:** Introduction to Biostatistics
- **BMI 576:** Introduction to Bioinformatics
- **BMI 776:** Advanced Bioinformatics
- **CS301:** Introduction to Data Programming

Programming/Bioinformatics Books



HADDOCK • DUNN

Powerful Object-oriented Python Programming
5th EDITION
Updated for 3.5 and 2.7

Learning

Python



O'REILLY®

Copyrighted Material

Mark Lutz



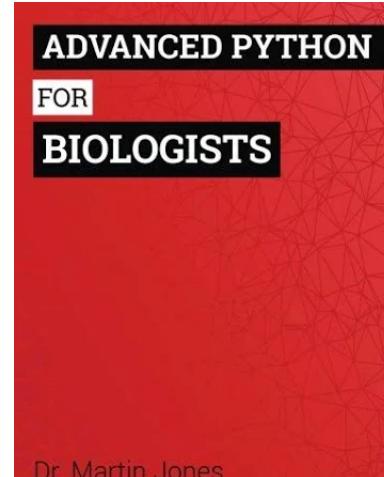
O'REILLY®



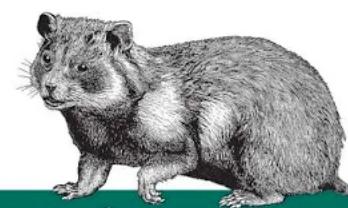
R for Data Science

IMPORT, TIDY, TRANSFORM, VISUALIZE, AND MODEL DATA

Hadley Wickham &
Garrett Grolemund



O'REILLY®



Bioinformatics Data Skills

REPRODUCIBLE AND ROBUST RESEARCH WITH OPEN SOURCE TOOLS

Vince Buffalo

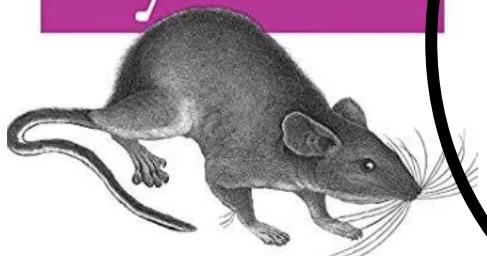
Programming/Bioinformatics Books



HADDOCK • DUNN

Powerful Object-Oriented Python Programming
5th EDITION
Updated for 3.5 and 2.7

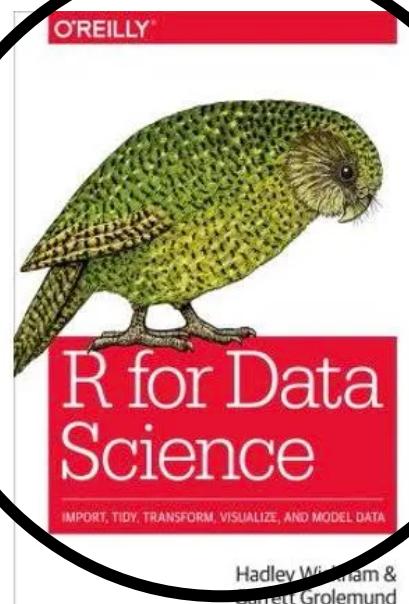
Learning
Python



O'REILLY®

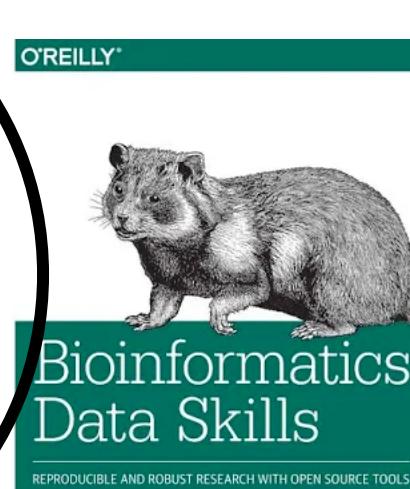
Copyrighted Material

Mark Lutz



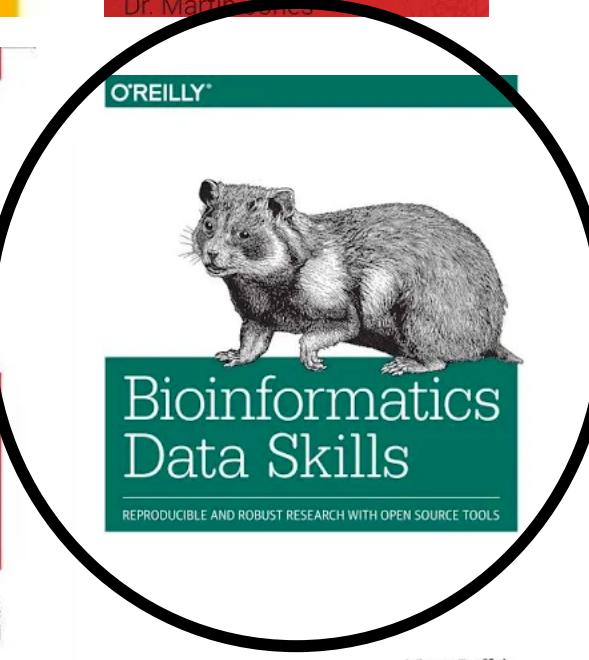
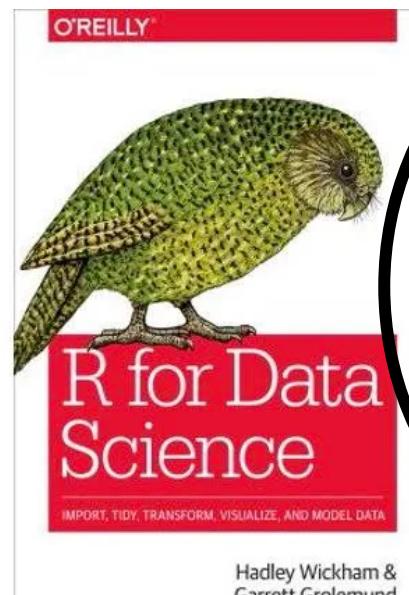
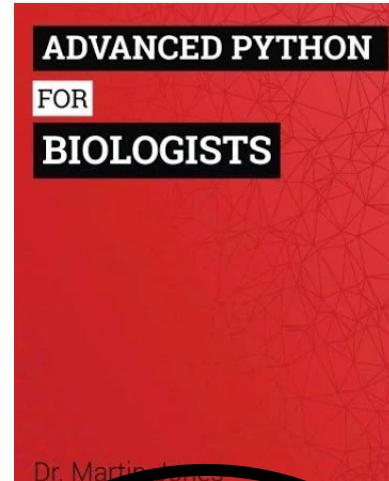
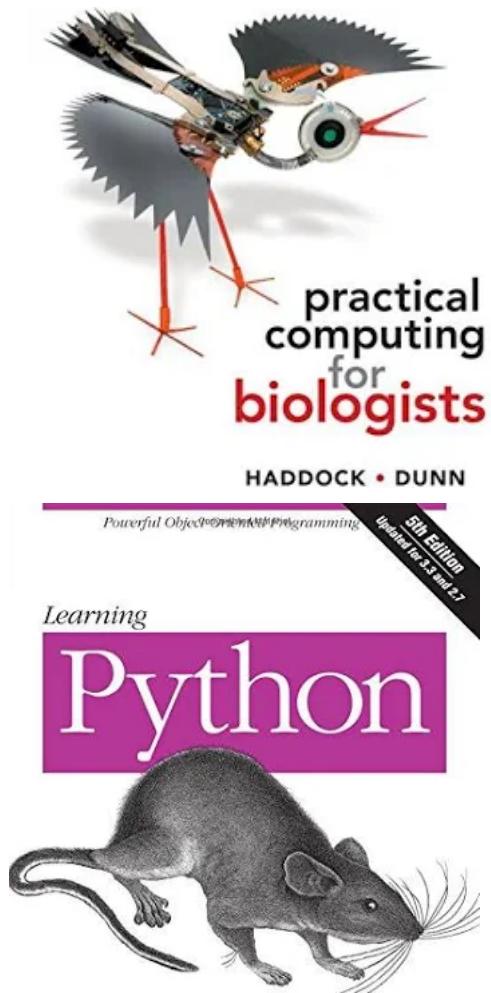
O'REILLY®

Hadley Wickham &
Garrett Grolemund



Vince Buffalo

Programming/Bioinformatics Books



Online Courses



Khan Academy



coursera

Google

- Range of coursework from basic programming in R/python
- Official courses from Harvard/MIT offered on edX in machine learning concepts/advanced bioinformatics
- If all else fails; Google it

The Carpentries



software carpentry



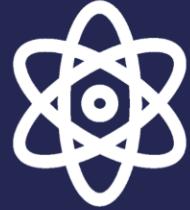
One Organization
with an
international
community of
volunteers



that develop
lessons, train
instructors +
organize
workshops



in **data**
management and
software
development
best practices



For and by
researchers
across disciplines

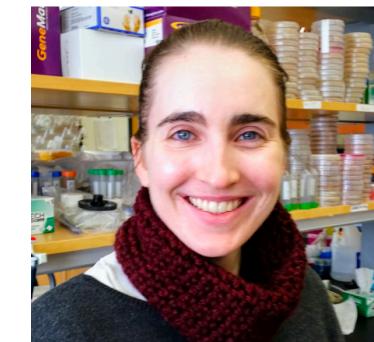
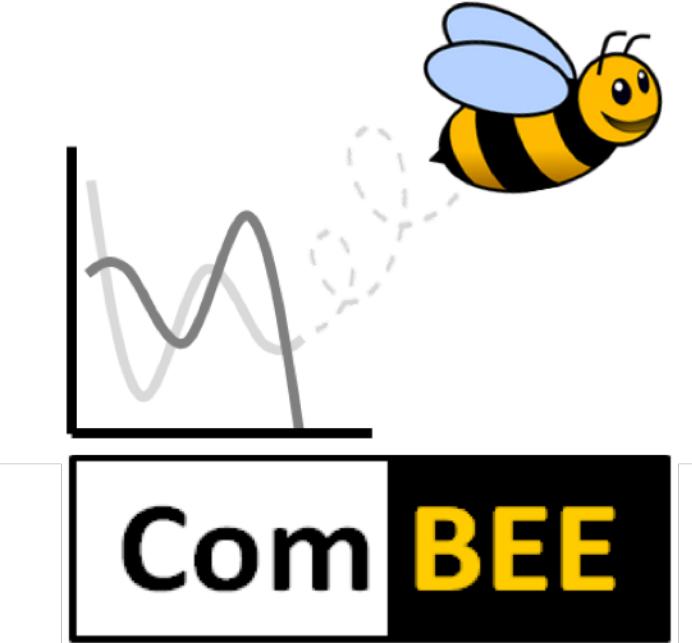
Carpentry Workshops on Campus



- Workshops focused on teaching reproducible computational practices
- Data Carpentry: Project organization skills, SQL, R
- Software Carpentry: Unix shell, Python, and version control (git)]
- Large community of local instructors
- R workshops will be held weekly during Fall semester starting September 11th
- Both carpentries workshops usually held in January over winter break
- For updates about registration and other computation/data science events on campus: join-dshubcommunity@lists.wisc.edu

ComBEE

- Computational Biology, Ecology & Evolution
- Community of practice, student organized group to provide support for researchers applying computational tools to their research in ecology/evolution
- Monthly seminars on computational biology/theoretical ecology/evolution
- Weekly study groups on ‘omics related topics
- **Social gathering on Sept. 6th @ 4PM in MSB 6201**
- join-combee@lists.wisc.edu
- <https://combee-uw-madison.github.io>



Kirsten Gotting – Currie Lab
(Genetics Program)
Elizabeth McDaniel –
McMahon Lab (MDTP)

Quantitative Biology Initiative

Quantitative Biology Initiative

at the University of Wisconsin–Madison

- Initiative to bring together quantitative biology on campus
- Holds weekly seminars: <https://wid.wisc.edu/seminars/qbio/>
- Minor in Quant Bio: <https://qbi.wisc.edu/education/phd-minor/>
- <https://qbi.wisc.edu/>

Steenbock Libraries Workshop Series

- R workshop series and an Open Coding Lab (coding office hours/hacky hour) during the Fall semester
- R workshop series covering R basics, data wrangling, visualization
- Expanded R workshops for researchers
- Hosted in the Biocommons in Steenbock
- <https://github.com/maglet/uw-r-workshops>



Tobin Magle

tobin.magle@wisc.edu

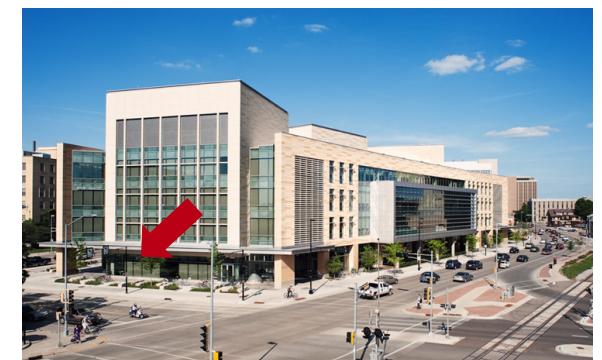
Research Data Services Facilitator
Steenbock Libraries

Data Science Hub

- First stop for all data science related questions
- Hosts carpentries and data science training workshops
- Building a data science community and facilitating interdisciplinary collaborations
- <http://datascience.wisc.edu>
- Find out about events, workshops, professional development trainings, how to get involved by joining the Data Science Hub listserv: join-dshubcommunity@lists.wisc.edu



Sarah Stevens
Data Science Facilitator
facilitator@datascience.wisc.edu



Microbiome Hub

MADISON

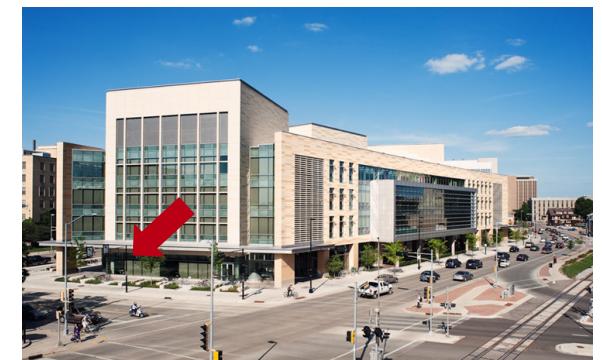


Hub

- Services and consultation concerning:
 - Experimental design
 - Data analysis
 - Coordinating collaborative research
 - Data management
- Developing workshops, teaching modules, seminar series and conferences
- Conducting outreach activities
- <https://microbiome.wisc.edu>



Sailendharan Sudakaran
Manager
madmicrobiome@wid.wisc.edu
@madmicrobiome



Biotech Center Workshops

- Biotech center on campus offers Bioinformatics workshops (usually costs \$\$\$)
- Workshops include:
 - Linux Basics for NGS Data Analysis
 - Intro to NGS Data Analysis
 - 16S Amplicon Sequencing Processing & Analysis
 - RNAseq Analysis
 - Single-cell RNA-seq
 - ChIPseq
- <http://www.biotech.wisc.edu/services/brc/workshop>

Center for High Throughput Computing (CHTC)

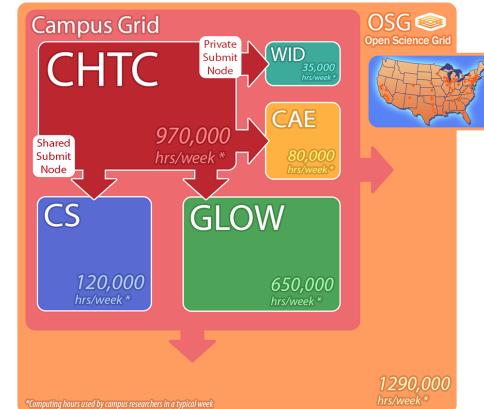
- Free, campus resource
- Scale up your computational research from your laptop
- Can run more analyses in parallel and larger jobs using their resources
- Facilitators who can help you get started – weekly office hours
- <https://chtc.cs.wisc.edu>



Lauren Michael
Research Computing Facilitator
lmichael@wisc.edu



Christina Koch
Research Computing Facilitator
ckoch5@wisc.edu



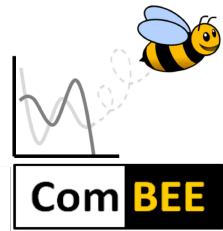
Questions?



Elizabeth McDaniel

McMahon Lab – main office space in Engineering hall

emcdaniel@wisc.edu



Fliers with computational resources, ComBEE monthly seminar schedule for the Fall semester

ComBEE Social on September 6th @ 4PM in MSB 6201!