CEITEC

Central European Institute of Technology

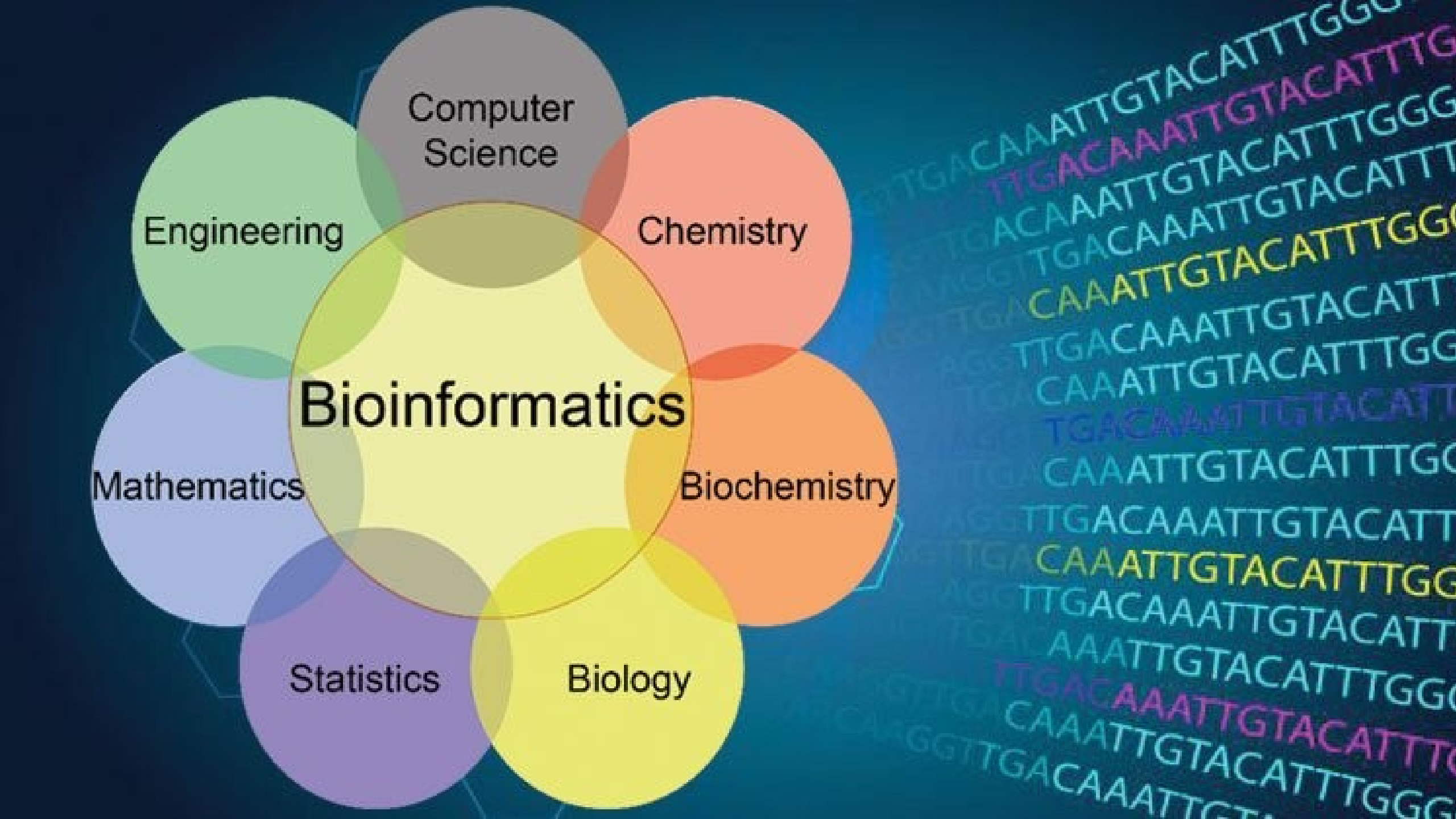
BRNO | CZECH REPUBLIC

Introduction to Bioinformatics (LF:DSIB01)

Week 1 : Introduction to the course

Introductions

Let’s take 1 minute to introduce ourselves, our name, our background
the main project we work on, and our motivation for taking this class


Computer Science
Engineering
Chemistry
Bioinformatics
Mathematics
Biochemistry
Statistics
Biology

What is Bioinformatics?

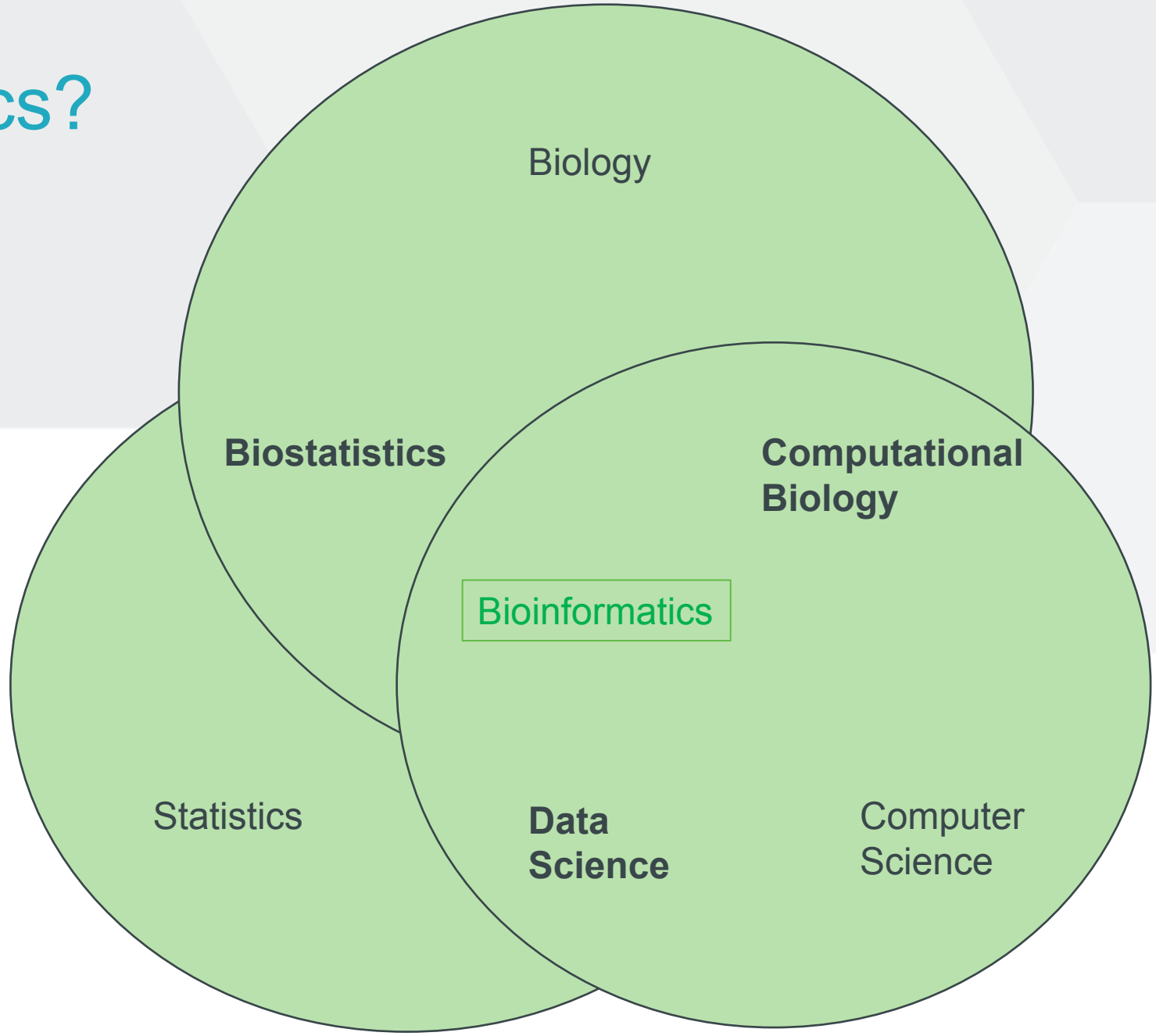
A science that uses Computational and Statistical tools in order to address Biological questions.

Key Skills

Scientific Rigor
Engineering Mentality
Collaborative Spirit
Interdisciplinary Understanding
Simplification and Presentation

Key Pitfalls

Hacker Mentality
Bad Code > Reproducibility
Uninterpretable Models
Jargon and Gatekeeping
Losing track of goal: Biology



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Goals of this course

Someone finishing this course should:

a) Have a basic understanding of the theory and practice of Bioinformatic Research

b) Be able to practically function in a Bioinformatics research group setting or other collaborative setting

c) Be able to produce and present analysis results

Syllabus / week

Week	Date	Material	
Week 1	17-Sep-21	Introduction to the course	
Week 2	24-Sep-21	Intro to Molecular Biology / Genomics	Organizing data, Git
Week 3	1-Oct-21	Exploring the human genome	Sequence Databases, Preprocessing NGS data
Week 4	8-Oct-21	Sequence Alignment	NGS data Alignment, Peak Calling
Week 5	15-Oct-21	Sequence (over)Representation	Motif Finding Tools
-	22-Oct-21	Week Off	
-	29-Oct-21	Week Off	
Week 6	5-Nov-21	Evaluation Metrics and Data Visualization	
Week 7	12-Nov-21	ML techniques I (log regresion, SVM)	
Week 8	19-Nov-21	ML techniques II (decision trees, random forest)	
Week 9	16-Nov-21	ML techniques III (ANN, perceptrons)	
Week 10	3-Dec-21	ML techniques IV (CNN) + Advances	
-	10-Dec-21	Wrap up	
-	17-Dec-21 (?)	**Colloquium**	

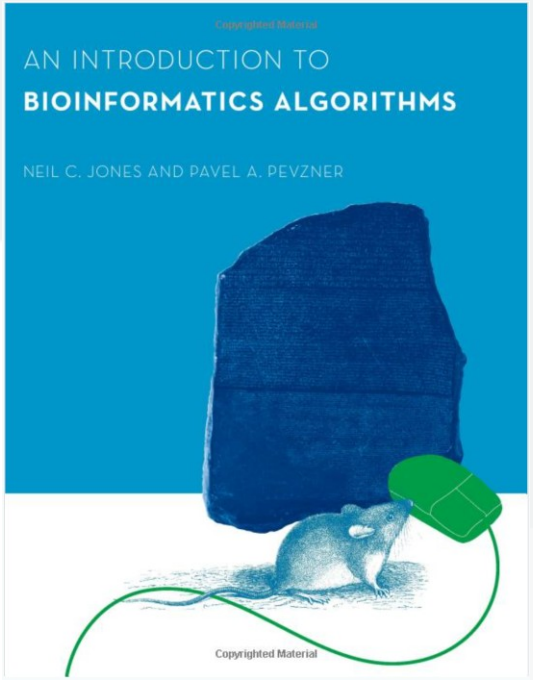
Resources / Tools

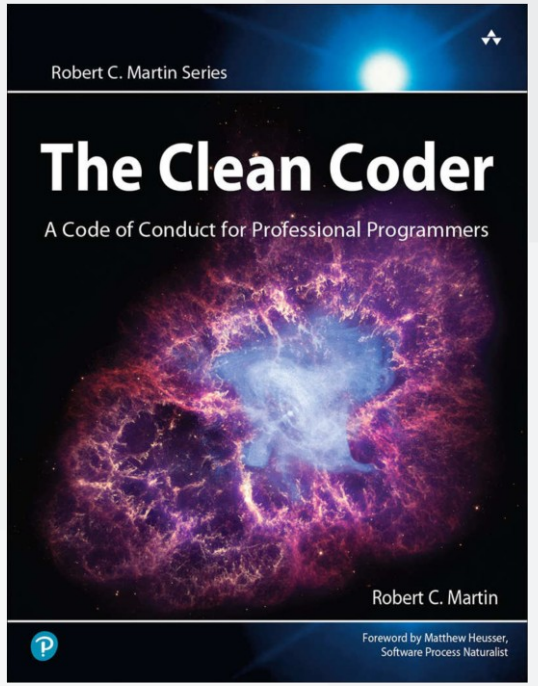
Tools

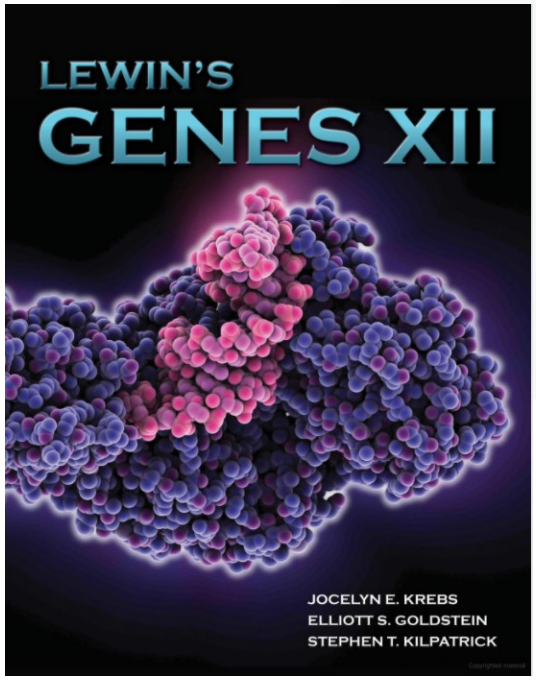
- Python
- Github
- Google Colaboratory
- Jupyter Notebook

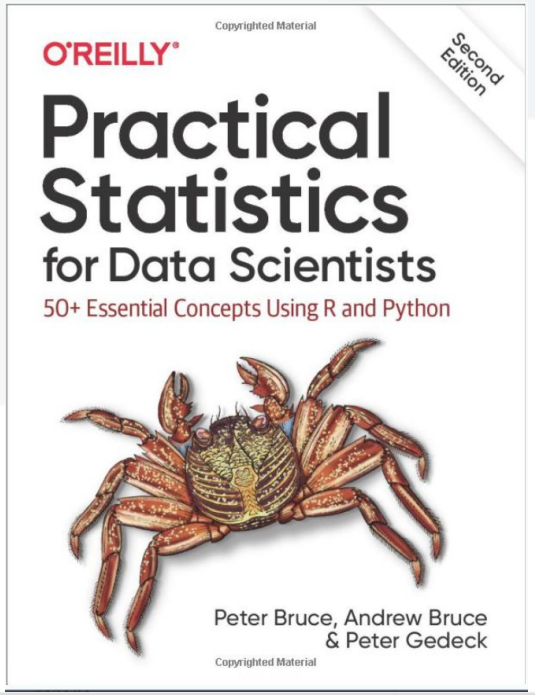
Resources

https://www.kaggle.com/learn/overview
https://wiki.python.org/moin/BeginnersGuide/NonProgrammers
https://wiki.python.org/moin/BeginnersGuide/Programmers
https://guides.github.com/activities/hello-world/
https://research.google.com/colaboratory/faq.html
https://www.dataquest.io/blog/jupyter-notebook-tutorial/
http://www.biostathandbook.com/index.html









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Evaluation

Ongoing project through the semester

Small task after each practical – can be finished at home

Colloquium: discussion of questions, results etc

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For any questions, comments etc

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