Computational Genetics BMI 559/659
Fall Term 2014
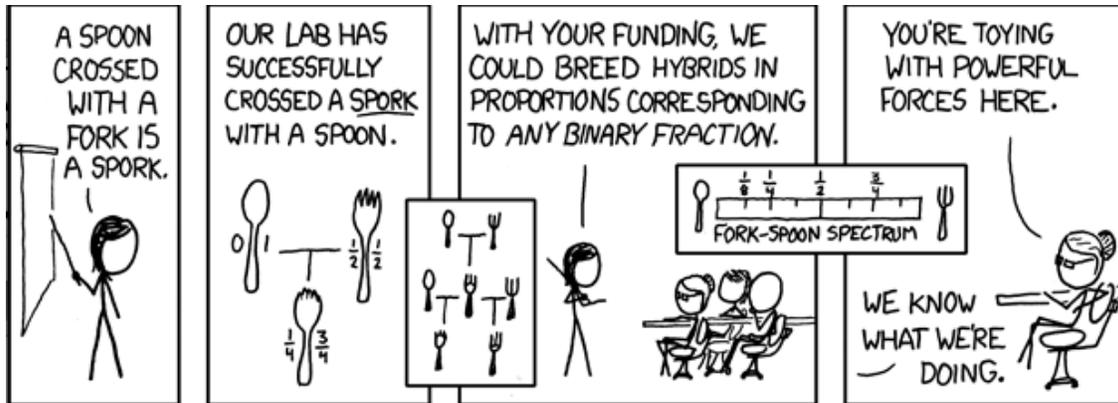

Image from xkcd.com (http://xkcd.com/419/)

Credits: 3.0
Offering: On campus – Fall
Prerequisites: Acceptance into the DMICE graduate program, BMI550 and BMI551 or permission of the instructor.

COURSE INSTRUCTOR:

Shannon K. McWeeney, Ph.D., Professor, Division of Biostatistics,
Department of Public Health & Preventive Medicine,
Head, Division of Bioinformatics and Computational Biology, Department of
Medical Informatics and Clinical Epidemiology
Phone: (503) 494-8347
E-mail: mcweeney@ohsu.edu
Office hours: By appointment

TEXTBOOK
Required: Human Molecular Genetics, Fourth Edition
Authors: Tom Strachan and Andrew Read
ISBN-10: 0815341490 | ISBN-13: 978-0815341499
Publisher: Garland Science; 4th edition
Non-Required Additional Texts for Reference:
Bioinformatics for Geneticists: A Bioinformatics Primer for the Analysis of Genetic Data
Author: Michael R Barnes; Wiley; 2 edition

Journal articles will also be assigned in class each week.

COURSE MEETING DAY AND TIME:
Tuesdays 10:30-11:55am BICC 124
Fridays 1:00-2:25pm BICC 124

COURSE DESCRIPTION:
This course is designed for students with a mathematical/computational background needing an in depth discussion of the genetic concepts underlying current experimental methods. Emphasis will be given to the genomic level techniques, data representations and the integration of the data types with the biology. Prior molecular biology or genetic knowledge is not needed or assumed. The foundation and principles of molecular genetics and population genetics will be presented in the context of data intensive techniques used to study genetic problems. The course will also address challenges that are faced in computational genetics by the need for standardization of data capture and communication, organization of easily accessible repositories, and algorithms for integrated analysis based on heterogeneous sources of information.

Lectures will include the following topics:
- Scientific Communication, DNA Structure & Function
- Genetic Variation
- OMICS Technology for Analyzing Structure & Expression: Batch effects
- Non-coding RNAs and RNA editing
- Epigenetics and Imprinting; Methylation
- Heritability & Quantitative Genetics
- Linkage, LD and Imputation
- GWAS
- QTL and e-QTL; Causal Inference
- CNV and LOH
- Pharmacogenetics

METHODS OF EVALUATION:
Grades are assigned based on the following criteria:
A: 94-100%
A-: 90-93.9%
B+ 87-89.9%
B: 84-86.9%
B-: 80-83.9%
C+: 77-79.9%
C: 74-76.9%
C-: 70-73.9%
D+: 67-69.9%
D: 64-66.9%
D-: 60-63.9%
F: Below 60%
Grades will be based on: Scientific Writing / Summaries 25%; Final Project 30%; Class Participation 25%; Homework Assignments 20%

Graduate Studies in the OHSU School of Medicine is committed to providing grades to students in a timely manner. Course instructors will provide students with information in writing at the beginning of each course that describes the grading policies and procedures including but not limited to evaluation criteria, expected time needed to grade individual

student examinations and type of feedback they will provide.

Class grades are due to the Registrar by the Friday following the week of finals. However, on those occasions when a grade has not been submitted by the deadline, the following procedure shall be followed:

1) The Department[1] /Program Coordinator[2] will immediately contact the Instructor requesting the missing grade, with a copy to the Program Director and Registrar.
2) If the grade is still overdue by the end of next week, the Department[1] /Program Coordinator[2] will email the Department Chair directly, with a copy to the Instructor and Program Director requesting resolution of the missing grade.
3) If, after an additional week the grade is still outstanding, the student or Department[1] /Program Coordinator[2] may petition the Office of Graduate students for final resolution.

   1   *For courses that are run by a specific department.*
   2   *For the conjoined courses (course number is preceded by CON_ that are run by Graduate Studies.*

COPYRIGHT INFORMATION:
Every reasonable effort has been made to protect the copyright requirements of materials used in this course. Class participants are warned not to copy, audio, or videotape in violation of copyright laws. Journal articles will be kept on reserve at the library or online for student access. Copyright law does allow for making one personal copy of each article from the original article. This limit also applies to electronic sources.

To comply with the fair use fair use doctrine of the US copyright law, Sakai course sites close three weeks after grades are posted with the Registrar. Please be sure to download all course material you wish to keep before this time as you will have no further access to your courses.

SYLLABUS CHANGES AND RETENTION:
This syllabus is not to be considered a contract between the student and the School of Medicine. It is recognized that changes may be made as the need arises. Students are responsible for keeping a copy of the course syllabus for their records.

STUDENT ACCESS:
OHSU is committed to providing equal access to qualified students with disabilities. Student Access determines and facilitates reasonable accommodations, including academic adjustments and auxiliary aids, for students with documented disabilities. A qualified student with a disability is a person who meets the academic and technical standards requisite to admission or participation in a particular program of study. As defined by the Americans with Disability Act (ADA), a person with a disability has a physical or mental impairment that substantially limits one or more major life activities of the individual. This may include, but is not limited to, physical conditions, chronic health issues, sensory impairments, mental health conditions, learning disabilities and ADHD. Student Access works with students with disabilities from all of OHSU's educational programs and at each campus.

Each school has an assigned Program Accommodation Liaison (PAL), who acts as an

"in-house" resource for students and faculty concerning access issues for students with disabilities. The PAL works in collaboration with Student Access to implement recommended accommodations for students with disabilities.

It is recommended that you contact Student Access to consult about possible accommodations if you a) received disability accommodations in the past, b) begin experiencing academic difficulties, and/or c) are given a new diagnosis from your healthcare provider.

Learn more about Student Access:
Phone: 503 494-0082
Email: studentaccess@ohsu.edu
Website: www.ohsu.edu/student-access

ACADEMIC HONESTY:
Course participants are expected to maintain academic honesty in their course work. Participants should refrain from seeking past published solutions to any assignments. Literature and resources (including Internet resources) employed in fulfilling assignments must be cited. See http://www.ohsu.edu/xd/education/library/research-assistance/plagiarism.cfm?WT_rank=1# for information on code of conduct for OHSU and
http://www.ohsu.edu/xd/education/teaching-and-learning-center/for-students/index.cfm for more information on citing sources and recognizing plagiarism.

In an effort to uphold the principles and practice of academic honesty, faculty members at OHSU may use originality checking systems such as Turnitin to compare a student's submitted work against multiple sources.

To protect student privacy in this process, it will be necessary to remove all personal information, i.e. student name, email address, student u-number, or any other personal information, from documents BEFORE submission.

USE OF SAKAI:
This course will have an online component, which can be accessed through Sakai, OHSU's online course management system. For any technical questions or if you need help logging in, please contact the Sakai Help Desk.

Hours: Sakai Help Desk is available Mon – Fri, 8 am – 10 pm and weekends and holidays 12 pm – 5 pm
Contact Information:
(Toll-free) 877-972-5249
(Web) http://atech.ohsu.edu/help
(Email) sakai@ohsu.edu

INCLEMENT WEATHER POLICY:
When the weather forecaster is calling for ice or snow, call the OHSU Alert Line,

503 494-9021, for information regarding weather conditions that may affect operations at OHSU. This hot line will offer specific recorded messages for road conditions on OHSU's Marquam Hill and West campuses (option 1), and for patients (option 2), students (option 3) and employees (option 4). If extreme weather conditions present potentially unsafe situations, the provost of the university may choose to delay or cancel classes, or alter office and research activities. If classes are canceled or delayed, residents and students who have patient care responsibilities must meet those obligations.
For more information, please view the website
http://www.ohsu.edu/xd/about/visiting/weather/index.cfm or call the above hotline.

DMICE COMMUNICATION POLICY
1. If the syllabus directs the student to contact the TA before contacting the instructor, the student should do so. Otherwise, the student should contact the instructor and allow 2 business days (not including weekends) for a response.
2. If the student does not receive a response from the instructor within 2 business days, s/he should contact the TA (if there is one). When contacting the TA s/he should cc the instructor and Diane Doctor at doctord@ohsu.edu.
3. If a student does not receive a response from the TA within 1 business day (not including weekends), s/he should contact Diane Doctor at doctord@ohsu.edu and cc the instructor and the TA.
4. If Diane does not reply within 1 business day (not including weekends), the student should contact Andrea Ilg at ilgan@ohsu.edu.
5. Students having difficulties with Sakai should contact the Sakai Help Desk at sakai@ohsu.edu or at (877) 972-5249. Sakai help is available M-F from 8am to 10-pm and weekends from Noon to 5pm. Do not contact the instructor.