

# NEUROGENETICS

FALL 2017

Tu and Th, 12:05-12:55 PM, 1441 Genetics/Biotech Center

## LEARNING GOALS

Obtain basic understanding of key concepts; acquire public presentation skills; practice critical evaluation of experimental data.

### DATE                      LECTURE/TOPIC

Sep 7 (Th)      1.      Course Introduction

#### Introduction to Genetics

Sep 12 (Tu)      2.      Mendelian Inheritance  
Sep 14 (Th)      3.      Human Pedigree Analysis  
Sep 19 (Tu)      4.      Quantitative Genetics I  
Sep 21 (Th)      5.      Quantitative Genetics II

#### Introduction to Neuroscience

Sep 26 (Tu)      6.      Structure and Function of the Nervous System (I)  
Sep 28 (Th)      7.      Structure and Function of the Nervous System (II)

Oct 3 (Tu)      8.      **Exam I (in class)**

#### Genetic Analysis of Neurodevelopment in Drosophila

Oct 5 (Th)      9.      CRISPER-based genome editing  
Oct 10 (Tu)      10.      CRISPER-based genome editing in Drosophila

#### Genetic Analysis of Traumatic Brain Injury in Drosophila

Oct 12 (Th)      11.      Genetic Screen in Drosophila  
Oct 17 (Tu)      12.      Genetic Screen in Drosophila to understand traumatic brain injury

#### Genetic Analysis of Age-Dependent Retinal Pathologies in Mouse

Oct 19 (Th)      13.      Mapping of Risk Alleles  
Oct 24 (Tu)      14.      Mapping of Modifiers

#### Genetic Models of Neurodevelopmental Disorders

Oct 26 (Th)      15.      Using Knockout Mice to Model Rett Syndrome  
Oct 31 (Tu)      16.      Using Conditional Knockout Mice to Study Cell Type Specific Contribution to Rett Syndrome

Nov 2 (Th)      17.      **Exam II**

#### Tools for Identifying Genetic Variants underlying Neurological Diseases in Human

- Nov 7 (Tu) 18. Genome-wide association studies (array-based)  
Nov 9 (Th) 19. Genome-wide association studies (sequencing-based)

#### In-class Preparation of Student Presentation

- Nov 14 (Tu) 20 Students will be divided into sub-groups. Each group will be assigned one  
Nov 16 (Th) 21 research paper for presentation. Students will work together and consult  
Nov 21 (Tu) 22 with course director to prepare their presentation in these 3 classes.

#### Student Presentation of Primary Research Papers

- Nov 28 (Tu) 23. TBA  
Nov 30 (Th) 24. TBA  
Dec 5 (Tu) 25. TBA  
Dec 7 (Th) 26. TBA  
Dec 12 (Tu) 27 TBA

#### **PREREQUISITE**

Either one college-level Genetics course or one college-level Neuroscience course

#### **COURSE WEBSITE**

Students can access this syllabus, lecture slides, reading assignments, exam grades and other related materials at the learn@UW course website.

#### **TEXTS**

**Griffiths, Wessler, Carroll, Doebley** (2015) *Introduction to Genetic Analysis, 11th Edition*. WH Freeman and Co. (Recommended)

**Bear, Connors, Paradiso** (2015) *Neuroscience-Exploring the Brain, 4<sup>th</sup> Edition*. Wolters Kluwer (Recommended)

The books listed above are on reserve at campus libraries.

Additional reading assignment will include a mixture of primary research papers and general news and views. For examples, please see the representative list below.

#### **REPRESENTATIVE LIST OF READINGS:**

1. The failure of the genome. (2011) The Guardian.
2. Gene drives spread their wings. (2015) Science.
3. Identification of spinal circuits transmitting and gating mechanical pain. (2014) Cell.
4. A CRISPR-Cas9 gene drive system targeting female reproduction in the malaria mosquito vector *Anopheles gambiae*. (2015) Nature Biotechnology.

#### **EXAMS**

Two in-class exams

#### **COURSE DIRECTOR**

Prof. Qiang Chang. Rm 657, Waisman Center, 1500 Highland Avenue. Tel: 262-9416. E-mail: [qchang@waisman.wisc.edu](mailto:qchang@waisman.wisc.edu); Office hours: Mo 4-5 pm or by appointment

## **GRADING**

20% of the class grade is based on classroom participation. Participation grading will follow the guideline (<https://kb.wisc.edu/images/group120/24561/GuidelinesforEvaluatingParticipation.pdf>). 60% of the class grade is based on performance in the two in-class exam (30% each). 20% of the class grade is based on performance in research paper presentation.

Letter grade is assigned as follows: A=85-100%, AB=80-85%, B=65-80%, BC=60-65%, C=50-60%, D=40-50%, F=0-40%.