

# Principles of Genetic Analysis II

## MGY315H

### Winter 2018

### Course Outline

University of Toronto  
Department of Molecular Genetics  
Molecular Genetics and Microbiology Program (MGY)  
MSB Teaching labs #3379 & #3280

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Late policy: 10% will be deducted per day up to 2 days late. Reports more than 2 days late will receive a mark of zero.

# **Yeast Genetics 2018**

## **Yeast section**

### **Dr Charlie Boone**

Dept of Molecular Genetics

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Phone: 416-946-7260

## Yeast Lab Table of Contents

PART I : **BACKGROUND READING**..... Error! Bookmark not defined.

- A. ***Saccharomyces cerevisiae* – Leading Edge of Molecular Genetics**.... Error! Bookmark not defined.
- B. **Yeast Life Cycle and its Application to Genetics** ..... Error! Bookmark not defined.
- C. **Establishing Genetic Networks: Synthetic Genetic Analysis (SGA)** . Error! Bookmark not defined.
- D. **Elucidation of a Genetic Pathway in *S. cerevisiae*** ..... Error! Bookmark not defined.
- E. **The Basics of Meiotic Linkage Analysis** ..... Error! Bookmark not defined.
- F. **Episomes vs. Integrants: Foundational Concepts in Yeast Genetic Transformation [Read prior to Yeast Labs 5-6]** ..... Error! Bookmark not defined.

PART II : **YEAST LABS**..... Error! Bookmark not defined.

- A. **YEAST LAB 1: Read Background A-B.** ..... Error! Bookmark not defined.
- B. **YEAST LAB 2: Read Background A-D.** ..... Error! Bookmark not defined.
- C. **YEAST LAB 3: Read Background D.**..... Error! Bookmark not defined.
- D. **YEAST LAB 4: Read Background E-F.**..... Error! Bookmark not defined.
- E. **YEAST LAB 6: Read Background C.** ..... Error! Bookmark not defined.

PART III : **LAB REPORT OUTLINES**..... Error! Bookmark not defined.

- A. **Yeast Lab Report 1: Genetics of the yeast mating pathway. *Worth 10%*** .....Error! Bookmark not defined.  
*Combine data from Yeast Exps 1 (Yeast Life Cycle and its Application to Genetics), Exp 3 (Yeast sex change) and Exp 4 (Yeast mating pathway)*..... Error! Bookmark not defined.
- B. **Yeast Lab report 2. Meiotic Segregation Analysis**..... Error! Bookmark not defined.
- C. **Yeast Lab Report 3. Yeast transformation. *NB In-lab report (one per group)*.**.....Error! Bookmark not defined.
- D. **Yeast Lab report 4. Establishing Genetic Networks: Synthetic Genetic Analysis (SGA)** ..... Error! Bookmark not defined.

PART IV : **APPENDIX**..... Error! Bookmark not defined.

## MGY315 Winter 2018 Yeast Genetics Section

### Experimental Schedule

#### **YEAST LAB 1: Jan 4, 2018**

- Exp1. Genetic Analysis of Mating: Start
- Exp2. Start SGA: Mate MATa G418<sup>R</sup> array cells with MATx NAT<sup>R</sup> query strains.
- Exp3. Quick yeast transformation (making mutants and changing mating types)

#### **YEAST LAB 2: Jan 11, 2018**

- Exp1. Genetic Analysis of Mating: Finish (score plates)
- Exp2. SGA--lab tech has replica plated to select for diploids. Students will replica plate diploids onto sporulation (Spo) medium. **Grow 23° C.**
- Exp3. Mating type switching --Each group will get 5 ml of each liquid culture in YEP+Raff and induce HO endonuclease with galactose and then plate to mating type testers and controls.
- Exp4. Mating type pathway--Start

#### **YEAST LAB 3: Jan 18, 2018**

- Exp2. SGA--look for spores under the microscope. Replica plate or patch to haploid selection plates (haploid selection #1). Grow 30°C
- Exp3. Score mating type tester plates.
- Exp4. Finish mating type pathway--score plates

#### **YEAST LAB 4: Jan 25, 2018**

*Combined lab report on yeast mating for Expts 1, 3 and 4 due (worth 10%)*

- Exp2. SGA--Replica plate (or patch) to haploid mutant selection #2; grow 30°C
- Exp5. Meiotic segregation analysis--START and FINISH. *A group lab report will be due in 2 weeks (one report per group).*

#### **YEAST LAB 5: Feb 1, 2018**

- Exp2. SGA--replica plate for double mutant selection (YPD+G418+NAT).
- Exp 6. Yeast genetic elements lab (high efficiency yeast transformation).

#### **YEAST LAB 6: Feb 8, 2018**

*Exp5 meiotic segregation analysis, group lab report due today (worth 5%).*

- Exp2. SGA-score results.
- Exp6. Score results for high efficiency yeast transformation. *Group in-lab report for will be done today in lab (worth 5%; include your pre-lab predictions)! (5% value)*

#### **FLY LAB 1: Feb15, 2018** *Individual SGA lab reports due (5% value).*

*Next week is study week--no fly lab this week. Have a good break!*

**Last day to drop S courses: Mar 14, 2017**

# **Drosophila Genetics 2018**

## **Drosophila section**

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**MGY315 Winter 2018 Drosophila Genetics Section  
Experiments Schedule**

**Fly Lab I (Feb. 15, 2018)**

Experiment 1, Part 1: Examining wild-type *Drosophila melanogaster*  
Experiment 3, Part 1: Setting up Recombination Mapping Cross I  
Experiment 4, Part 1: Setting up Unknown Mutant Cross 1

**FLY QUIZ I: Due at the end of class (1 mark)**

**READING WEEK (Feb. 20-23, 2018)**

**Fly Lab II (Mar. 1, 2018)**

Experiment 4, Part 2: Turning Unknown Mutant Cross 1  
Experiment 2: Polytene Chromosome Lab

**FLY QUIZ II: Due at the end of class (2 marks)**

**\*\*\*\*Collecting flies for Unknown Mutant crosses (Mar. 6-9, 7:30-9:30 am)**

Experiment 4, Part 3: Collecting Unknown Mutant Progeny [TUES-FRI]

**Fly Lab III (Mar. 8, 2018)**

Experiment 1, Part 2: Examining single mutant flies  
Experiment 3, Part 2a: Setting up Recombination Mapping Cross 2  
Experiment 3, Part 2b: Examining multiple mutant flies and F<sub>1</sub> progeny

**FLY QUIZ III: Due at the end of class (2 marks)**

**FLY WORKSHEET I: Due on Mar. 15 (5 marks)**

**\*\*\*\*Collecting flies for Unknown Mutant crosses (Mar. 12-15, 7:30-9:30 am)**

Experiment 4, Part 4a: Collecting Unknown Mutant Progeny [MON-THURS]

**Fly Lab IV (Mar. 15, 2018)**

Experiment 4, Part 4b: Setting up Unknown Mutant Cross 2  
Experiment 4, Part 4c: Examining Unknown Mutant flies and F<sub>1</sub> Progeny

**FLY WORKSHEET II: Due on Mar. 22 (5 marks)**

**Fly Lab V (Mar. 22, 2018)**

Experiment 3, Part 3: Scoring F<sub>2</sub> Progeny from Recombination Mapping Crosses

**FLY LAB REPORT I: Formal Lab Report Due on Mar. 29 (7.5 marks)**

**Fly Lab VI (Mar. 29, 2018)**

Experiment 4, Part 5: Scoring F<sub>2</sub> Progeny from Unknown Mutant Crosses

**WORKSHEET: Answers will be posted on Blackboard by TAs**

**FLY LAB REPORT II: Formal Lab Report Due on Apr. 3 (7.5 marks)**

**Final Exam (date to be determined)**

Eukaryotic Genetics Section (Yeast and Flies – 30% of total mark)