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

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Yeast Lab Table of Contents

PART I  : BACKGROUND READING.............................................

A.  Saccharomyces cerevisiae – Leading Edge of Molecular Genetics ....

B.  Yeast Life Cycle and its Application to Genetics ........

C.  Establishing Genetic Networks: Synthetic Genetic Analysis (SGA).

D.  Elucidation of a Genetic Pathway in S. cerevisiae ....

E.  The Basics of Meiotic Linkage Analysis ..............

F.  Episomes vs. Integrants: Foundational Concepts in Yeast Genetic Transformation [Read prior to Yeast Labs 5-6]

PART II  : YEAST LABS.........................................................

A.  YEAST LAB 1: Read Background A-B.

B.  YEAST LAB 2: Read Background A-D.

C.  YEAST LAB 3: Read Background D.

D.  YEAST LAB 4: Read Background E-F.

E.  YEAST LAB 6: Read Background C.

PART III  : LAB REPORT OUTLINES......................................

A.  Yeast Lab Report 1: Genetics of the yeast mating pathway.  Worth 10% ....

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).......

B.  Yeast Lab report 2. Meiotic Segregation Analysis ......

C.  Yeast Lab Report 3. Yeast transformation. NB In-lab report (one per group)......

D.  Yeast Lab report 4. Establishing Genetic Networks: Synthetic Genetic Analysis (SGA)........

PART IV  : APPENDIX..............................................................
MGY315H Course Outline

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\(^R\) array cells with MATx NAT\(^R\) 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\(^\circ\) 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\(^\circ\) C
- Exp4. Finish mating type pathway--score plates

YEAST LAB 4: Jan 25, 2018
\textit{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\(^\circ\) C
- Exp5. Meiotic segregation analysis--START and FINISH. \textit{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).

YEAST LAB 6: Feb 8, 2018
\textit{Exp5 meiotic segregation analysis, group lab report due today (worth 5\%).}
- Exp2. SGA-score results.
- Exp6. Score results for high efficiency yeast transformation. \textit{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 \textit{Individual SGA lab reports due (5\% value).}

\textit{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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MGY315H Course Outline

MGY3215 2018-5
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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 F1 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 F1 Progeny
    FLY WORKSHEET II: Due on Mar. 22 (5 marks)

Fly Lab V (Mar. 22, 2018)
    Experiment 3, Part 3: Scoring F2 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 F2 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)