Biol 342.3 Fungi Environment and People

Instructor: Prof. Susan Kaminskyj, Biology room 169 (office), room 167 (lab)
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Lectures: Tuesdays/Thursdays, Biol room 124, 8:30-10:00 am
Labs: Tuesdays Biol room 307, 1:30-5:30,
Demonstrator: Amira El-Ganiny (Biol 167) Amira.Elganiny@usask.ca
Text: B. Kendrick, The Fifth Kingdom 3rd Edition
Lab manual: Electronic access through PAWS

Fungi affect many aspects of our daily lives. Mycorrhizal and septate endophyte fungi were essential for plant colonization of land, about 450 million years ago, which preceded and was necessary for colonization by animals. Single-celled fungi (yeasts) and filamentous fungi (molds) have been used by humans since antiquity, although this was not understood until much later. Every breath we take contains spores that are potential pathogens or allergens. Fungi are part of the normal microbiological community on our skins. Some fungi provide essential recycling services for dead plant material, but others are plant parasites or pathogens. As well as using fungi through biotechnology, we compete with them for food resources, and contend with them as pathogens and decay.
Fungal cells are extremely small and seldom form macroscopic communities. So, unless occurring as aggregates (for example, mushrooms) or in pure culture, they can be difficult to detect without microscopy, sterile culture, or molecular techniques. This course will consider these and other aspects of mycology and will include analysis of current literature and student-designed experiments.

The objectives of this course are:

- to provide tools for isolating and identifying fungal specimens, and to extend this by considering their possible positive or negative impacts using library and internet research.
- to compare and contrast the major growth forms, and to examine the effect of physical parameters on fungal growth
- to consider the roles of tolerance to environmental variation, and to roles of sporulation
- to study how fungi obtain nutrients, and to examine aspects of environmental perception
- to learn about fungal genetics and reproduction in widely studied model systems
- to examine the ecological importance of fungi as recyclers and mycorrhizal symbionts
- to learn about medical and agricultural impacts of pathogenic species
- to consider biotechnological applications of filamentous and single-celled species

Course evaluation

Lecture – 55% – midterm exam 15 %; final exam 40 %. The final exam is comprehensive.
Self-study topic (SST) presentation: 20 minute powerpoint presentation of an aspect already covered in class, based on information from literature 10 %
Laboratory – 35% – Report A (mushroom description) – 5 %
Report B (mushroom identification) 10 %
Report C (mold isolation, identification, enzyme) 10 %
Report D (*Aspergillus* genetics) 10 %

This course will follow the University of Saskatchewan Academic Honesty standards which are described in detail at http://www.usask.ca/university_secretary/honesty/

Week	Date	Lecture topic	Text chapter	Lab Topic	
1	3-Sep	Intro course structure and organization. Labs: materials, lab manual; topic presentations	1		
2	8-Sep	Overview of macrofungi in the field -- holobasidiomceyes: gills, teeth and pores; ascomycetes	1	Mushroom description lab; start wine fermentation	
	10-Sep	How to collect and identify fungi using field guides; collection and data collection; what you should bring	Lab manual appendix		
	12-Sep	Field trip		Emma Lake (meet 830am at Biology)	
3	15-Sep	Holobasidiomycetes	2	Identifying field-collected fungi; rack wine to secondary	
	17-Sep	Eukmycota: zygomycota, Dikaryomycota as a group	3		**Mushroom description rep't A (5%)**
4	22-Sep	Basidiomycotina	4	Isolate fungi from natural substrates and set up moist chambers; mushroom kit	
	24-Sep	Ascomycotina	4		
5	29-Sep	Asexual ascomycetes and yeasts	7	Single isolate cultures	**Mushroom ID rep't B (10%)**
	1-Oct	Spore dispersal: air, water, ballistics, bugs	8		
6	6-Oct	Fungal lifecycle 1 - spore germination and hyphal growth	9	Identify cultures	
	8-Oct	Fungal lifecycle 2 - substrate penetration; sporulation	11		
7	13-Oct	**Midterm, to end of Oct 8th**		Identify cultures part 2; Enzyme assay setup; stabilize wine	**Midterm (15%)**
	15-Oct	Fungal ecology -- recycling dead plant material	11		**Self-study topic (SST) presentation (10%)**
8	20-Oct	Fungal plant pathology	12	Enzyme assay analysis	2 SSTs
	22-Oct	Animal predators; animal mutualists	16		
9	27-Oct	Mycorrhizae	17	Clean cleistos and spread spores for outcross study; Bottle wine	**Mold ID / enzyme rep't C (10%);** 2 SSTs
	29-Oct	Plant symbionts	literature		

10	3-Nov	Animal symbionts	16	Grid master plates for ascospore analysis	2 SSTs
	5-Nov	Fungi as food -- mushrooms, truffles, quorn	18		
11	10-Nov	Fungi in food -- bread, cheese, miso	19	Nutritional phenotype plates	3 SSTs
	12-Nov	Specialty chemicals -- drugs, citrate			
12	17-Nov	Food and agricultural spoilage	20	Nutritional phenotype plates	3 SSTs
	19-Nov	Fungi in houses			
13	24-Nov	Mycotoxins -- aflatoxin, satratoxin, lysergic acid	21	Analysis of outcross; class results; inheritance in haploid organisms	3 SSTs
	26-Nov	Medical mycology	23		
14	1-Dec	Review		Pot luck and presentations	**Genetics rep't D (10%)** 3 SSTs
	tba	**Final Exam**			**40%**