

# Biology 342 Fungi, Environment & People Syllabus

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## Lecture Instructor

Nicole Kearns

## Email

[Nicole.kearns@usask.ca](mailto:Nicole.kearns@usask.ca)

## Room

Biology 123

## Time

8:30 am - 9:20 am MWF

## Lab

### Laboratory

### Demonstrator

Jacey Bell

## Email

[jacey.bell@usask.ca](mailto:jacey.bell@usask.ca)

Teaching Assistant

Dan Wiens

## Room

Biology 307

## Time

1:30 pm - 5:20 pm

Tuesday

## Course Overview

Often overlooked due to their small size, or wrongly considered to be 'lower plants', fungi are more closely related to animals. They have major impacts on the environment, human health, agriculture, and biotechnology. We examine fungal diversity, cell biology and development, reproductive and genetic strategies, symbioses, and biotechnology applications in this diverse and successful group.

## Course Introduction

Biology 342 Fungi, Environment and People will extend the basic survey of fungi provided in Biology 121 and consider their relationships with their environment, including other organisms. Fungi affect many aspects of our daily lives. Mycorrhizal fungi were essential for land colonization by plants (~450 million years ago), which was necessary for colonization by animals. Yeasts and filamentous fungi have been used by humans since antiquity, although the details were not understood until much later. The air we breathe contains spores that are potential pathogens or allergens. Fungi are part of the normal microbiological community living on our skins. Some fungi are symbionts with plants or animals, some fungi provide essential recycling services, and other fungi are parasites or pathogens. In all, people compete with fungi for food resources, contend with them as pathogens and agents of decay, and exploit them in applied mycology. Fungal cells are small and many do not form macroscopic communities. So, unless occurring as aggregates (for example mushrooms) or in pure culture, they can be difficult to detect without microscopy. Biology 342 will consider these and other aspects of fungi, their relationships with the environment, and their relationship with people.

## Instructor Profile

I work as a plant ecologist and a sessional lecturer. My background is in northern plant ecology and I work doing rare plant surveys throughout the prairie provinces in Canada. I hold a masters degree from the U of S in Northern Plant Ecology supervised by Dr. Jill F. Johnstone. My experience with fungi started in my undergraduate studies at the U of S when I worked in Dr. Yangdou Wei's Plant Pathology lab as a summer student. I later completed my undergraduate thesis in molecular plant pathology under Dr. Wei's supervision. I am fascinated by the interactions between fungi and the environment and how fungi affect us on a day-to-day basis. At home, I have a one year old daughter and I love to spend time with my family including our two dogs and cat. We love to cook, make our own sourdough bread and my husband also enjoys making homemade beer.

## Reference Texts (not required)

The Fifth Kingdom, *Bryce Kendrick*

The Biology of Plants, *Peter Raven*

### Office Hours

Since I work off campus, if you would like to meet to discuss the course material please email me to schedule a meeting. I will be available after class for questions and will be able to meet in room 144. Please do not hesitate to contact me by email. I will respond as soon as possible, but please be aware that I may not respond during business hours.

### Prerequisite(s): BIOL 120 and 121

### Course Outcomes

This course will consider fungal growth and reproduction, the ecological roles of fungi, the economic roles of fungi, fungi in medicine, and applied mycology. Successful completion of Biology 342 will also provide you with practice in techniques for isolating, identifying, and examining filamentous fungi. We will compare and contrast how fungi contribute to ecological stability, and how they explore and exploit the environment for their own needs. By the end of the course, you should be able to:

- Define and discuss cellular and genetic characteristics of fungi and fungus-like organisms.
- Classify the major groups of true fungi, with examples of key taxa.
- Compare modes of fungal growth and nutrition, of reproduction, and of genetic exchange.
- Describe fungal ecological relationships with plants and animals.
- Describe and explain how fungi are used in medicine (e.g. penicillin, chaga, etc.).
- Describe and explain how fungi play a role in the economy (i.e. crop yields, food production and storage, etc.)
- Describe and explain how fungi are used in traditional and modern biotechnology.
- Describe and explain how fungi are used in bioremediation

### Course Schedule

Week	Lecture	Topics	Laboratory
Jan 4 – 6	Welcome & Module 1 Characteristics of Fungi	Morphology, lifecycles, feeding types.	No Lab
Jan 9 – 13	Module 1	4 Phyla	Lab 1
Jan 16-20	Module 1/2 Ecology	Decomposers, nutrient cycling and the nitrogen cycle, symbiotic relationships	Lab 2
Jan 23-27	Module 2 Ecology	Carbon sequestration, climate change	No Lab - Project Outline due
Jan 30-Feb 3	Module 3 Economics	Products, nutritional properties, food/food processing, food spoilage	Lab 3

<b>Week</b>	<b>Lecture</b>	<b>Topics</b>	<b>Laboratory</b>
Feb 6-10	Module 3 Economics	mushroom gathering, traditional use, plant pathology	Lab 4
Feb 13-17	<b>Review and Midterm</b>		<b>Midterm</b>
Feb 20-24	----- <b>Break</b> -----		
Feb 27-Mar 3	Module 3/4 Medicine	Pests *Guest Lecture: Dr. Jill Thomson (Plant Pathology), Poisonous fungi, hallucinogenic mushrooms	Lab 5
Mar 6-10	Module 4 Medicine	Health benefits of fungi *Guest Lecture: Nina Savinoe (Herbalist), Toxins, allergens, pharmaceuticals, medical mycology	Lab 6
Mar 13-17	Module 4/5 Applied Mycology	Restoration, biocontrol, bioremediation	No Lab – Project Paper Due
Mar 20-24	Module 5 Applied Mycology	Ecoforestry, fungicides	Presentations
Mar 27-31	Module 6 Growing Fungi	Inoculation methods, cultivation, gardening	Presentations
Apr 3-5	Review		No Lab

### **Course Evaluation**

<b>Grading Scheme</b>	<b>Date</b>	<b>% of Final Grade</b>
Midterm Exam	February 14, 2017	15
Final Exam	TBD	35
Project Paper	March 14, 2017	10
Presentation	March 21 and 28, 2017	10
Laboratory	-	30
Total		100%

## Evaluation Components

### 1) Midterm Exam

**Value:** 15% of final grade

**Date:** February 14, 2017 at 1:30 pm (during the Laboratory time)

**Length:** 2 hours (100 marks)

**Type:** Lecture material ONLY

**Description:** Exam format will include fill in the blank, short answer, multiple choice, diagrams, and long answer.

**Please note:** Students have 3 business days following a missed midterm to contact Nicole Kearns regarding an alternative arrangement.

### 2) Final Exam

**Value:** 35% of final grade

**Date:** Final examinations may be scheduled at any time during the examination period (April 6 to April 29, 2017); students should therefore avoid making prior travel, employment, or other commitments for this period. If a student is unable to write an exam through no fault of his or her own for medical or other valid documentation must be provided and an opportunity to write the missed exam may be given. Students are encouraged to review all examination policies and procedures: <http://students.usask.ca/academics/exams.php>

**Length:** 3 hours

**Type:** Comprehensive; Lecture material ONLY

**Description:** Exam format will include fill in the blank, short answer, multiple choice, diagrams, and long answer.

### Project and Presentation

**Type:** Project Paper and Presentation on a topic of your choice

**Description:** Identify a topic related to some aspect of fungi, their environmental interactions with animals or people, or biotechnology. A list of sample topics and useful resources will be provided. You will need to choose a topic and presentation date within the first two weeks of term and submit a Project Outline for review by January 24, 2017. Conduct library and internet research to inform yourself about the key issues related to your topic, including how people and the environment are affected. Create a well-rounded and informed viewpoint of key issues including how people and/or the environment are affected. If possible, propose a strategy for exploiting or mitigating the impact.

### 3) Paper (Report)

**Value** 10% of final grade

**Paper Due Date:** March 14, 2017

Project Outline (a.k.a. Storyboarding) must be submitted for approval by **January 24, 2017** including a PowerPoint presentation outlining your topic and key issues. This outline will form as the storyboard for your paper and the backbone of your presentation.

Paper should be written in Word, size 10 font, Times New Roman, 1.0 spacing, APA style bibliography, 5 pages not including figures and bibliography.

### 4) Presentations on either March 21 or March 28, 2017

**Value:** 10% of final grade

**Date:** Presentations will be on Tuesday afternoons during the lab session either March 21 or 28, 2017

Present your ideas as a 15 min PowerPoint seminar. A copy of your PowerPoint will be archived on Blackboard for class files; these presentations will not be recorded. Presentations will be peer-reviewed. There will be two short written answer questions on the final exam related to the selfstudy presentations from other students in the class. Students cannot write about their own topic.

## Laboratory

**Value:** 30% of final grade

**Type:** Biological drawings, formal lab reports, and participation.

**Description:** Students are expected to attend each of the scheduled laboratory periods. **5% of your final grade** will be awarded based on laboratory participation, including attendance and completion of all laboratory exercises. Biological drawings will be graded based on representation, correct labels, accuracy, and neatness. Although laboratory exercises may be performed in pairs or groups, formal lab reports must be written individually. Reports will be marked based on content, format, style, and references; a rubric will be provided to students prior to the assignment of reports.

Lab 1 (Jan. 10): Introduction to sterile technique & microscopy, Microfungi I, start enzyme activity experiment

Lab 2 (Jan. 17): Microfungi II, – 4 %, **drawings due same day**

Lab 3 (Jan. 31): Macrofungi identification – 4 %, **drawings due same day**

Lab 4 (Feb. 7): Lichens, slime molds, & complete enzyme activity experiment – **10%, report due Feb. 24, 2017**

Lab 5 (Feb. 28): Plant pathogens – 7 %, **report due Mar. 7, 2017**

Lab 6 (Mar. 7): Fungi and food

## Submitting Assignments

All assignments are due by the end of the day (midnight Central Standard Time). Assignments are to be submitted on Blackboard.

## Late Assignments

Late assignments are excepted if permission is granted by the Instructor PRIOR to the due date.

There is a 10% per day penalty for late assignments.

Late assignments will not be accepted after the last day of class (April 5, 2017)

## University of Saskatchewan Grading System (for undergraduate courses)

**Exceptional (90-100)** A superior performance with consistent evidence of

- a comprehensive, incisive grasp of the subject matter;
- an ability to make insightful critical evaluation of the material given;
- an exceptional capacity for original, creative and/or logical thinking;
- an excellent ability to organize, to analyze, to synthesize, to integrate ideas, and to express thoughts fluently.

**Excellent (80-90)** An excellent performance with strong evidence of

- a comprehensive grasp of the subject matter;

- an ability to make sound critical evaluation of the material given;
- a very good capacity for original, creative and/or logical thinking;
- an excellent ability to organize, to analyze, to synthesize, to integrate ideas, and to express thoughts fluently.

**Good (70-79)** A good performance with evidence of

- a substantial knowledge of the subject matter;
- a good understanding of the relevant issues and a good familiarity with the relevant literature and techniques;
- some capacity for original, creative and/or logical thinking;
- a good ability to organize, to analyze and to examine the subject material in a critical and constructive manner.

**Satisfactory (60-69)** A generally satisfactory and intellectually adequate performance with evidence of

- an acceptable basic grasp of the subject material;
- a fair understanding of the relevant issues;
- a general familiarity with the relevant literature and techniques;
- an ability to develop solutions to moderately difficult problems related to the subject material;
- a moderate ability to examine the material in a critical and analytical manner.

**Minimal Pass (50-59)** A barely acceptable performance with evidence of

- a familiarity with the subject material;
- some evidence that analytical skills have been developed;
- some understanding of relevant issues;
- some familiarity with the relevant literature and techniques;
- attempts to solve moderately difficult problems related to the subject material and to examine the material in a critical and analytical manner which are only partially successful.

**Failure <50** An unacceptable performance

### **Criteria That Must Be Met to Pass**

Must complete the midterm and final examination in order to pass the class.

### **Attendance Expectations**

Students are expected to attend both lectures and labs.

### **Participation**

5% participation mark for labs.

### **Recording of the Course**

Recording the course is not allowed.

### **Student Feedback**

Feedback from students is welcome and encouraged.

## **Integrity Defined (from the Office of the University Secretary)**

The University of Saskatchewan is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the Student Conduct & Appeals section of the University Secretary Website and avoid any behavior that could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence. Academic dishonesty is a serious offence and can result in suspension or expulsion from the University.

All students should read and be familiar with the Regulations on Academic Student Misconduct (<http://www.usask.ca/secretariat/student-conduct-appeals/StudentAcademicMisconduct.pdf>) as well as the Standard of Student Conduct in Non-Academic Matters and Procedures for Resolution of Complaints and Appeals (<http://www.usask.ca/secretariat/student-conduct-appeals/StudentNon-AcademicMisconduct.pdf>)

For more information on what academic integrity means for students see the Student Conduct & Appeals section of the University Secretary Website at: <http://www.usask.ca/secretariat/student-conduct-appeals/forms/IntegrityDefined.pdf>

## **Examinations with Disability Services for Students (DSS)**

Students who have disabilities (learning, medical, physical, or mental health) are strongly encouraged to register with Disability Services for Students (DSS) if they have not already done so. Students who suspect they may have disabilities should contact DSS for advice and referrals. In order to access DSS programs and supports, students must follow DSS policy and procedures. For more information, check <http://students.usask.ca/health/centres/disability-services-for-students.php>, or contact DSS at 966-7273 or [dss@usask.ca](mailto:dss@usask.ca).

Students registered with DSS may request alternative arrangements for mid-term and final examinations. Students must arrange such accommodations through DSS by the stated deadlines. Instructors shall provide the examinations for students who are being accommodated by the deadlines established by DSS.

## **Student Supports**

### **Student Learning Services**

Student Learning Services (SLS) offers assistance to U of S undergrad and graduate students. For information on specific services, please see the SLS web site <https://www.usask.ca/ulc/>.

### **Student and Enrolment Services Division**

The Student and Enrolment Services Division (SESD) focuses on providing developmental and support services and programs to students and the university community. For more information, see the SESD web site <http://www.usask.ca/sesd/>.

## **Treaty Acknowledgement**

As we gather here today, we acknowledge we are on Treaty Six Territory and the Homeland of the Métis. We pay our respect to the First Nation and Métis ancestors of this place and reaffirm our relationship with one another.

## **Other Acknowledgements**

I would like to acknowledge Dr. Susan Kaminskyj, Dr. Jill Thomson, and Jacey Bell for their help in the creation of this course.