



**UNIVERSITY OF
CALGARY**

DEPARTMENT OF BIOLOGICAL SCIENCES
COURSE OUTLINE

1. Course: BIOLOGY 435—BIOLOGY OF FUNGI

Lecture Section(s) L01 MWF 13:00 EEEL 210 Fall 2016

Course Coordinator/Instructor: Dr. H. Addy EEEL 235C 220-8963 addy@ucalgary.ca

D2L Course site: d2l.ucalgary.ca (F2016BIOL435L01). All lab handouts, assignments, course information, extra study material, links to assigned articles and to sites of interest will be posted on this site.

Biological Sciences Department BI 186 403-220-3140 biosci@ucalgary.ca

- 2. Prerequisites: Biology 313 and 331.** A student may not register in a course unless he/she has a grade of at least C- in each prerequisite course. See section 3.5.C in the Faculty of Science section of the online Calendar. www.ucalgary.ca/pubs/calendar/current/sc-3-5.html

Antirequisite(s): Credit for both Biology 435 and 335 will not be allowed.

- 3. Grading:** The University policy on grading and related matters is described sections F.1 and F.2 of the online University Calendar. In determining the overall grade in the course the following weights will be used:

Individual Work

Learning Assessments	3%
Lab Assignments	6%
Quizzes	10%
Assignments	7%
Midterm exam (individual component)	20% (in lab on Oct. 25)
Final exam (individual component)	32% (scheduled by Registrar)

Team Work*

Quizzes	10%
In-class Assignments	5%
Lab Assignments	2%
Midterm exam (team component)	2% (in lab on Oct. 25)
Final exam (team component)	3% (scheduled by Registrar)

Each piece of work in the categories outlined above submitted by the student will be assigned a percentage score. The student's average percentage score for the various components listed above will be combined with the indicated weights to produce an overall percentage for the course, which will be used to determine the course letter grade using the conversion scale provided below. A maximum grade of D+ will result if the weighted average of the midterm and final exams is not a passing grade (>50%). A student's grade is determined by marks for both individual work and teamwork components (e.g., team quizzes and assignments). *At the end of the term, each student will evaluate the contributions of the other members of his/her team. All team members will get a "peer score", which is the sum of the points that they are granted from each teammate. The instructor will also assess the quality of feedback that each student provides to other students. These two values determine an individual's peer evaluation score, which is the multiplier for each student's total teamwork mark and determines his/her final mark for the teamwork component of the course.

Letter Grade	Overall course mark cutoff
A+	Reserved for outstanding performance
A	88%
A-	84%
B+	80%
B	76%
B-	72%
C+	68%
C	64%
C-	60%
D+	55%
D	50%
F	<50%

4. **Missed Components of Term Work:** The regulations of the Faculty of Science pertaining to this matter are found in the Faculty of Science area of the Calendar in [Section 3.6](#). It is the student's responsibility to familiarize himself/herself with these regulations. See also [Section E.3](#) of the University Calendar

5. **Scheduled out-of-class activities:** None

REGULARLY SCHEDULED CLASSES HAVE PRECEDENCE OVER ANY OUT-OF-CLASS-TIME-ACTIVITY.

6. **Course Materials:** Required "21st Century Guidebook to Fungi" (2011) by Moore, Robson and Trinci, Cambridge University Press (a copy of this book is available as a Reserve Reading in the Taylor Family Digital Library)

Optional: Stephenson SL. 2010. *The Kingdom Fungi: The Biology of Mushrooms, Molds & Lichens*. Timber Press. Portland OR.

Additional readings will be assigned for most topics; links to these articles will be provided on D2L.

Online Course Components: Some teamwork resources are provided by CATME, a system of secure web-based tools for forming teams. Additional teamwork resources are provided by ITPMetrics, a U of Calgary-based system that provides a secure web-based tool for peer evaluations. Both of these tools are free to all students and are not dependent on prior access. TopHat may be used for some in-class activities; if you do not have a cell phone or portable computing device, we will work an alternative means of participating in TopHat questions and earning any marks tied to those questions.

7. **Examination Policy:** No calculators or electronic devices are permitted for tests or examinations. Students should also read the Calendar, [Section G](#), on Examinations.

8. **Approved Mandatory and Optional Course Supplemental Fees:** There are no optional or mandatory course supplemental fees.

9. **Writing across the curriculum statement:** In this course, the quality of the student's writing on assignments will be a factor in the evaluation of those assignments. See also [Section E.2](#) of the University Calendar.

10. **Human studies statement:** If you agree, your course work may be used for research purposes. Your responses will remain anonymous and confidential. Grouped data (no individual responses) may be used in academic presentations and publications. Participation in such research is voluntary and will not influence grades in this course. Students' signed consent forms will be withheld from instructors until after final grades are submitted. More information will be provided at the time student participation is requested. See also [Section E.5](#) of the University Calendar.

ETHICS IN THE BIOLOGICAL SCIENCES

Studies in the Biological Sciences involve the use of living and dead organisms. Students taking laboratory- and field-based courses in these disciplines can expect involvement with and experimentation on such materials. Students perform dissections on dead or preserved organisms in some courses. In particular courses, students experiment on living organisms, their tissues, cells, or molecules. Sometimes field work requires students to collect a variety of living materials by many methods, including humane trapping.

All work on humans and other animals conforms to the Helsinki Declaration and to the regulations of the Canadian Council on Animal Care. The Department strives for the highest ethical standards consistent with stewardship of the environment for organisms whose use is not governed by statutory authority. Individuals contemplating taking courses or majoring in one of the fields of study offered by the Department of Biological Sciences should ensure that they have fully considered these issues before enrolling. Students are advised to discuss any concern they might have with the Undergraduate Program Director of the Department.

11. OTHER IMPORTANT INFORMATION FOR STUDENTS:

(a) **Academic Misconduct:** (cheating, plagiarism, or any other form) is a very serious offence that will be dealt with rigorously in all cases. A single offence may lead to disciplinary probation or suspension or expulsion. The Faculty of Science follows a zero tolerance policy regarding dishonesty. Please read the sections of the University Calendar under [Section K](#). Student Misconduct to inform yourself of definitions, processes and penalties

(b) **Assembly Points:** In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on [assembly points](#).

(c) **Student Accommodations:** Students needing an Accommodation because of a Disability or medical condition should contact Student Accessibility Services in accordance with the Procedure for Accommodations for Students *with Disabilities* available at http://www.ucalgary.ca/policies/files/policies/procedure-for-accommodations-for-students-with-disabilities_0.pdf.

Students needing an Accommodation in relation to their coursework or to fulfil requirements for a graduate degree, based on a Protected Ground other than Disability, should communicate this need, preferably in writing, to the Associate Head of Biological Sciences, Dr. H. Addy, by email addy@ucalgary.ca or phone 403 220-3140.

- (d) **Safewalk:** Campus Security will escort individuals day or night (<http://www.ucalgary.ca/security/safewalk/>). Call 220-5333 for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.
- (e) **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPP). As one consequence, students should identify themselves on all written work by placing their name on the front page and their ID number on each subsequent page. For more information, see also <http://www.ucalgary.ca/secretariat/privacy>.
- (f) **Student Union Information:** VP Academic Phone: 403 220-3911 Email: suvpaca@ucalgary.ca
SU Faculty Rep. Phone: 403 220-3913 Email: science1@su.ucalgary.ca, science2@su.ucalgary.ca and science3@su.ucalgary.ca;
Student Ombuds Office: 403 220-6420 Email: ombuds@ucalgary.ca; <http://ucalgary.ca/provost/students/ombuds>
- (g) **Internet and Electronic Device Information:** You can assume that in all classes that you attend, your cell phone should be turned off unless instructed otherwise. Also, communication with other individuals, via laptop computers, Blackberries or other devices connectable to the Internet is not allowed in class time unless specifically permitted by the instructor. If you violate this policy, you may be asked to leave the classroom. Repeated abuse may result in a charge of misconduct.
- (h) At the University of Calgary, feedback provided by students through the Universal Student Ratings of Instruction (USRI) survey provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses (www.ucalgary.ca/usri). Your responses make a difference - please participate in USRI Surveys.

Department Approval _____ **ORIGINAL SIGNED** _____ Date _____

B435 F16; 8/27/2015 1:48 PM

UNIVERSITY OF CALGARY—DEPARTMENT OF BIOLOGICAL SCIENCES
BIOLOGY 435—BIOLOGY OF FUNGI
COURSE SYLLABUS FALL 2016

COURSE PERSONNEL

INSTRUCTOR: Dr. Heather Addy EEEL 235C 403-220-8963 addy@ucalgary.ca

Office Hours: Thursdays 1-2 pm but I am also available at other times of the week for individual or group assistance – please just email or phone me to arrange a time to meet.

LAB TECHNICIAN: Ms. Fran Cusack EEEL 301B

TA: Ms. Jennifer Retzlaff jlcosh@ucalgary.ca

OVERVIEW OF THE COURSE:

Most people don't know much about fungi, even though fungi play such important roles in our lives and in the world around us. If we think about fungi at all, it's usually in their role as decomposers. But there is so much more to these fascinating organisms: their symbiotic associations with plants and animals, their roles as sources of foods and medicines, and the promise they hold in bioremediation and even as building materials. There's the darker side of fungi too: many of them are pathogens and some cause serious diseases in humans and other animals, such as the "white-nose syndrome" that is wiping out bat species around the world. In this course, we will explore these and other topics as we discuss the diversity of fungi, their physiology, ecology, and interactions with other organisms, including humans. In the labs, you will have an opportunity to observe the diversity of fungi, learn the fundamentals of fungal identification, and investigate their ecological and economic roles.

COURSE LEARNING OUTCOMES:

At the end of this course, you should be able to:

1. contrast the features that distinguish fungi from plants, animals and bacteria
2. describe the phyla of fungi and their life histories
3. describe the characteristic morphology of a fungal mycelium and explain its pattern of differentiation with development
4. explain the factors responsible for the characteristic shape of a fungal mycelium, and describe how the mycelium differentiates as it develops compare and contrast the roles played by different parts of the mycelium in terms of nutrient acquisition and reproduction
5. explain the links between fungal lifestyle and reproductive biology
6. explain the ecological roles and global importance of fungi as saprotrophs, symbionts, and sources of food, antibiotics, allergens and toxins
7. work safely with fungal cultures using sterile technique
8. critically read research articles about fungi; interpret and explain figures/tables from such articles
9. work effectively as part of a team and provide constructive feedback to team members
10. communicate effectively both in writing and orally

RESPONSIBILITIES AND EXPECTATIONS:

My philosophy of teaching is that it is my responsibility to create and maintain the conditions that allow students to learn. Feedback from students is very important to me so that I will know whether such conditions exist, how well the course is going and where problems are arising. In addition to a midterm and end-of-term course evaluation, I will also be meeting weekly with **class representatives**, students who volunteer to discuss all aspects of the course with me and raise any concerns communicated to them by other students. I use a team-based learning approach in this class to provide students the opportunity to obtain and strengthen skills in working as part of a team. This approach has also been demonstrated to promote learning by giving students numerous opportunities to discuss course concepts with other students and the instructor, and to practice applying course concepts to answer questions and solve problems. As another source of support, we will also have peer mentors in this course. The **peer mentors** are students who have taken this course previously and done well in it; they will attend classes and provide guidance and help as your team works on assignments. You will meet the peer mentors in our first class.

To make our time together as effective as possible, it is important that the lecture and laboratory learning environments are ones of mutual respect. I will do whatever I can to create and maintain that environment; my expectations of student conduct are outlined below:

- **Everyone has the right to learn as well as the responsibility to not deprive others of their right to learn.** Actions such as talking during instruction/lecturing, or using laptops and other electronic devices for non-class activities can be very distracting and affect others' learning. Please monitor your own behaviour during classes and labs and restrict your use of laptops and other electronic devices to only those activities directly related to class to ensure that you do not distract others.

- Please arrive at class and your lab on time. Late arrivals and early departures can be disruptive and can result in you missing important information. I understand that there are special circumstances when you may have to arrive late or leave early; please make your arrival/departure as unobtrusive as possible and be sure to let your teammates know about your situation in advance of class.
- Please let me know right away if you are dealing with a problem or situation that is preventing you from performing at the level you want to be at in this class.
- Please treat your classmates, lab instructors, peer mentors and me with respect. There may be times when you are frustrated with something that is going on in the course and find it difficult to be patient. However, to maintain a respectful and constructive environment in this class, I ask that you are respectful of others in your words and actions.

What you can expect from the lab instructors and me:

- We will treat all students with respect and do our best to make our expectations about how to succeed in this class clear.
- We will do our best to help your learning by designing clear assignments and assessments that provide you with timely feedback.
- We will start and end classes and labs on time.
- I will be available outside of class time through office hours, appointments or email should you want to review concepts that are not clear, discuss study strategies, learn more about any topic or discuss concerns about any aspect of the course. Please note that I will aim to reply to emails within 24h, except on weekends.
- I will organize review sessions for exams and provide sample exam questions.

ACADEMIC INTEGRITY:

Each student in this course is expected to abide by the University of Calgary Code of Academic Conduct. You are encouraged to study together and to discuss information and concepts covered in lecture, labs and assigned readings with other students, **but all** individual work (including drawings) that you submit in this course for academic credit must be your own work. In the case of team assignments, all members of the team are responsible for the honesty and integrity of the document.

Academic misconduct (cheating, plagiarism, or any other form) is a very serious offence that will be dealt with rigorously in all cases. All work submitted for this class (whether as a draft or for final grading) is held to the strictest standards for intellectual honesty. A single offence may lead to a grade of zero for the assignment involved, disciplinary probation, suspension or expulsion. The Faculty of Science follows a zero tolerance policy regarding dishonesty. In addition to reading the sections of the University Calendar under "Student Misconduct", I will assume that you have read and understand the information posted on the Dept. of Biological Sciences' webpage dealing with academic honesty: <http://www.bio.ucalgary.ca/undergrad/academichonesty.html>. In particular, be sure that you understand what constitutes plagiarism—test yourself by taking the on-line quiz.

TEAM-BASED LEARNING:

In this class, we will be using a Team-Based Learning (TBL) approach. In this process, you will spend many classes working in teams applying what you've learned from the textbook and other assigned readings. Teams in TBL are different than the kind of group work you may have done in other classes: the instructor forms the teams (as described below) which work together throughout the term to complete course assignments and quizzes; team members also evaluate each other's contributions to the group throughout the term. Before your team tackles an assignment, TBL uses short tests to make sure you've got the basics from the required readings. They're not ordinary tests, though: you take the tests both individually and as a team, and you get immediate feedback, so the tests function as learning tools. I will do some lecturing but a lot of our class time will be spent on applying what we've learned. Here are the basics:

1. Prior to the first class, I will send you a link to a web-based tool (CATME) that we will use to form the teams and to do peer assessments during the term. It is important that the teams as diverse as possible, so you will be asked to answer some survey questions about your background, your major/year, problem-solving styles and other factors that will help us form successful teams. You will meet your teammates in the first class.
2. For each major unit in the course, you will be assigned some readings in the Moore et al. textbook and/or other readings or videos; I prepare a reading guide for all assigned readings/videos to help you focus on the most important points in the assigned readings. At the beginning of the unit, you will individually take a short (~10-15 questions) multiple-choice test called an "Individual Readiness Assessment Test" (**iRAT**) to see how well you've understood the concepts in the assigned reading. In calculating your final grade, I will not count your lowest individual quiz score for the term. Quizzes missed without a valid excuse (medical or family emergency) will be awarded a mark of zero. Missed quizzes may not be written at a later time.
3. Right after taking the iRAT, you will take the same test with your team. This is called a "Team Readiness Assessment Test" (**tRAT**). For the group test, you'll use a special "scratch-off" answer sheet that immediately tells you whether you have the correct answer for full marks. If your team doesn't choose the correct answer on the first try, you make a second choice for partial credit. If it takes you three tries to get the correct answer, you again earn partial credit for the item. As for the iRATs, quizzes missed without a valid excuse will be awarded a mark of zero; missed quizzes may not be written at a later time.
4. When you've finished the tRAT, your team provides written feedback as to which concepts are still unclear or for which you would like more information.

5. I'll use the individual and team scores as well as the written feedback to determine what material needs to be discussed and clarified, which is what will happen in the next class meeting. I'll also incorporate any supplemental information that you'll need to complete the in-class team assignments that involve application of what you learned in the readings; these assignments are often sample exam questions, so you will also be gaining practice in answering exam questions.

6. The other grade components in the course include:

Lab assignments involve both individual and team components. The individual components are generally brief (~1-page) written assignments, reflecting on the lab material and how it helped you understand lecture material. You should be able to integrate information from lecture and the assigned readings into your answers for these lab assignments. The team components are 1-2 conceptual questions; your team must come to consensus on its answer to these questions and will submit one team answer.

Individual learning assessments: These include two on-line learning assessments (one at the beginning of the term, and one at the end) that deal with your approach to studying and your experience of the course's learning environment.

Assignments: Feedback from students in previous terms indicates that one of the biggest challenges for students in this course is making connections among the various sources of information (the textbook, other assigned readings, lab material, lectures, etc.) The goal of these individual assignments is to help you make such connections and to see how the different topics are related to each other. Some of these assignments will be brief written assignments (e.g. 1-2 paragraphs), others will involve concept maps and other graphic summaries; details will be provided in class.

Exam questions include both multiple-choice and short-answer format (length varying from a sentence to a paragraph) and consist mainly of the same type of questions as the team assignments completed throughout the term. Exam questions will be based on lectures, assigned readings and lab material; you should be able to integrate information from the labs into your answers to lecture exam questions. The **midterm exam** will be written during your regular lab time on **Tuesday October 25** and will cover lecture and lab material to that point in the term. The final exam is cumulative and is scheduled by the Registrar. Note that both exams will include both an individual component and a team component; like the RATs, the latter will be based on multiple-choice questions.

7. At least twice during the semester (mid-way through and at the end), each of you will complete a confidential "Peer Evaluation" to assess the contribution of the other members of your team. You'll be evaluating each member on his/her participation in team activities (Did they come to class regularly? Were they prepared for the day's activity? Did they contribute productively to the team? Respect others' ideas?). You will also provide written feedback to the other members of your team. I will also assess each of you based on the quality of feedback that you provide (Are specific behaviours described clearly so that the person will know what they can adjust or change to improve their group's performance? Are content and tone constructive and helpful?). More information on the Peer Evaluation process and the rubric I will use to assess your feedback is provided on D2L. I'll take each person's composite score, convert it to a percent, and apply it to your overall mark for teamwork (tRATs and team assignments).

8. The team nature of this class requires you to be in class and to do your part as a member of your Team. Quizzes missed without a valid excuse (medical or family emergency) will be awarded a mark of zero. Missed quizzes may not be written at a later time. The nature of team assignments is such that you can't do them individually, so you can't make them up. In addition, attendance at all labs is required for this course; because we share the lab room with another course, it isn't possible to offer make up labs. If you miss a lab, an in-class quiz or assignment or the midterm exam for medical reasons, the only documentation that will be accepted in BIOL 435 is a completed **Physician/Counsellor Statement form**, which can be downloaded from: http://www.ucalgary.ca/UofC/departments/UHS/PDFs/deferred_exam_form.pdf

You must provide the completed form, signed by your physician, to me within **48 hours** from the date that you missed the lab, class or midterm.

9. **Accommodations for students with disabilities:** If you have academic accommodations from the Disability Resource Centre (DRC), please talk to me within the first two weeks of classes so that appropriate accommodations can be made. Information about the services provided by the DRC can be accessed at: <http://www.ucalgary.ca/UofC/Others/DRC/>

10. **Student Support:** The Student Success Centre's Writing Support Centre is available to assist students writing assignments and improve writing skills: <http://www.ucalgary.ca/writingsupport/>

UNIVERSITY OF CALGARY—DEPARTMENT OF BIOLOGICAL SCIENCES
 BIOLOGY 435—BIOLOGY OF FUNGI
 COURSE SYLLABUS FALL 2016

OVERVIEW OF LECTURE SCHEDULE*	
DATE (APPROXIMATE)	TOPIC
Sept. 12	Introductions and overview of course: first team meeting
Sept. 14 & 16	Introduction to fungi: What are fungi? What features differentiate them from other organisms?
Sept. 19 – 26	Unit 1. Evolution and diversity of fungi Part 1: Ancestral fungi and evolution of mycelial growth (Chytridiomycota & Zygomycota)
Sept. 28 – Oct. 14	Unit 2. Evolution and diversity of fungi Part 2: Evolution of Dikarya (Ascomycota & Basidiomycota)
Oct. 10	Thanksgiving; No classes
Oct. 17 – 21	Fungal Growth, Nutrition & Metabolism
Oct. 24	Midterm Review (in class)
Tuesday Oct. 25	Midterm Exam (in lab during regular lab time)
Oct. 26 – Nov. 4	Fungal Growth, Nutrition & Metabolism continued
Nov. 7 – Dec. 5 Nov. 7 – 21	Fungi as Symbionts. 1. Symbiosis with phototrophs: Lichens
Nov. 10 – 13	Reading Days; no classes
Nov. 23 – Dec. 5	Fungi as Symbionts continued: 2. Symbiosis with heterotrophs: fungal pathogens; medical mycology
Dec. 7, 9	Fungi and Humans; Summary

***Please see the detailed class schedule on D2L, which shows quiz dates as well as assigned readings for each quiz.**

UNIVERSITY OF CALGARY—DEPARTMENT OF BIOLOGICAL SCIENCES
 BIOLOGY 435—BIOLOGY OF FUNGI
 COURSE SYLLABUS FALL 2016

LABS: Week 1: B01/B02 Tuesdays 0900-1200/1300-1600 BI 126 (unless otherwise indicated)
 Week 2: B03/B04 Tuesdays 0900-1200/1300-1600 BI 126 (unless otherwise indicated)

LAB SCHEDULE	
DATE	TOPIC
Sept. 13	Lab 1: Team Building Exercise (meet in EDC 289 for this week only!) Lab Sections B01 & B02
Sept. 20	Lab 1: Team Building Exercise (meet in EDC 289 for this week only!) Lab Sections B03 & B04
Sept. 27	Lab 2: Introduction to fungal growth forms; Evolution & Diversity of Fungi Part 1 (Lab Sections B01 & B02)
Oct. 4	Lab 2: Introduction to fungal growth forms; Evolution & Diversity of Fungi Part 1 (Lab Sections B03 & B04)
Oct. 11	Lab 3: Evolution & Diversity of Fungi Part 2: Dikarya (Lab Sections B01 & B02)
Oct. 18	Lab 3: Evolution & Diversity of Fungi Part 2: Dikarya (Lab Sections B03 & B04)
Oct. 25	Midterm Lab & Lecture Exam (all lab sections) We will have 2 lab rooms for this date; details will be provided in class
Nov. 1	Lab 4: Dikarya continued (Lab Sections B01 & B02)
Nov. 8	Lab 4: Dikarya continued (Lab Sections B03 & B04)
Nov. 15	Lab 5: Fungal Nutrition (Lab Sections B01 & B02)
Nov. 22	Lab 5: Fungal Nutrition (Lab Sections B03 & B04)
Nov. 29	Optional lab: Mushroom cultivation
Dec. 6	Optional lab: Mushroom cultivation