

**The University of Manitoba
Faculty of Agricultural and Food Sciences**

COURSE TITLE: Pollination Biology
Course Number ENTM4320

Academic Session: Fall 2023

Credit Hours = 3

Classroom Location: CiscoWebex - UMLearn

Meeting Days and Class Hours: MWF 12h30 – 13h20

No laboratory

Course Web Page: UM Learn webpage

Instructor Information

Name: Dr. Kyle Bobiwash

Office Location: Entomology Building Room 212

Office Hours: By appointment or drop-in if available, contact me by email to book

Email Address: kyle.bobiwash@umanitoba.ca

Note that you must email from your University of Manitoba account. Normal response time will be within 48 hours.

Course Philosophy

Students' Learning Responsibilities

Students are expected to download the instructor's notes prior to the lecture. Students are expected to attend and participate in class and contribute to discussions.

Why this course is useful?

This course will examine the biology and ecology of social, semisocial and solitary insect pollinators and their ecological interactions with entomophilous plants.

Course Description/Objectives

Instructional Methods

Lectures. The course will provide the base knowledge to allow students to craft a project proposal/grant aimed at tackling a food system issue facing Indigenous peoples.

Course Objectives

Students will learn:

- The diversity of pollinating insects
- Different life strategies employed by pollinators
- Ecological and evolutionary concepts associated with pollinators and their interactions with plants

Students will gain experience on:

- Developing an NSERC graduate student grant aimed at exploring a pollinator or pollination ecology issue

Learning outcomes

At the end of this course, students will be able to:

- **Identify** broad categories of pollinators and their associated behaviours
- **Understand** the many factors driving the composition of a pollinator community
- **Develop** an understanding of important elements to consider in pollinator conservation
- **Generate** ideas and proposals that can advance our understanding of pollinators

Description of Examinations

Midterm lecture exam October 25th, 2023 - 20%

Final lecture exam (TBA – scheduled by the university) – 25%

Description of Assignments

Paper discussion -10% (lead) and 5% (participation)

Research proposal (draft due Friday, November 17, 2023, final edits end of class) – 25%

Proposal seminars Wed Nov. 20, 2023 - onwards - 15%

ENTM4320 -- Pollination Biology – Assignments

Paper discussion (10% and 5%)

Each Friday, we will read and discuss a contemporary or classical manuscript that aligns with our week's class focus or specific research interests of students. One student (or professor) will lead the discussion and it's the responsibility of fellow classmates to ensure that the discussion does not stall.

Research proposal (25%):

Students will choose a topic in consultation with the lecturer, in which the subject matter relates to current issues in pollination biology.

Grading will be based upon the ability to select important and relevant information from the **primary** literature, to interpret and synthesize any information you present, and to develop ideas and methodologies to address new questions. Grant proposals submitted after the deadline will be penalized 2% for each additional day the essay is late.

General format of the proposal:

The proposal should be approximately 5 single-spaced (8.5 x 11 inches) pages of text including tables, graphs or literature cited. Font size should be equivalent to 10 characters per inch (12 point). All margins should be 0.75 inches. In addition, each proposal should contain a one-page lay abstract summarizing the area of research you are focusing on and the methodology

you are proposing to use to enhance our knowledge. The abstract will be copied and distributed to all members of the class during the oral seminar

If possible, organize the information under various headings including "Introduction/background", "Methods" and "Conclusion" sections. The use of diagrams, tables, etc. is encouraged if it will help to clarify aspects of your essay. Figures and tables should be included only if they are referred to in the text. Figures and tables should be numbered sequentially, cited (if adapted from a source), and placed on separate pages with an appropriate title.

Tips from NSERC (don't follow their length guidelines)

https://www.nserc-crsng.gc.ca/OnlineServices-ServicesEnLigne/instructions/201/pgs-pdf_eng.asp#appinfo

Provide a detailed yet concise description of your proposed research project for the period during which you are to hold the award. Be as specific as possible. Provide background information to position your proposed research within the context of the current knowledge in the field. State the significance of the proposed research to a field or fields in NSE. State the objectives and hypothesis, and outline the experimental or theoretical approach to be taken (citing literature pertinent to the proposal) and the methods and procedures to be used.

Seminar (15%)

(Beginning November 20th, 2023):

Students will present a 10 minute seminar and discussion on their research proposal topic at a time assigned by the instructor. This will be followed by a question and discussion period of approximately 5 minutes. Prior to the seminar, copies of the research proposal abstract will be distributed to all members of the class. Students will be tested on the contents of seminars on the final exam. Students should e-mail or upload a copy of the powerpoint slides (in PDF format) to the instructor. Information on seminars presented by students will be examinable material on the final exam.

Please find below great resources to plan and prepare for your seminar:

<https://www.science.org/careers/2019/04/three-tips-giving-great-research-talk>

<https://www.nature.com/articles/d41586-018-07780-5>

<https://www.apa.org/science/about/psa/2014/02/presenting>

Letter Grade Equivalency:

A+ = >90%; A=80-89%; B+ =75-79%; B=70-74%; C+=65-69%; C=60-64%; D=50-59%; F=<50%.

Texts, Readings, Materials

Textbook(s) – Authors, Titles, Edition

None. Notes will be posted on the UM Learn Course site.

Supplementary Reading

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Course Policies

Late and Missed Assignments

Penalties for late submission of Assignments and the Final Grant Proposal are 2% per day late (weekends included). Group work presents challenges in ensuring all members contribute relatively equally throughout the term. Scenarios may arise where a portion of the project is not complete due to circumstances, this possibility should be brought to the instructor's attention prior to the submission date to determine the proper accommodations. As such, please do not wait till the last few days to ensure that all portions of the project have been assigned or completed.

Missed Exams

A missed final examination will follow the rules outlined in the University Calendar.

Academic Integrity

Students are responsible for ensuring they comply with academic integrity rules and guidelines. Check the University on-line Calendar section on Academic Integrity, including plagiarism and cheating. If in doubt, check with the instructor.

University Policies

The [Academic Calendar](http://umanitoba.ca/student/records/academiccalendar.html) <http://umanitoba.ca/student/records/academiccalendar.html> is one important source of information. View the sections *University Policies and Procedures* and *General Academic Regulations*.

Student Accessibility Services

If you are a student with a disability, please contact SAS for academic accommodation supports and services such as note-taking, interpreting, assistive technology and exam accommodations. Students who have, or think they may have, a disability (e.g. mental illness, learning, medical, hearing, injury-related, visual) are invited to contact SAS to arrange a confidential consultation. *Student Accessibility Services* <http://umanitoba.ca/student/saa/accessibility/>. 520 University Centre, 204 474 7423. Student_accessibility@umanitoba.ca

Copyright

Please respect copyright. See the University's Copyright Office website at <http://umanitoba.ca/copyright/> or contact um_copyright@umanitoba.ca.

Some Specific Potential Issues for this Course:

A literature review is an important part of this course. Students need to discuss potential plagiarism issues with the instructor to ensure that they understand the appropriate method for citation, and what constitutes plagiarism in a scientific document. Submitting a draft version that contains plagiarized material still constitutes plagiarism. If in doubt, check with an instructor!

Use of Third Party Detection and Submission Tools

Electronic detection tools may be used to screen assignments in cases of suspected plagiarism.

Group Work Policies:

Students are encouraged to work together, but must hand in their own research proposals.

Course Content**Topics to be covered:*****Key dates***

Course introduction - September 6th, 2023

Midterm – October 25, 2023

NSERC proposal day - November 1, 2023

November 8 – November 15, 2023

Kyle gives a “research talk and the students grill him” day – November 15, 2021

Start of student seminars! – November 20, 2023

Final exam review – Last week of class

Course topic outline**Week 1**

Key issues and concepts in pollination biology

Week 2

Mechanics of pollination

Week 3

Pollination syndromes and species adaptations

Week 4

Evolution of pollination and plant-pollinator interactions

Week 5

Social behaviour of insects and pollinators

Week 6

Management of pollinators

Midterm #1**End of first half of class****The second half of the course will pull from topics based on class interest and research proposals**

- Life history and biology of insect pollinators with emphasis on solitary and social bees
- Factors regulating populations of social insects
- Relationship between life history and foraging
- Semiochemicals
- Communication and foraging
- Pollinator energetics
- Rules governing foraging decisions
- Foraging theory
- Chemical and physical aspects of pollination
- Pollinator-plant interactions
- Competition among pollinators for plants
- Competition and Facilitation among plants for pollinators,
- Pollen competition
- Gene flow and pollination
- Community level interactions in pollination systems
- Pesticide pollinator interactions
- Other topics of interest based on student feedback

Student Services**Writing and Study Skills Support**

The Academic Learning Centre (ALC) offers services that may be helpful to you as you fulfill the requirements for this course. Through the ALC, you may meet with a study skills specialist to discuss concerns such as time management, reading and note-taking strategies, and test-taking strategies. You may also meet one-on-one with a writing tutor who can give you feedback at any stage of the writing process, whether you are just beginning to work on a written assignment or already have a draft. Writing tutors can also give you feedback if you submit a draft of your paper online. (Please note that the online tutors require 48 hours, from Mondays to Fridays, to return your paper with comments.)

All Academic Learning Centre services are free for UofM students. For more information, please visit the Academic Learning Centre website at umanitoba.ca/student/academiclearning/

You can also talk to a member of the Academic Learning staff by calling 480-1481 or by dropping in at 201 Tier Building.

Student Accessibility Services

Student Accessibility Services (SAS) provides support and advocacy for students with disabilities of all kinds: hearing, learning, injury-related, mental health, medical, physical or visual. Students with temporary disabilities such as sprains and breaks are also eligible to use our services. SAS acts as a liaison between students and the faculty and staff of the University of Manitoba as well as support agencies within the province of Manitoba. Please phone: 474-6213 (voice) or 474-9690 (TTY) for service.

Student Counselling Centre

For 24/7 mental health support, contact the Mobile Crisis Service at 204-940-1781.

Student Counselling Centre

Contact SCC if you are concerned about any aspect of your mental health, including anxiety, stress, or depression, or for help with relationships or other life concerns. SCC offers crisis services as well as individual, couple, and group counselling. *Student Counselling Centre:*

<http://umanitoba.ca/student/counselling/index.html>

474 University Centre or S207 Medical Services
(204) 474-8592

Student Support Case Management

Contact the Student Support Case Management team if you are concerned about yourself or another student and don't know where to turn. SSCM helps connect students with on and off campus resources, provides safety planning, and offers other supports, including consultation, educational workshops, and referral to the STATIS threat assessment team.

Student Support Intake Assistant <http://umanitoba.ca/student/case-manager/index.html>

520 University Centre
(204) 474-7423

University Health Service

Contact UHS for any medical concerns, including mental health problems. UHS offers a full range of medical services to students, including psychiatric consultation.

University Health Service <http://umanitoba.ca/student/health/>

104 University Centre, Fort Garry Campus
(204) 474-8411 (Business hours or after hours/urgent calls)

Health and Wellness

Contact our Health and Wellness Educator if you are interested in information on a broad range of health topics, including physical and mental health concerns, alcohol and substance use harms, and sexual assault.

Health and Wellness Educator <http://umanitoba.ca/student/health-wellness/welcome.html>

Katie.Kutryk@umanitoba.ca

469 University Centre
(204) 295-9032

Live Well @ UofM

For comprehensive information about the full range of health and wellness resources available on campus, visit the Live Well @ UofM site:

<http://umanitoba.ca/student/livewell/index.html>

University of Manitoba Libraries (UML)

As the primary contact for all research needs, your liaison librarian can play a vital role when completing academic papers and assignments. Liaisons can answer questions about managing citations, or locating appropriate resources, and will address any other concerns you may have, regarding the research process. Liaisons can be contacted by email or phone, and are also available to meet with you in-person. A complete list of liaison librarians can be found by subject: <http://bit.ly/WcEbA1> or name: <http://bit.ly/1tJObB4>. In addition, general library assistance is provided in person at 19 University Libraries, located on both the Fort Garry and Bannatyne campuses, as well as in many Winnipeg hospitals. For a listing of all libraries, please consult the following: <http://bit.ly/1sXe6RA>. When working remotely, students can also receive help online, via the Ask-a-Librarian chat found on the Libraries' homepage: www.umanitoba.ca/libraries.

The English Language Centre has workshop and programs in advanced academic and health-sciences English (located at 520, University Centre).

Your rights and responsibilities

As a student of the University of Manitoba you have rights and responsibilities. It is important for you to know what you can expect from the University as a student and to understand what the University expects from you. Become familiar with the policies and procedures of the University and the regulations that are specific to your faculty, college or school.

The [Academic Calendar](http://umanitoba.ca/student/records/academiccalendar.html) <http://umanitoba.ca/student/records/academiccalendar.html> is one important source of information. View the sections *University Policies and Procedures* and *General Academic Regulations*.

While all of the information contained in these two sections is important, the following information is highlighted.

- If you have questions about your grades, talk to your instructor. There is a process for term work and final **grade appeals**. Note that you have the right to access your final examination scripts. See the Registrar's Office website for more information including appeal deadline dates and the appeal form <http://umanitoba.ca/registrar/>
- You are expected to view the General Academic Regulation section within the Academic Calendar and specifically read the **Academic Integrity** regulation. Consult the course syllabus or ask your instructor for additional information about demonstrating academic integrity in your academic work. Visit the Academic Integrity Site for tools and support <http://umanitoba.ca/academicintegrity/> View the **Student Academic Misconduct** procedure for more information.
- The University is committed to a respectful work and learning environment. You have the right to be treated with respect and you are expected to conduct yourself in an appropriate respectful manner. Policies governing behavior include the:

Respectful Work and Learning Environment

http://umanitoba.ca/admin/governance/governing_documents/community/230.html

Student Discipline

http://umanitoba.ca/admin/governance/governing_documents/students/student_discipline.html and,

Violent or Threatening Behaviour

http://umanitoba.ca/admin/governance/governing_documents/community/669.html

- If you experience **Sexual Assault** or know a member of the University community who has, it is important to know there is a policy that provides information about the supports available to those who disclose and outlines a process for reporting. The **Sexual Assault** policy may be found at:
http://umanitoba.ca/admin/governance/governing_documents/community/230.html More information and resources can be found by reviewing the Sexual Assault site
<http://umanitoba.ca/student/sexual-assault/>
- For information about rights and responsibilities regarding **Intellectual Property** view the policy http://umanitoba.ca/admin/governance/media/Intellectual_Property_Policy_-_2013_10_01.pdf

For information on regulations that are specific to your academic program, read the section in the Academic Calendar and on the respective faculty/college/school web site
<http://umanitoba.ca/faculties/>

Contact an **Academic Advisor** within our faculty/college or school for questions about your academic program and regulations <http://umanitoba.ca/academic-advisors/>

Student Advocacy

Contact Student Advocacy if you want to know more about your rights and responsibilities as a student, have questions about policies and procedures, and/or want support in dealing with academic or discipline concerns.

<http://umanitoba.ca/student/advocacy/>

520 University Centre

204 474 7423

student_advocacy@umanitoba.ca

Citing literature:

When citing literature from the primary literature or other sources refer to it in the text of the essay as follows.

For example:

a) Martinez and Wheeler (1991) found that haemolymph concentration of the egg yolk protein vitellogenin in the ant, *Camponotus festinatus*, is dependent upon the social environment.

or

b) In the ant, *Camponotus festinatus*, haemolymph concentration of the egg yolk protein vitellogenin is dependent upon the social environment (Martinez and Wheeler, 1991).

A list of "literature cited" should be provided using the same format as that found in the Canadian Journal of Zoology.

For example:

Journal References:

a) Martinez, T. and Wheeler, D. 1991. Effect of the queen, brood and worker caste on haemolymph vitellogenin titre in *Camponotus festinatus* workers. *J. Insect Physiol.* **37**: 347-352.

Book References:

b) Waddington, K. D. 1983. Foraging behaviour of pollinators. *In Pollination Biology Edited by L. Real*, Academic Press, New York. pp. 213-239.

Seminar:

Students will present a seminar and discussion on their essay topic at a time assigned by the instructor. This will be followed by a question and discussion period of approximately 5 minutes. Prior to the seminar, copies of the abstract will be distributed to all members of the class. Students will be tested on the contents of seminars on the final exam. Students should e-mail a copy of the powerpoint slides to the instructor. Information on seminars presented by students will be examinable material on the final exam.