

LAKEHEAD UNIVERSITY

BIOL-1130-FA



Plant Biology
Laboratory Manual
Fall 2015
Student Edition

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A. About the cover

This is the Plant Biology class of 2014 writing their final lab bell ringer exam. Attending all labs and using your time wisely are keys to be success on this exam. Bell ringer questions are similar to the on-line quizzes.

B. About this manual

Although many exercises are original and have a “northern” flavour, the contents of this lab manual are in large part borrowed, expanded, or shortened versions of botany exercises typically presented in first year. I would like to express special thanks to James Schaefer, Diana Abraham and Lynn Ruxton for their efforts on earlier versions of this manual.

Significant re-arrangement of lab activities in 2014 has aligned lab material to lecture material. Each year, a new experiment comprises the content for your scientific poster. Older versions of the lab manual for this course should be discarded! Back by popular demand are in-class drawings and in-class quizzes!

Ancient Chinese Proverb:

I hear and I forget,
I see and I remember,
I touch and I understand.

Modern American Proverb:

The illiterate of the 21st century will not be those who cannot read and write,
but those who cannot learn, unlearn, and relearn.

-Alvin Toffler

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C. Laboratory topics for BIOL1130FA

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Table 1: Laboratory schedule. Labs start the week of September 20; NO labs week of September 14! **Tuesday sections are F1, F2, F3, F6 and Thursday sections are F4, F5.** Fall term courses commence Monday September 14 and end Monday December 7. The final date to register is Friday September 25 and the final date for withdrawal is Friday November 6. Consult the course calendar for further information. Assignment and Quiz due dates appear on the D2L calendar. Additional requirements are found in this lab manual.

PART 1	FORM AND FUNCTION	Tuesday / Thursday
Lab 1	Field of Plant Biology Be prepared to go outside!	Sept. 22 / Sept. 24
Lab 2	Cells, Tissues, Mitosis, Meiosis	Sept. 29 / Oct. 1
Lab 3	Plant Organs (Stems, Roots, Leaves)	Oct. 6 / Oct. 8
PART 2	SURVEY of PLANTS and THEIR PRE-DECESSORS	
Lab 4	Cyanobacteria and Algae	Oct. 13 / Oct. 15
	Mandatory Attendance	
Lab 5	Practising the Scientific Method	Oct. 20 / Oct. 22
Lab 6	Non-Vascular Plants	Oct. 27 / Oct. 29
Lab 7	Seedless Vascular Plants	Nov. 3 / Nov. 5
Lab 8	Seed Plants: Gymnosperms	Nov. 10 / Nov. 12
	POSTERS DUE 11:50 pm in D2L DropBox	Nov. 13
Lab 9	Seed Plants: Angiosperms	Nov. 17 / Nov. 19
Lab 10	Review lab	Nov. 24 / Nov. 26
Lab 11	FINAL LAB BELL RINGER EXAM	Dec. 1 / Dec. 3

D. Lecture topics for BIOL1130FA

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Table 2: Lecture schedule. Students are responsible for reading material in the chapters indicated. Fall term biology courses commence Monday September 14 and end Monday December 7. The final date to register is Friday September 25 and the final date for withdrawal is Friday November 6.

Topics	Chapters
Life on Earth, Classification	1
Evolution of Plants	88
Plant Cells	13–18
Mitosis	32, 33, 47
Tissues	110, 111
Vegetative Organs, Growth	110, 112, 113
Lifecycles, Meiosis	35, 36
Prokaryotes to Eukaryotes	80, 84, 84
WEDNESDAY OCTOBER 7: TERM TEST 1	
Algae	86, 88
Bryophytes	89
Seedless Vascular Plants	90
Gymnosperms	91, 92, 111
WEDNESDAY NOVEMBER 4: TERM TEST 2	
Angiosperms	93
Flowers and Fruits	115, 116
Photosynthesis	28–31, 120
Respiration	25–27
Water, Transpiration	6, 113
Nutrients	114
Hormones	119
As per scheduling: TERM TEST 3	

Quizzes and Assignments are outlined in this lab manual. Check your due dates! Attending lab sessions are the best way to keep up with lab requirements.



E. Marking scheme

LECTURE:	TERM TEST 1	20.0%
	TERM TEST 2	20.0%
	TERM TEST 3	20.0%
LABORATORY:	ASSIGNMENTS	7.5%
	QUIZZES	7.5%
	POSTER	10.0%
	FINAL LAB EXAM	15.0%



Lecture tests MUST be written during the assigned date and time! Term Test 1 does not include Algae. Term Test 2 covers Algae to Gymnosperms. Term Test 3 covers Angiosperms to end of term. Questions are derived from, but not limited to, material presented in lecture, textbook(s), and labs.

Quizzes are administered via D2L. Missed quizzes cannot be made up. Your lowest quiz mark will be dropped. You are allowed 10 attempts for each quiz and only your highest mark for each quiz recorded. Consider quizzes as an opportunity to test your knowledge of lab material! Style is VERY similar to that on the bell ringer.



Assignments are given this term DURING the lab section for which YOU have registered. Assignments cannot be made up.

Your individual **scientific poster** is worth 10%. It is based on a research experiment which YOU CONDUCT during lab (i.e. you must be present; attendance will be taken!) This poster is submitted on-line in PDF format via the D2L DropBox. A poster template is on D2L. Although experiments are conducted in groups, EACH STUDENT must submit an original presentation of their work. A marking rubric is provided. Review Lab 5 for additional details. The deduction for a late scientific poster (provided an extension is granted) will be 10% per day (including weekends).



F. Required textbooks

The required texts are:

- The **2015 lab manual**. Updates to lab content, assignments and schedules were made from previous years. Purchase via bookstore. A PDF colour version will be posted on D2L for download to devices. Bookstore purchase will be more economical than printing it out at home.
- **Principles of Biology** from Nature Education. A “born-digital” textbook with additional material beyond the scope of this course. License available from the bookstore and IT NEVER EXPIRES! Any updates to the text are also included with your lifetime ownership. You will find this textbook helpful in other biology courses.

- **A Photographic Atlas for the Botany Laboratory, 6th ed.** Older editions are OK, but compare your edition with those of TAs during your lab sessions.

PLEASE WRITE YOUR NAME AND EMAIL IN ALL YOUR BOOKS. If they are left behind in a lab or lecture, this is the only way we return them to you!



G. Introduction to our laboratory program

a) Welcome

Biology is the **science** of life. This course in Plant Biology will familiarize you with the evolution and diversity of plants, bring to your attention their crucial ecological role on this planet, and engage you in the critical thinking practiced by biologists.

Topics explored in labs and lectures generally coincide. However, lab activities provide additional opportunities for you to learn by seeing, doing, and asking questions of yourself, fellow students, and lab instructors. Do you consider plants as being quite different from “higher” animals? Why? Perhaps this ASAP Science video (<http://www.youtube.com/watch?v=u2GWd2j3qJ8>) will change your view.

Towards the end of the course, please provide feedback on the labs by completing Section B. Forms can be dropped off anonymously in the wooden box next to the microscope cabinets (between CB3012 and CB3013). Thanks!

With regards to your responsibility as a student, review the [Code of Student Behaviour and Disciplinary Actions](#) for Lakehead University students.

b) Overview of lab activities

Nine (9) lab sessions, a review session, and a bell ringer exam are scheduled this term (Table 1). All lab material cannot be displayed during the review, however, anything accessible during your lab time slot may appear on the bell ringer exam. Therefore, spend YOUR weekly lab sessions wisely! Complete all sketches, questions, and assignments found in this manual. Make summary charts and study cards. Attempt all quizzes. Add additional notes and drawings to help YOU learn the material. Taking pictures of material and leaving early HAS NOT been a successful strategy in the past. If you do take pictures, use PowerPoint or a drawing program to add your own labels; design your own quizzes!

Detailed, labelled drawings become invaluable as you learn to recognize similarities and differences in the internal and external anatomies of plant groups. When making drawings, you are compromising between working quickly (so that you can get through all material) and providing sufficient detail to later jog your memory. For example, when drawing a stem cross section, it is NOT necessary to draw every cell. Rather, outline and label the general tissue types (e.g., vascular bundle, ground tissue, cortex), then select one vascular bundle to draw in cellular detail, labelling phloem, xylem, collenchyma, and ground tissue.

