



Please Note: This *Course Syllabus* is an important step in updating the format of our distance courses. If for any reason the *Course Syllabus* does not match the print *Course Guide* or online course information, the *Course Syllabus* shall be taken as correct.

COURSE SYLLABUS

COURSE TITLE: Applied Botany

COURSE CODE: HORT 13.6

TERM: Term 3 2014_15

COURSE CREDITS: 6

DELIVERY: PHC

COURSE SECTION: W03 or W07

Course Description

Basic plant anatomy at the cellular level and whole organ level is covered as well as the processes of photosynthesis and respiration. Thorough coverage is given to plant classification and naming, with botanical grammar being stressed. Plant hormones, pollination, fruit set and ripening are discussed. Basic propagation is addressed and comprehensive coverage is given to climatic factors of importance to prairie horticulture. The course concludes with a discussion of diseases of significance to prairie horticulture.

Course Objectives

Applied Botany is a course of study designed to relate the basic questions of botany to the practical questions faced by many horticulturists. Wherever possible, the course will attempt to bridge the gap between issues of botany and the “real world” where plants and people interact. As an introductory course, *Applied Botany* acts as a foundation to many of the other courses in the Certificate Program.

Course Overview

You will learn the structural characteristics used to distinguish and identify plants with an account of plant anatomy. From here the function of organs such as roots, stems, leaves and flowers can be understood. As well, the various horticulturally important structures such as bulbs, rhizomes and corms and tubers will be studied. A self-study laboratory on plant anatomy and variation will be assigned in which you are asked to purchase a specific array of fresh fruits, vegetables and flowers from a supermarket and make drawings to demonstrate your understanding of plant anatomy.

Basic physiological processes which are essential to plant growth and development will be presented, with the role of plant growth regulators being discussed. In addition, because of the significant limitations presented to horticulture by the severe prairie climate, this class will closely address the relationship of plants to the environment, with a focus on those factors significant on the Prairies.

Various propagation techniques will be outlined, with this section being built upon earlier discussion of plant anatomy, growth and growth regulation. If you do not plan to take the advanced course in propagation, *Applied Botany* should provide you with a good basic understanding of propagation.

Finally, concepts in plant pathology, entomology and weed science will be presented to help you understand some of the various pests that horticultural plants may encounter.

Your Instructor

Contact Information

Vanessa Ross Young

Phone: 306-966-5097

Available weekdays between 9:30 and 4:00 PM CST

Profile

Vanessa Ross Young started teaching on Campus in the Biology Undergrad labs in 2002 and has been with the University ever since. In addition to her work with PHC, she also coordinates gardening.usask.ca outreach education, including the U of S Master Gardener Program where she instructs workshops in Botanical Latin, Botany, Soil Science and Communications. Between scheduling courses and workshops, hiring instructors, developing curriculum and teaching for the U of S Master Gardener Program, Vanessa also does freelance photography, edits books on horticulture and raises three very busy little boys.

Optional Resources

Textbooks

If you wish to purchase a textbook for the course, the following is ideal, but optional.

Capon, Brian 2010. *Botany for Gardeners: An Introduction and Guide*. Timber Press, 3rd Edition. Portland Oregon. 268 pp. ISBN-10: 160469095X

Textbooks are available from the University of Saskatchewan Bookstore:

www.usask.ca/consumer_services/bookstore/textbooks

Other Required Materials

In addition to the Course Guide materials, you will need access to a good dictionary (they are available in libraries so you don't need to buy one) and access to a number of general botany books to complete the assignments.

Supplementary Resources

There is a wealth of information on the Internet. This can be an excellent resource but please do not fall into the trap of believing everything published on the Internet. Use a critical eye when evaluating this information. University, Government and national level horticultural society links will be the most reliable. Remember that Wikipedia can be edited by anyone and a great deal of the horticulture "advice" on the Internet is not considered best practice.

It is perhaps more important to recognize that students who use the Internet to assist with gathering their assignment answers tend to perform significantly worse on the final exam than those who worked through the problems on their own. This is especially true for assignment two as the questions are designed to give students the opportunity to think about how the botany is

presented, and the ability to understand and apply this learning is critical for success in the final exam and beyond.

Course Schedule

Wk	Module	Suggested Readings/Activities: ALL ARE AVAILABLE WITHIN YOUR COURSE MATERIALS	Evaluation
1	Module 1: Introduction to Horticulture Module 2: Plant Classification and Naming	Appendix A Taxonomy: Life's Filing System - Crash Course Biology #19 http://www.youtube.com/watch?v=F38BmgPcZ_I . [Video] Monocots Vs. Dicots Explained http://www.youtube.com/watch?v=gl2RxzAT-ww . [Video]	
2	Module 3: Plant Cells and Tissues Module 4: Photosynthesis and Respiration	Plant Cells: Crash Course Biology #6 http://www.youtube.com/watch?v=9UvlqAVCoqY . [Video] Young, P.G. (1982). Plant Cell Structure. In <i>The Botany Coloring Book</i> , (pp.3-3a). Coloring Concepts Inc. [PDF in Blackboard] Baldwin, B. Fruit should pray for welfare of leaves. [PDF in Blackboard] Photosynthesis: Crash Course Biology #8 http://www.youtube.com/watch?v=sQK3Yr4Sc_k . [Video]	Assignment 1 Due: April 7
3	Module 5: Vegetative Anatomy	Young, P.G. (1982). Storing Food Reserves. In <i>The Botany Coloring Book</i> , (pp.72-72a). Coloring Concepts Inc. [PDF in Blackboard] Why Leaves Change Color: Untamed Science http://www.youtube.com/watch?v=cyj7kyYX_gQ . [Video] Ellis, B.W. & Bradley, F.M. (1996). Diseases: What Goes Wrong? In <i>The Organic Gardener's Handbook of Natural Insect and Disease Control</i> , (pp. 4, 23, 53, 133, 204, 218, 229 & 345). [PDF in Blackboard]	Start on Assignment 2 as it is quite time consuming to complete.
4	Module 6: Floral Anatomy	The beautiful tricks of flowers http://youtu.be/bhYIWRWtDuY . [Video] Elpel, T.J. (2010). Keying. In <i>Botany in a Day: the Patterns Method of Plant Identification</i> , (pp. 24-36). HOPS Press, LLC. [PDF in Blackboard] Young, P.G. (1982). Basic Flower Structure. In <i>The Botany Coloring Book</i> , (pp.82-82a). Coloring Concepts	Assignment 2 Due: April 21

		<p>Inc. [PDF in Blackboard]</p> <p>Louie Schwartzberg: The hidden beauty of pollination http://youtu.be/eqsXc_aefKI. [Video]</p> <p>Young, P.G. (1982). Basic Flower Types. In <i>The Botany Coloring Book</i>, (pp.83-83a). Coloring Concepts Inc. [PDF in Blackboard]</p> <p>Young, P.G. (1982). The Flowering Branch. In <i>The Botany Coloring Book</i>, (pp.91-91a). Coloring Concepts Inc. [PDF in Blackboard]</p>	
5	Module 7: Plant Hormones, Fruit Development and Propagation	<p>Plant Hormones: Chemical Control of Growth and Reproduction http://education-portal.com/academy/lesson/plant-hormones-chemical-control-of-growth-and-reproduction.html. [Web Activity]</p> <p>Baldwin, B. Short-day plants monitor long nights. [PDF in Blackboard]</p> <p>Every city needs healthy honey bees: Noah Wilson-Rich http://youtu.be/DwGoZA8ZpHo. [Video]</p> <p>Epigeal germination climbing bean time lapse http://youtu.be/G2RuVxdr0mA. [Video]</p> <p>Time-lapse Phaseolus Runner Bean. Hypogeal germination http://youtu.be/WAwhoXG062I. [Video]</p> <p>Asexual Plant Reproduction: Vegetative Propagation and Bulbs http://education-portal.com/academy/lesson/asexual-plant-reproduction-vegetative-propagation-and-bulbs.html. [Web Activity]</p> <p>Dr. Ken Mudge on cutting propagation http://youtu.be/yFL-jEkWSV8. [Video]</p> <p>Propagating Plants from Cuttings http://youtu.be/luL3DdjSC2M. [Video]</p> <p>How To Take Leaf Lamina Cuttings - Horticultural Tips – Nottingham http://youtu.be/ngVHqjm0Cyk. [Video]</p> <p>How to Multiply Your Plants: Succulent, Kalanchoe Cuttings http://youtu.be/-15AUVIOW50. [Video]</p> <p>Air Layering http://youtu.be/Uwq5CrMjDcw. [Video]</p> <p>How to graft a fruit tree http://youtu.be/qTtXmBVsolY. [Video]</p> <p>Plant Tissue Culturing at Home: DIY Genetic Horticulture http://youtu.be/5zRMVMqyrZI. [Video]</p>	Start work on assignment 3 essay.
6	Module 8: Climate	<p>SaskAdapt - Saskatchewan's climate change impacts and adaptation information centre http://www.parc.ca/saskadapt/</p>	

7	Module 9: Plant Disease	<p>Common Vegetable Diseases http://youtu.be/INh9zgDz2Qw. [Video]</p> <p>Tomato Problem Solver: A Guide to the Identification of Common Problems http://aggie-horticulture.tamu.edu/vegetable/tomato-problem-solver/.</p> <p>Welcome to the Cornell Plant Pathology Vegetable Disease Web Page http://vegetablemdonline.ppath.cornell.edu</p> <p>Garden Pest and Disease Directory http://www.gardeners.com/on/demandware.store/Sites-Gardeners-Site/default/Search-PestsDiseases</p> <p>Pests and Diseases http://www.bbc.co.uk/gardening/advice/pests_and_diseases/</p> <p>Ellis, B.W., & Bradley, F.M., (1996). Diseases What Goes Wrong. In <i>The Organic Gardener's Handbook of Natural Insect and Disease Control</i>, (pp. 4, 23, 53, 133, 204, 218, 229 & 345). Emmaus PA: Rodale Press Inc. [PDF in Blackboard]</p>	
8&9			<p>Assignment 3 Due: May19</p> <p>Review and prepare for exam</p>
10	FINAL EXAM		June 6

Note: If for any reason the Course Syllabus Reading List does not match the Module Reading List, the Course Syllabus shall be taken as correct.

Grading Scheme

Assignment #1	10%
Assignment #2	20%
Assignment #3	30%
Final Exam (closed book)	40%
Total	100%

Your assignment questions can be found under the Evaluations (Assignments) tab in your course menu. Open the Evaluations tab and click on Assignments. You will see all three assignment documents there.

Information on literal descriptors for grading at the University of Saskatchewan can be found at:
<http://students.usask.ca/current/academics/grades/grading-system.php>

Please note: There are different literal descriptors for undergraduate and graduate students.

More information on University policy related to grading and examinations can be found at: <http://policies.usask.ca/policies/academic-affairs/academic-courses.php>

The University of Saskatchewan Learning Charter is intended to define aspirations about the learning experience that the University aims to provide, and the roles to be played in realizing these aspirations by students, instructors, and the institution. A copy of the Learning Charter can be found at: <http://policies.usask.ca/documents/LearningCharter.pdf>

Evaluation Components

CCDE Writing Centre – Quality Writing Help for Free!

Anyone taking a distance class (online, independent studies, televised, or multi-mode delivery) administered by the CCDE can use this free service. The Writing Centre provides tools and support to help you write effective essays, reports, or reviews. Simply submit a project draft, and a qualified tutor will assess your work and offer advice to improve your project. Contact the CCDE Writing Centre at <http://www.ccde.usask.ca/writing>

Assignment 1 (located under Assignments in the course menu)

Value: 10% of final grade

Due Date: See Course Schedule Above

Purpose: Translation of plant names to demonstrate that you know how they were arrived at, and what they mean. You will also be marked on the correct use of botanical grammar.

Description: Use a comprehensive English dictionary to translate 14 scientific plant names to English.

Assignment 2 (located under Assignments in the course menu)

Value: 20% of final grade

Due Date: See Course Schedule Above

Purpose: This assignment deals with botanical structures, and is intended to give the student a hands-on appreciation for plant anatomy. It will require you to visit your local grocery store to purchase some common items.

Description: To complete the assignment, each student will be asked to purchase a selection of common fruits, vegetables and flowers available at most major supermarkets. These structures will then be dissected and simple line drawings made to demonstrate the different parts that are being examined.

Submitting Assignment # 2: To submit Assignment 2 please scan or take photos of your drawings in order to use the assignment submission tool. As a last resort you can fax this assignment but clarity will be an issue and your mark may be affected.

Assignment 3 (located under Assignments in the course menu):

Value: 30% of final grade

Due Date: See Course Schedule Above

Purpose: The student will demonstrate their knowledge of the course concepts by applying them to a specific horticulture plant of their choosing. Students are encouraged to problem solve, intelligently discuss concepts and/or describe the interconnectedness of relevant botanical concepts rather than list facts about their selected plant.

Description: Select a plant that interests you, where the reading and research you do can be applied to a personal or commercial interest. For example, the strawberry would be an ideal subject for someone intending to establish a commercial strawberry plantation. An elm tree might be a good subject for a person employed in the pruning division of a city parks department. You may choose any plant that falls into the realm of horticulture — a paper on wheat or barley would not be accepted. However, a paper on any wildflower, medicinal plant, houseplant, fruit, vegetable or ornamental plant is acceptable.

Final Exam (Online & Closed book):

Value: 40% of final grade

Date: See Course Schedule

Format: The final examination will be an online exam and open for 24hrs (from 9:00 a.m. on the exam day until 9:00 a.m. the following day). Please go to the assignment tool to view the exam within that time frame.

It is very important to note that this is a 3-hour exam. Once you log in and access the exam the clock will start ticking in which you will have only 3 hours to complete. At the end of that 3-hour time period, you will be logged out of the exam.

Please be aware that once you have logged into the exam you cannot leave or try to navigate to another part of the course. If you do exit the exam, you will not be allowed back in as you are only allowed one attempt at this exam.

The 3-hour time limit does not allow you enough time to look up answers or review assignments so make sure you are prepared.

Description: The final exam will consist of fill in the blank questions where the correct word must be supplied to complete the sentence as well as multiple choice questions where students will choose the best answer from those provided. It will also include short answer questions where you will have to solve and explain problems based on botanical knowledge. It will cover material from all modules, with slightly heavier weighting on material that has not already been stressed on previous assignments. The exam is closed book.

Submitting Assignments

To obtain your best mark, you should complete all assignments and attempt all questions in each assignment in the course. If you know only part of the answer, put it down and you may receive partial marks. Remember, instructors find it very easy to mark a question that has not been attempted.

You are expected to submit assignments by the due dates indicated in your Course Syllabus. The instructor has the discretion to penalize late submissions or not. Assignments submitted beyond the final exam date may or may not be accepted by the instructor. If you

experience legitimate problems such as accident or family illness, discuss it with your instructor so that some suitable arrangement can be worked out.

Before submitting any assignment, ensure to save a backup copy of it in case the original is lost.

All of the assignments are located under assignments in the course menu .

Please submit all assignments online, using the Assignments tool in Blackboard.

Assignments Tool in Blackboard:

1. From the Course Home Page, on the left menu click Assignments.
2. On the Assignments page, click the Assignment you want to submit and download any attached files.
3. In the Upload Assignment area, key in the Assignment Materials text box or attach your file. Note the file naming rules.
4. Add any Comments for your instructor.
5. Click Submit to submit the assignment.
6. Review Submission History that appears after you Submit. Click OK if you need to go back and revise.

For Further Information about Using the Blackboard Assignments Tool:

1. From inside Blackboard, click on the Help tab to see U of S Course Tools/BBLearn 9.
2. On the tool bar under Course Tools, click the Students' Help tab and then click one of the following options:
 - Videos and then click Working with Assignments (2 min 59 sec video).
 - Course Tools Help Documents and click Working with Assignments (a pdf document)
 - FAQs

Faxed Assignments:

Be sure to indicate the course name, your section number and the assignment number on the cover page with your name and address. The instructor will put your grade and comments under My Grades in the course menu

Checking Your Assignment Grades

1. From the Course Home Page, on the left menu click My Grades.
2. To see the grade for the specific assignment, click on the assignment grade.
3. View the details of your grade and any instructor comments.

The following criteria are considered in grading assignments and the final examination:

- Demonstrated analytical/critical insight ability
- Evidence of appropriate level of understanding of course content
- Breadth/depth of coverage of the question/s
- Assignment organization
- Syntax, technical errors, clarity of expression

Integrity Defined

“Integrity is expected of all students in their academic work – class participation, examinations, assignments, research, practica – and in their non-academic interactions and activities as well.”
(Office of the University Secretary)

It is your responsibility to be familiar with the University of Saskatchewan *Guidelines for Academic Conduct*. More information is available at
<http://www.usask.ca/secretariat/student-conduct-appeals/IntegrityDefined.pdf>

Module Objectives

Module 1

1. Define horticulture.
2. Describe how horticulture differs from other branches of agriculture science and state whether or not these differences are always distinct.
3. Distinguish between a *basic* science, and an *applied* science and describe how these types of science differ.
4. List the main branches of horticulture science.
5. Describe the fundamental role of the development of agriculture in the development of human society.
6. Outline where our major food crops come from.
7. Define the term “crop improvement”.
8. Describe how plants are domesticated and improved and explain why it might be important to know where a specific crop originated.
9. List the two most basic means of plant propagation and describe how these means of propagation affect the plants we grow.
10. Define “selection” and explain how selection can have a strong influence on the plants we grow.
11. Describe how hybridization or chance mutations can lead to crop improvement.
12. Define genetic engineering and describe the benefits it might have for crop improvement.

Module 2

1. Describe two main ways in which plants can be classified.
2. Define what plant parts are the most useful in identifying whether two plants are closely related.
3. Describe differences exist between monocots and dicots.
4. Define an annual, a biennial and a perennial.
5. Explain the difference between a herbaceous perennial and a woody perennial plant.
6. Explain why some plants have to be hardier than others.
7. Define binomial nomenclature, and explain why it is important to horticulture.
8. Define the three parts of a scientific name and describe how each part is indicated.
9. Explain the difference between a variety and a cultivar and describe how each would be indicated when writing.
10. Explain why Latin is used as the language of botanical names.
11. Use botanical grammar correctly.

Module 3

1. Describe the basic components of plant cells and the role that each component plays.
2. Explain the term “plant tissue”.
3. Describe the three main types of plant tissues and what the role each type of tissue plays in the life of a plant.
4. Describe two specific types of vascular tissue and what role each of these tissues plays.
5. Explain what specialization permit dermal tissue to function effectively in both water collection and water conservation.
6. Describe how new cells are formed.
7. Name the regions of cell division.
8. Describe the location of the primary and secondary meristems in a plant and how these meristems differ in function.

Module 4

1. Define photosynthesis.
2. Explain why photosynthesis is important not only to plants, but also to people.
3. List the things necessary for photosynthesis to occur.
4. Identify the source of all plant carbon and explain why this is important to us.
5. State the products of photosynthesis and explain why these products are important to us.
6. Explain what meant by light quality, and how it affects photosynthesis.
7. Describe the conditions when we must be most careful in considering light quality.
8. Explain how light intensity affects photosynthesis.
9. Explain why greenhouse growers would increase the carbon dioxide concentration in the greenhouse.
10. Define respiration.
11. List the major factors affecting respiration rate.
12. Explain how a knowledge of respiration is directly related to proper storage of horticultural products.
13. Describe precooling and list the types of crops that would require it
14. Define controlled atmosphere storage and list the types of crops is it used for
15. Explain what is meant by a net assimilation rate and why must we consider this factor in growing plants
16. Define leaf area index and explain why might it be a very important consideration for people attempting to produce more productive crops.

Module 5

1. List the major functions of roots.
2. Define “root hair” and explain how it differs from a root branch.
3. Describe some of the different root modifications and how we use these modified roots in horticulture.
4. Define the “drip line” of a tree and explain why it is important to recognize this zone.
5. List the basic functions of stems.
6. State the stem parts that permit you to distinguish stems from roots.
7. List the different stem modifications that are important horticulturally.
8. List the functions of leaves.
9. List the different parts of a leaf.
10. Explain how a monocot leaf differs from a dicot leaf.
11. Explain how you would distinguish a thorn from a spine or a prickle.
12. Differentiate between a compound leaf and a leaflet stating the structure you would look for to make this distinction.

Module 6

1. Describe the basis on which plants are grouped into families.
2. List the parts of a typical dicot flower.
3. List the parts of a typical grass flower.
4. List the male and female parts of a flower.
5. Give the different names for flowers missing different parts.
6. Differentiate between a monoecious plant and a dioecious plant.
7. Describe how a monoecious and a dioecious plant would be treated differently.
8. Explain how you would know that a grass flower is pollinated by wind while a rose flower is pollinated by insects.
9. Define “inflorescence”.
10. Explain how a botanist and a horticulturist would differ on their definition of a fruit.
11. List the different types of botanical fruits.

Module 7

1. Define “plant hormone”.
2. Identify the four main classes of plant hormones.
3. Describe how an understanding of plant hormone action is important to botany and horticulture; include any practical applications derived from this knowledge.

4. List the factors that affect the production of flowers by a plant.
5. Define photoperiod and describe how plants measure photoperiod.
6. Distinguish between a short-day, long-day and day-neutral plant and describe how these differences play a role in the horticultural use of these different types of plants.
7. Describe the difference between pollination and fertilization of a flower.
8. Distinguish between self-pollination and cross-pollination.
9. List the characteristics of a ripening fruit.
10. Explain how the rate of fruit ripening can be increased or decreased.
11. Describe the difference between a climacteric and a non-climacteric fruit.
12. List the factors affecting the germination of a seed.
13. Define seed dormancy and explain why it is important to some seeds.
14. Describe the differences between endogenous and exogenous dormancy, and how each condition is treated by horticulturists.
15. List the factors affecting seed viability and longevity.
16. Explain why seedlings should be hardened off before being transplanted from a greenhouse to a garden situation
17. List the advantages of vegetative propagation
18. List the factors affecting the rooting of cuttings
19. Define grafting, and explain how it is used in horticulture
20. List the advantages of tissue culture for propagating plants

Module 8

1. List the characteristics of the prairie climate.
2. Distinguish between climate, microclimate and mesoclimate and describe how each of these can be used to your advantage.
3. Define climate zones and describe their characteristics.
4. List two plants that display northern vigour effects.
5. Define cardinal temperatures.
6. Describe the type of damage plants can suffer from excessively high temperatures.
7. Explain the difference between chilling injury and freezing injury.
8. Explain the difference between absolute and relative humidity.
9. Describe how diurnal temperature shifts affect plant growth.
10. Explain how site selection can affect frost damage to plants.

11. Explain how irrigation water protects plants from frost.
12. List the different means of measuring the heat accumulation of a crop.
13. Explain how the strategies of annuals, herbaceous perennials and woody perennials differ for winter survival.
14. Define bud dormancy, and explain how it relates to winter survival of woody plants.
15. List the natural and cultural factors that influence development of dormancy.
16. State the time of the year a plant is most and least hardy.
17. Describe the result of ice formation within a cell.
18. Explain how hardy plants tolerate freezing, and how they avoid freezing.
19. List some types of winter injury woody plants can suffer.

Module 9

1. Define the term “plant disease”.
2. Differentiate between an infectious and a non-infectious plant disease.
3. List the chief types of organisms that cause infectious plant diseases.
4. Explain the means by which pathogens may be spread to host organisms.
5. List the primary means of disease prevention.
6. List some of the most common horticultural plant diseases, and describe how they are best treated.
7. List some of the most common types of non-infectious plant diseases?
8. Describe the various means of preventing non-infectious plant diseases.

Acknowledgements

Course Authors

Brian Baldwin, M.Sc., University of Saskatchewan (Original Course Author)

Vanessa Young, University of Saskatchewan (Online Development/Author)

Instructional Design and Course Development

Instructional Designers and Technologists:

Dirk Morrison, M.Sc

Jordan Epp, M.Ed

Robb Larmer

Support Staff:

Diana Hebig

Cindy Klassen