CODE: BIOL 125  
TITLE: Introduction to Plants

INSTITUTE: STEM  
DEPARTMENT: Biology

COURSE DESCRIPTION: This course is intended to meet a laboratory science requirement for the non-science major, and is a required course in the Ornamental Horticulture Certificate Program. The student will become familiar with the structure and function of plant roots, stems, leaves, flowers, fruits and seeds. An understanding of plant diversity develops through the study of plant evolution and classification. A variety of interesting plants native to various parts of the world will be observed and discussed with emphasis on their structure, growth requirements, propagation and ecological role in the natural landscape. Laboratory activities include greenhouse projects and several field trips.

PREREQUISITES: Grade of “C” or higher in MATH 012, MATH 015 or satisfactory completion of College's foundational studies requirement in computation and READ 095 or satisfactory completion of College's foundational studies requirement in reading, and ENGL 095 or satisfactory completion of College's foundational studies requirement in writing

PREREQUISITES OR COREQUISITES:

COREQUISITES:

CREDITS: 4  
LECTURE HOURS: 3  
LAB/STUDIO HOURS: 2

REQUIRED MATERIALS:

ADDITIONAL TIME REQUIREMENTS:
(Identify open lab or other lab requirements)
To visit one or more garden centers or shops which sell a variety of materials you may need to take proper care of houseplants, tend the garden or improve lawns and landscape plantings.

COURSE LEARNING OUTCOMES:
• Examine the gross and microscopic anatomy of roots, stems, leaves, flowers, fruits and seeds and understand the relationship between the various structures.
• Demonstrate comprehension of the relationship between different types of plants and how they are adapted to succeed in different biomes found in the United States.
• Identify, comprehend and compare the benefits, potential hazards and cost of horticultural supplies used by home gardeners.

GRADING STANDARD:
A student must have an average of 65% or better for the classroom component and an average of 65% or better for the laboratory component of the course in order to earn a passing grade for the course.
Upon completion of the course, grades will be assigned as follows:

A = 92 – 100%
A- = 89 - 91%
B+ = 86 - 88%
B = 82 - 85%
B- = 79 - 81%
C+ = 76 - 78%
C = 70 - 75%
D = 65 - 69%
F = <65%
Unit examination results will be reported as the grade assigned by the faculty calculated to the first decimal place. These grades will be weighed according to course grading policy. In calculating the course grade, 0.5 will round up to the next numerical grade and 0.4 will round down to the next lower numerical grade.

A grade of C or better is required in all pre-requisite courses. Career studies courses must have a grade of C or better to count toward the Mathematics / Science Program – Biology Option.

Students are permitted to withdraw from the course without penalty until approximately 80% of the semester is complete. Please see term schedule for the exact deadline.

At the end of the semester, application for an Incomplete may be made if a student with proper documentation needs to complete no more than one lecture exam and/or one laboratory practical. The granting of an Incomplete is at the discretion of the instructor.

**COURSE CONTENT:**

Unit One: Cellular Basis of Life  
Unit Two: Plant Organs – Roots, Stems and Leaves  
Unit Three: Plant Reproduction, Propagation and Biotechnology  
Unit Four: Investigating the Plant Environment  
Unit Five: Plant Diversity  
Unit Six: North America as a Plant Environment

**DEPARTMENT POLICIES:**

**COLLEGE POLICIES:**

For information regarding:
- Brookdale’s Academic Integrity Code
- Student Conduct Code
- Student Grade Appeal Process

Please refer to the **STUDENT HANDBOOK AND BCC CATALOG**.

**NOTIFICATION FOR STUDENTS WITH DISABILITIES:**

Brookdale Community College offers reasonable accommodations and/or services to persons with disabilities. Students with disabilities who wish to self-identify must contact the Disabilities Services Office at 732-224-2730 or 732-842-4211 (TTY), provide appropriate documentation of the disability, and request specific accommodations or services. If a student qualifies, reasonable accommodations and/or services, which are appropriate for the college level and are recommended in the documentation, can be approved.

**ADDITIONAL SUPPORT/LABS:**

**Course Website:**

*Biology Department information and BIOL 125 resources are available on the Brookdale website:*

https://www.brookdalecc.edu/stem-institute/biology/*
BIOL-125  
Introduction to Plants  
#1 of 6 Units

4 Credits

Name of Unit: Cellular Basis of Life

Unit Objective: Identify and describe the structure and function of plant cells, organelles and tissues in order to better understand and appreciate the complexity of plant life and how plants react to change in their environment.

Method of evaluation: Written Quiz, Written Test and Laboratory Practical

Estimated Time to Achieve: 2 weeks

<table>
<thead>
<tr>
<th>Learning Objectives</th>
<th>Recommended Learning Experiences</th>
</tr>
</thead>
<tbody>
<tr>
<td>The student will be able to:</td>
<td></td>
</tr>
<tr>
<td>1. Demonstrate effective usage of both the compound and</td>
<td>Attend scheduled class and take notes.  Attend scheduled</td>
</tr>
<tr>
<td>dissection microscopes in the observation and</td>
<td>class and take notes.  Attend scheduled class and take</td>
</tr>
<tr>
<td>identification of plant cells, tissues and organs.</td>
<td>lecture notes.</td>
</tr>
<tr>
<td>2. Identify the following parts of a typical plant</td>
<td>Participate in class discussion  Complete lab 2  Read</td>
</tr>
<tr>
<td>cell using a compound microscope, electron</td>
<td>Chapter 3 in your textbook, Introductory Plant Biology</td>
</tr>
<tr>
<td>photomicrographs or a cell model.</td>
<td></td>
</tr>
<tr>
<td>a. primary and secondary cell walls</td>
<td></td>
</tr>
<tr>
<td>b. middle lamella</td>
<td></td>
</tr>
<tr>
<td>c. plasma membrane</td>
<td></td>
</tr>
<tr>
<td>d. central vacuole</td>
<td></td>
</tr>
<tr>
<td>e. mitochondria</td>
<td></td>
</tr>
<tr>
<td>f. endoplasmic reticulum (rough &amp; smooth)</td>
<td></td>
</tr>
<tr>
<td>g. ribosomes</td>
<td></td>
</tr>
<tr>
<td>h. dictyosomes</td>
<td></td>
</tr>
<tr>
<td>i. chloroplasts</td>
<td></td>
</tr>
<tr>
<td>j. leucoplasts</td>
<td></td>
</tr>
<tr>
<td>k. chromoplasts</td>
<td></td>
</tr>
<tr>
<td>l. microtubules/microfilaments</td>
<td></td>
</tr>
<tr>
<td>m. nucleolus</td>
<td></td>
</tr>
</tbody>
</table>

Complete lab 1.

Read Chapter 3 in your textbook,
n. nuclear membrane  
o. chromosomes (chromatin)

<table>
<thead>
<tr>
<th>BIOL-125</th>
<th>Introduction to Plants</th>
<th>#1 of 6 Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course Number</td>
<td>Title</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Learning Objectives</th>
<th>Recommended Learning Experiences</th>
</tr>
</thead>
</table>
| 3. State the function(s) of the structural components listed in Objective #2. | Read Chapter 3 in your textbook.  
Take notes during class |
| 4. Summarize the major events of photosynthesis and cellular respiration to gain an appreciation of how green plants produce and utilize chemical energy to maintain life. Write the summary equation for each process. | Attend class and take lecture notes  
Refer to Chapter 10  
Study Table 10.2 on page 186 |
| 5. Trace the sequence of events that occur during the stages of the Cell Cycle beginning and ending with Interphase (G1). | Read Chapter 3 (pages 44-48)  
Attend class and take lecture notes |
| 6. Identify, using prepared microscope slides, photographs and models, the stages of mitosis including Prophase, Metaphase, Anaphase and Telophase. | Study lab models and complete lab |
| 7. Define mitosis and state the significance of the process to the reproduction, growth and repair of plants and plant tissues; be able to identify the sites where mitosis occurs to promote primary and secondary growth. | Attend class and take lecture notes |
| 8. List, describe and identify meristematic and non-meristematic tissues found in flowering plants. | Read and outline the information in Chapter 4 of your text.  
Attend class and take lecture notes  
Study the photographs of tissue types in Chapter 4 |
<table>
<thead>
<tr>
<th><strong>Name of Unit:</strong></th>
<th>Plant Organs – Roots, Stems and Leaves</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Unit Objective:</strong></td>
<td>Identify and describe the individual and collective functions of tissues found in the roots, stems and leaves of flowering plants. Identify and describe common types of specialized roots, stems and leaves of flowering plants as adaptations to aid survival or reproduction.</td>
</tr>
<tr>
<td><strong>Method of evaluation:</strong></td>
<td>Written Quiz, Written Test and Laboratory Practical</td>
</tr>
<tr>
<td><strong>Estimated Time to Achieve:</strong></td>
<td>3 weeks</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Learning Objectives</strong></th>
<th><strong>Recommended Learning Experiences</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>The student will be able to</td>
<td></td>
</tr>
</tbody>
</table>

1. Compare and contrast monocot and dicot flowering plants on the basis of their root, stem, leaf, flower and seed morphology using laboratory models, prepared microscope slides and live specimens.

   - Attend class and take lecture notes.
   - Study diagrams comparing monocot and dicot plant structures.

2. Identify and describe the structure and function of various root types; identify root tissues and describe their function(s) using laboratory models, microscope slides and plant material.

   - a. epidermis
   - b. xylem (vessels and tracheids)
   - c. phloem (sieve tubes and companion cells)
   - d. pericycle
   - e. endodermis
   - f. stele (area)
   - g. parenchyma
   - h. cortex and pith (areas)

   - Read Chapter 5 in your textbook.
   - Complete Lab 16
   - Study models and materials on display in the laboratory
   - Attend class and take lecture notes
i. root hairs
j. fibrous vs. tap roots

<table>
<thead>
<tr>
<th>Learning Objectives</th>
<th>Recommended Learning Experiences</th>
</tr>
</thead>
</table>
| 3. Describe and give examples of various types of specialized roots. | Attend class and take lecture notes
Study diagrams in Chapter 5
Observe materials on display in the laboratory or greenhouse |
| 4. Identify, using models, diagrams, plant material and prepared slides, the tissues or structures found on or within the stems of herbaceous or woody plants. State the function of each structure or tissue. | Read Chapter 6 in your textbook
Attend class and take lecture notes
Complete Laboratory 5 and 15
Compare woody twigs in winter and summer condition (text Fig 6.1 on page 86) |
| a. epidermis | |
| b. cork (bark) | |
| c. cork cambium | |
| d. cortex | |
| e. pith | |
| f. vascular cambium | |
| g. xylem (vessels and tracheids) | |
| h. phloem (sieve tubes and companion cells) | |
| i. vascular rays (xylem and phloem rays) | |
| j. parenchyma | |
| k. sclerenchyma | |
| l. collenchyma | |
| m. vascular bundles | |
| n. axillary and terminal buds | |
| o. leaf and vascular bundle scars | |
| p. lenticels | |
| q. heart and sapwood in mature woody stems | |
| 5. Identify, describe and give examples of various types of specialized stems. | Study diagrams in Chapter 6
Attend class and take lecture notes
Complete scheduled closed lab assignments |
### BIOL-125 Introduction to Plants #2 of 6 Units

<table>
<thead>
<tr>
<th>Learning Objectives</th>
<th>Recommended Learning Experiences</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. Compare and contrast the structure and function of monocot and dicot leaves; identify, describe and give examples of simple and compound dicot leaves.</td>
<td>Read Chapter 7 in your textbook  Attend class and take lecture notes  Complete assigned lab activities</td>
</tr>
<tr>
<td>7. Identify, using diagrams or prepared slides, the following leaf tissues or secretions; state the function(s) of each</td>
<td>Read Chapter 7 in your textbook  Attend class and take lecture notes  Complete Lab 6  Study models, microscope slides and materials on display in the lab</td>
</tr>
<tr>
<td>a. epidermis and epidermal hairs  b. cuticle  c. xylem (vessels and tracheids)  d. phloem (sieve tubes and companion cells)  e. stoma  f. guard cells  g. palisade mesophyll (parenchyma)  h. spongy mesophyll (parenchyma)  i. sclerenchyma (fibers or sclerids)  k. veins</td>
<td></td>
</tr>
<tr>
<td>8. Apply knowledge of plant tissues to describe the cooperative functions and interactions of roots, stems and leaves.</td>
<td>Attend class and participate in discussion; take notes</td>
</tr>
</tbody>
</table>
**BIOL-125**  
**Course Number**

**Introduction to Plants**  
**Title**

#3 of 6 Units

**4 Credits**

**Name of Unit:**  
Plant Reproduction, Propagation and Biotechnology

**Unit Objective:**  
Discuss the importance and historical significance of flowering plants to human civilization. Identify structures and trace the life cycle of a flowering plant from one generation to the next. Describe and employ successful asexual, including plant biotechnology methods and sexual plant propagation techniques.

**Method of evaluation:**  
Written Quiz, Written Test and Laboratory Practical

**Estimated Time to Achieve:**  
2 ½ weeks

<table>
<thead>
<tr>
<th>Learning Objectives</th>
<th>Recommended Learning Experiences</th>
</tr>
</thead>
<tbody>
<tr>
<td>The student will be able to:</td>
<td></td>
</tr>
</tbody>
</table>
| 1. Identify the major parts of typical monocot and dicot flowers using live materials, prepared microscope slides, models and diagrams; state the function of each part discussed in class or lab. | Attend class and take lecture notes  
Read Chapter 8 in your textbook  
Study lab models  
Complete Lab 19 |
| 2. Diagram and describe the life cycle of a typical flowering plant using the alternation of generations concept. | Study the alternation of generations for the flowering plant life cycle  
Attend class and take lecture notes  
Study information in Chapter 8 and pages 432 – 435. |
| 3. Investigate and discuss the relationship between flowering plants and civilization | Read Chapter 24 in your textbook |
| 4. Identify and list the function(s) of seed parts and seedlings of representative monocot and dicot plants. | Attend class and take lecture notes  
Read Chapter 8 in your textbook  
Study models on display in the lab  
Complete Lab Exercises 20 and 21 |
<table>
<thead>
<tr>
<th>Learning Objectives</th>
<th>Recommended Learning Experiences</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Identify and describe examples of simple flowers, inflorescence types, fleshy fruits and dry fruits.</td>
<td>Attend class and take lecture notes. Observe and study examples of flower and fruit types on display in the laboratory or greenhouse.</td>
</tr>
<tr>
<td>6. List and describe the function and importance of five types of plant hormones found in flowering plants</td>
<td>Attend class and take lecture notes. Read Chapter 11 in your textbook. Observe demonstration on effect of plant hormones on plant growth and development.</td>
</tr>
<tr>
<td>7. Describe basic plant biotechnology techniques and state their significance in plant propagation and improving the quality of life for mankind.</td>
<td>Attend class and take lecture notes. Read Chapter 11 in your textbook. Observe demonstration on effect of plant hormones on plant growth and development.</td>
</tr>
<tr>
<td>8. Describe the vegetative propagation techniques used by horticulturists to asexually reproduce plant material in the greenhouse or garden.</td>
<td>Attend class and take lecture notes. Read Chapter 14. Propagate selected plants in the greenhouse under the supervision of your Biology Learning Assistant. Complete Lab.</td>
</tr>
</tbody>
</table>
BIOL-125 Introduction to Plants #4 of 6 Units

4 Credits

Name of Unit: Investigating the Plant Environment

Unit Objective: Identify and discuss the factors that influence the growth and continued healthy state of plants with emphasis on greenhouse and garden plants

Method of evaluation: Written Quiz, Written Test and Laboratory Practical

Estimated Time to Achieve: 2 ½ weeks

<table>
<thead>
<tr>
<th>Learning Objectives</th>
<th>Recommended Learning Experiences</th>
</tr>
</thead>
</table>

The student will be able to:

1. Discuss the overall effect of the following physical factors on the growth and continued healthy condition of greenhouse and garden plants:
   - Attend class and take lecture notes
   - Read pages 77 – 82 in your textbook
   - Read Appendix 4 (beginning on page 562)
   - Houseplants and Home Gardening in your textbook
   - Review pages 150 -162 and 168 – 169

2. List and describe the structure and composition of various garden and artificial (commercial mixes) soils. Compare their ability to hold water, provide nutrients to plant roots and potential for causing insect and disease problems.
   - Attend class and take lecture notes
   - Observe samples of garden and artificial soils or coarse aggregates including sand, perlite and vermiculite
   - Complete assigned lab activities
   
For additional information, refer to the following:

- Our Living Soil by Cook
- Vegetation and Soils by Eyre
- Introduction to Soils by Berger
- Internet Web Sites on Gardening
3. Discuss the following soil factors and the effects on plant growth and health:
   a. soil acidity
   b. soil temperature
   c. soil aeration
   d. soil micro and macro organisms

   Attend class and take lecture notes
   Complete lab activity on soil pH, nitrogen, phosphorus and potassium content using a Sudbury Soil Test Kit

4. List and discuss the significance of nine important elements in plant nutrition; state the observable effects of mineral deficiency for each of these essential elements

   Attend class and take lecture notes
   Study Table 9 on page 161 in textbook

5. Using your knowledge of plant structure, trace the movement of water, dissolved minerals and organic compounds in vascular plants. Include the following terms
   a. root pressure
   b. transpiration pull
   c. cohesion and adhesion
   d. diffusion
   e. osmosis
   f. active transport
   g. mass flow

   Review the structure of roots, stems and leaves with particular emphasis on the xylem and phloem tissue
   Read Chapter 9 (pages 150-160) in your textbook before class discussion on this objective
   Take notes on class discussion
   For additional information:
   Introduction to Plant Physiology by Bidwell
<table>
<thead>
<tr>
<th>Learning Objectives</th>
<th>Recommended Learning Experiences</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. Identify and describe remedies for the following plant pests and diseases:</td>
<td>Read Appendix 2 in your textbook</td>
</tr>
<tr>
<td>a. aphids</td>
<td>Study handout materials given out in class</td>
</tr>
<tr>
<td>b. white flies</td>
<td>Visit one or more garden centers to gather information to complete the Garden Center Project (submit to you instructor 3 weeks prior to the completion of a 15 week semester)</td>
</tr>
<tr>
<td>c. spider mites</td>
<td>Attend class and take lecture notes</td>
</tr>
<tr>
<td>d. scales</td>
<td>For additional information:</td>
</tr>
<tr>
<td>e. mealy bugs</td>
<td>How to Control Plant Diseases by Shurtleff</td>
</tr>
<tr>
<td>f. Japanese beetle grubs</td>
<td>General and Applied Entomology by Litt</td>
</tr>
<tr>
<td>g. damping off fungus</td>
<td>Introduction to Mycology by Alexopoulos</td>
</tr>
<tr>
<td></td>
<td>How to Know the Insects by Jaques</td>
</tr>
</tbody>
</table>
### BIOL-125

**Introduction to Plants**

**#5 of 6 Units**

**Course Number**

**Title**

**4 Credits**

**Name of Unit:** Plant Diversity

**Unit Objective:** Recognize and describe representatives of various plant divisions with emphasis on distinguishing characteristics. Discuss the evolutionary trends enabling plants to be successful on land

**Method of evaluation:** Written Quiz

**Estimated Time to Achieve:** 1 week

<table>
<thead>
<tr>
<th>Learning Objectives</th>
<th>Recommended Learning Experiences</th>
</tr>
</thead>
</table>

The student will be able to:

1. Discuss the basis and significance of the binomial system of plant classification. 
   - Attend class and take lecture notes

2. Using examples of economically important plants, compare and contrast the terms variety and cultivar.
   - Attend class and take lecture notes
   - Study handout on plant classification

3. Recognize representatives of major taxonomic groups useful in horticulture-related businesses.
   - Review Chapter 24 in your textbook

4. Identify representatives of economically important plant families.
   - Observe plants on display in the lab and greenhouse
   - Review Appendix 3 – Useful and Poisonous Plants in your textbook

5. Use a dichotomous key to identify genus and species of common flowering plants or evergreens.
   - Complete take home assignment
### BIOL-125  
**Course Number**  
**Introduction to Plants**  
**#6 of 6 Units**

**Name of Unit:** North America as a Plant Environment

**Unit Objective:** Describe the factors which contribute to and determine biome types in North America. Discuss representative plant and animal species associated with these large geographical areas and how the environmental and biotic factors mesh to provide a habitat and niche for each species. Discuss and describe the steps of primary and secondary plant succession.

**Method of evaluation:** Written Quiz

**Estimated Time to Achieve:** 2 weeks

<table>
<thead>
<tr>
<th>Learning Objectives</th>
<th>Recommended Learning Experiences</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Define the term ecosystem and utilize the following terms or concepts to construct a brief description of the interdependence between life forms and their physical environment.</td>
<td>Attend class and take lecture notes</td>
</tr>
<tr>
<td>a. producers</td>
<td>Read Chapter 25 in your textbook</td>
</tr>
<tr>
<td>b. primary level consumers</td>
<td></td>
</tr>
<tr>
<td>c. secondary and tertiary level consumers</td>
<td></td>
</tr>
<tr>
<td>d. decomposers</td>
<td></td>
</tr>
<tr>
<td>e. abiotic factors (physical factors)</td>
<td></td>
</tr>
<tr>
<td>food chains and webs</td>
<td></td>
</tr>
<tr>
<td>g. pyramids of mass, numbers and energy</td>
<td></td>
</tr>
<tr>
<td>h. cycling of elements vs. flow of energy</td>
<td></td>
</tr>
<tr>
<td>i. habitat vs. niche</td>
<td></td>
</tr>
<tr>
<td>j. interspecific vs. intraspecific competition</td>
<td></td>
</tr>
</tbody>
</table>
2. Define primary and secondary succession. Describe the stages of primary succession beginning with bare rock leading to a Deciduous Forest.

   Attend class and take lecture notes

   For additional information:
   - *Fundamental of Ecology* by Odum
   - *Web of Life* by Storer
   - *Basic Ecology* by Buchsbaum

3. Define the following terms:
   a. Xerosere
   b. Psammosere
   c. Hydrosere
   d. sere
   e. climax vegetation (species)
   f. lichens

   Read Chapter 25 in your textbook
   Attend class and take lecture notes

4. Locate eight vegetation types (biomes) on a map of North America; list the dominant vegetation in each biome. Compare each biome with regard to annual temperature and rainfall patterns:
   a. Tundra
   b. Taiga (Evergreen Forest)
   c. Temperate Deciduous Forest
   d. Grassland
   e. Desert
   f. Mountain Forest
   g. Tropical Rain Forest
   h. Pacific Northwest

   Read Chapter 26 in your textbook.
   Study the map of major biomes and compare to a road map of the U.S.
   Refer to Figure 26.1 on page 499 in your textbook
   Participate in campus field trip to observe climax species and factors influencing the Deciduous Forest Biome.

5. Discuss the effects of increased population and pollutants on the stability of our environment. Include consideration of pollutants and pesticides as factors which affect the quality of health and alter the environment in ways which we are only beginning to understand.

   Class discussion

*The syllabus is intended to give student guidance in what may be covered during the semester and will be followed as closely as possible. However, the faculty member reserves the right to modify, supplement, and make changes as the need arises.*