

SPRINGFIELD TECHNICAL COMMUNITY COLLEGE
ACADEMIC AFFAIRS

Course Number: BIO-112 Class/Lect. Hours: 3 Lab Hours: _____ Credits: 3 Dept.: Biology
Course Title: The Biology of Hydroponics Semester: F Year: 2019

Course Description, Prerequisite, Corequisite:

As an introduction to the biological basis of hydroponics, the Biology of Hydroponics will use the science of hydroponics as a vehicle for exploring how plants grow and develop. Students will learn basic plant biology, cell physiology, plant structure and function, nutrient requirements and environmental requirements and will apply this knowledge to understanding the design of agricultural hydroponic systems and how they provide what plants need to grow and thrive with some widely grown hydroponic species (e.g. tomatoes, cannabis, greens) used to provide examples of specific hydroponic systems. Written and oral presentation of student work will be an integral part of the course.

No prerequisites

OBJECTIVES/COMPETENCIES

Course Objectives	Competencies
<ol style="list-style-type: none">1. Students will know the basic divisions of taxonomy.2. Students will know basic cell biology and understand what distinguishes a plant cell from other cells.3. Students will know the major divisions of plant taxonomy and the anatomical features that distinguish the flowering plants.	<ol style="list-style-type: none">1. Student will be able to name and state the basic distinguishing characteristics of the fundamental domains and kingdoms into which all life may be divided.2. Students will be able to state the primary parts of a cell and state the function of each.3. Students will be able to state the features that distinguish a plant cell from other cells and state the function of each.4. Students will be able to identify and describe the levels of organization (molecules, organelles, cells, tissues, organs, whole plant) in flowering plants and be able to relate functional aspects at one level to function at a higher or lower level of organization.5. Students will name the primary adaptations that distinguish the flowering plants (angiosperms) from other plants.6. Students will state the function of the three major organs in vascular plants: roots, stems, and leaves.7. Students will describe the anatomy of a flower and state the function of each part.8. Students will state the chemical elements that are required for plant life and their basic role in plant physiology.

OBJECTIVES/COMPETENCIES

Course Objectives	Competencies
<p>4. Students will know the chemicals required for life and link them to cellular metabolism.</p> <p>5. Students will know the design of representative hydroponic systems and be able to state the function of each component of the system.</p> <p>6. Students will link the components of hydroponics systems to their role in supporting plant cell metabolism.</p> <p>7. Students will link the components of hydroponic systems to meeting the physiological needs of representative species.</p> <p>8. Students will work to develop their ability to present information in written and oral form.</p>	<p>9. Students will demonstrate knowledge of respiration and photosynthesis, state the reactants and products for each and describe their basic function in plant life.</p> <p>10. Student will state the characteristics that define hydroponics and controlled environmental agriculture (CEA).</p> <p>11. Students will describe the basic principles of hydroponics including plant needs and how they are met and advantages and disadvantages of hydroponics.</p> <p>12. Student will describe in detail the artificial interventions of hydroponics that meet each of the major physical and nutrient needs of plants.</p> <p>13. Students will describe the major types of hydroponics systems and the advantages and disadvantages of each including their applicability to small scale vs. large scale systems.</p> <p>14. Students will describe the light requirements of plants, including photosynthesis and control of flowering, and the role of natural vs. artificial lighting systems in meeting the physiological light requirements.</p> <p>15. Students will describe how hydroponics can meet the physiological needs of three commonly hydroponically grown species (tomatoes, cannabis, lettuce) in the context of their varying physiological needs and desired outcomes and the hydroponic interventions required.</p> <p>16. Students will demonstrate the ability to organize scientific information and present it in both oral and written form.</p>