NATURAL SCIENCES DEPARTMENT
HOSTOS COMMUNITY COLLEGE
of THE CITY UNIVERSITY OF NEW YORK

SYLLABUS FOR BOTANY OF FOOD – BIO 250
4 credits, 6 hours (3 lecture; 3 lab)
Pre-requisite: BIO210 and/or CHE210

COURSE DESCRIPTION:

The course is designed to introduce students to the world of plants and their importance for humanity. Topics include botanical classification, morphology, anatomy, physiology, reproduction and phytogeography of plants commonly known and commercialized. It emphasizes plants as sources of food and medicine, as well as their history of domestication, nutritional value, propagation and cultivation. Urban repositories of botanical knowledge (botanical gardens, community gardens, rooftop gardens, vertical gardens, and hydroponic gardens) are discussed as novel adaptations to life in urban settings. Social implications associated with contemporary crop production, cultural traditions and personal choices are also analyzed.

TEXTBOOK: The Botany of Food (Custom Version) Simpson, B. M. Ogorzaly. 2014. Fourth Edition. McGraw-Hill, New York. and Levetin, E., K. McMahon. 2012. *Plants and Society*. Sixth Edition. McGraw-Hill. ISBN: 13: 978130865667

Week	SUBJECT AREA	TEXT CHAPTER	PAGES
1.	**Plants in our world** What are plants? Flowering plants and non-flowering plants • How do monocot and dicot organs differ? • The plant body: What is the function of each organ? Plant life cycle – Flowers, Fruits and Seeds	1	1-22
2.	**Plant physiology** Metabolism, photosynthesis, cellular respiration • How do plants work? • What do plants need to grow and develop?	4	23-44
3.	**Human Nutrition** • Macronutrients and Micronutrients • Dietary guidelines	10	46-67

- Why are plants important in human nutrition?

4.	**Origins of agriculture: The cradle of agriculture** • Time frame • Myths and traditions • Where were crops domesticated?	2	68-81
5.	**Human manipulation of plants** • Sexual reproduction • Asexual reproduction • Gene alteration • Beyond traditional methods of propagation	3	82-96
6.	**Fruits and nuts of temperate and tropical regions** • What is a fruit? • Fruit types • Domesticated species: apples, pears, olives, kiwi, berries, tomatoes, peppers, oranges, avocados, bananas, mangoes, pineapple other fruits and nuts	4&5	97-159
7.	**The grass family: Old world and New World grains and cereals** • Botanical characteristics suitable for domestication • Modern cultivars and nutrition • Domesticated species: corn, wheat, rice, and other grains and pseudo-cereals	6&7	161-195
8.	**The bean family: Fabaceae – Legumes** • Botanical characteristics suitable for domestication • Modern cultivars and nutrition • Domesticated species: peas, beans, peanuts, soybeans and other legumes	8	196-217

	• Legumes for animal feed		
9.	**Foods from stems and leaves – vegetables** • Annual and biannual crops • Leafy crops • Perennial vegetables	9	218-237
10.	**Tubers and Rhizomes – food from roots and stems - starchy staples** • Botanical characteristics of starch storing organs • Nutritional value • Domesticated species: white potato, sweet potato, cassava, and other staples • Cultivation and processing	10	238-261
11.	**Vegetable oils – saturated and unsaturated fats** • Fats and oils stored in plans • Fats in processed food • Oil extraction • Oil sources: linseed, safflower, soybean, corn, sunflower, canola, and other oils	11	262-286
12.	**Feeding a hungry world – Plant breeding and crop improvement programs** • The Green Revolution • Genetic diversity of crops • New crops • Biotechnology	15	287-314
13.	**Ornamental plants** Gardening styles Parks, botanical gardens Major groups of ornamental plants Ornamental plants and recreational areas	20	395-423

	• Parks • Botanical gardens • Trees used in landscape design and ornamental plants		
14.	**Future trends** • Global food supplies • Biodiversity • Food and Health Urban agriculture: Urban farms, Community gardens, Agricultural innovations in urban areas: Green roofs, Vertical gardens, Hydroponic crops, Pot plants and terrariums Urban markets: Ethnic markets, Farmers' markets, Botanicas	21	424-441

LABORATORY SCHEDULE

LABORATORY MANUAL: *Urban Botany and Urban Agricultural Practices*. Hostos Community College. Will be accessed via BlackBoard.

Week	**Topics**
Week 1	Introduction to plant cells and cell inclusions Identification of: • Raphides • Druse • Plastids • Pigments

Week 2 Introduction to Composting

- What is composting?
- Composting techniques

Experimental design 1

- Set up **compost** experiment
- Observe progress weekly – annotate observations

Week 3 Vegetative organs and reproductive organs

- Morphology and function of roots, stems and leaves
- The Root: Structure and Development
- The Shoot: Primary Structure and Development
- Flowers and Fruits

Week 4 Plant physiology: Photosynthesis, transpiration, guttation

- Primary Metabolism. Photosynthesis, Light, and Life
- Light Reaction. Dark Reaction, C3, C4 and CAM

Growth and development: hormones

- Regulating Growth and Development: Plant Hormones

Experimental design 2

- Set an **hydroponic** experiment to observe plant growth
- Observe progress in one week – annotate observations

Week 5 Fruits of template and tropical regions

- Dissection of fruit samples
- Determination of fruit type
- Identification of structures
- Add scraps to composting tumbler

Week 6 Organically grown crops and genetically modified foods

- Identification of GMO
- Analysis by gel electrophoresis
- Continuation of composting practice
- DNA analysis of GMOs
- Experiment set up, data collection and analysis

Week 7 Nutrients of plant origin

- Test for organic molecules
- Testing plant based food samples

- Select plant based products and test for organic molecules
- Collect and analyze data in class

Week 9 **Fieldtrip 1**
Urban agricultural practices (one option)
- Roof top gardening
- Vertical gardens
- Hydroponics
- Seed planting in hydroponic chamber

Week 10 Grasses and tubers
- Identification of source plants
- Morphological descriptions
- Analysis of nutrient content
- Continuation of composting practices

Week 11 Legumes and Oils
- Identification of source plants
- Morphological descriptions
- Analysis of nutrient content
- Continuation of composting practice

Week 12 **Fieldtrip 2**
Urban agricultural practices (one option)
- Community garden
- Ethnic market
- Supermarket botany

Week 13 Harvest of hydroponic crops
Collection of compost soil

Week 14 **Fieldtrip 3**
- Ornamental plants New York Botananical Garden