

URBAN ECOSYSTEMS

What are Urban Ecosystems?

Urban ecosystems are human-influenced ecosystems that evolved from the natural ecosystems that existed prior to human settlement on a landscape. 80% of Canadians have moved into urban areas, and 68% of the global population is projected by the United Nations to become urban by 2050. Population growth and density combined with climate change challenges us to look after human health and well-being by making cities resilient and thrivable for future generations. Historically, this has happened organically in response to human needs and population growth. In contemporary times, urban environments are planned, designed, and managed through public policy that recognizes the need to design the built environment while respecting, protecting, and enhancing natural ecosystems within cities.

An urban ecosystem includes three basic components:

- The biodiversity of the natural or semi-natural environment provides essential ecosystem goods and services that sustains all urban life such as fresh water, clean air, carbon storage, food, shade, and habitat.
- The built environment includes all the spaces and places created or modified by people in order to live, work, and play. Built elements are buildings, transportation and grey infrastructure such as water and waste management, and open spaces such as parks, gardens, and play spaces. Increasingly, the built environment includes green infrastructure, which is a sustainable approach to water management that protects, repairs, or mimics the natural water cycle by planting trees and repairing wetlands and other natural areas that can absorb and store storm water runoff. Green roof ecosystems, living walls and rain gardens are increasingly integrated into urban green infrastructure plans in order to maximise the green benefits and avoid building costly grey infrastructure such as water treatment facilities.
- The socio-economic environment is concerned with sustaining livelihoods by providing health services, access to healthy food through urban agriculture and community gardens, connections to cultural traditions and practices, outdoor recreational activities, and improving health by providing public transportation and safe routes for walking and cycling.

Who Studies Urban Ecosystems?

Individuals interested in improving the quality of our urban environment are encouraged to apply. This program will appeal to students who are interested in an applied science program where they will analyze problems and implement solutions to enhance and protect the urban environments in which over 80% of the Canadian population lives. Students interested in the implementation of sustainable practices in urban environments will find this program of value.

Career Opportunities

Our graduates develop skills necessary for employment in the following areas:

- Green infrastructure specialists with local government and/or institutions
- Parks and natural areas management (local governments and NGOs)
- Food security programs in urban agriculture and community gardens

- Urban horticulture enterprise including design, installation, and maintenance of rain gardens, and living roof and wall ecosystems
- Horticulture specialists on multi-disciplinary urban landscape design teams
- Landscape and Grounds Maintenance Contractors
- Environmental consulting
- Graduate studies in Horticulture or related fields such as Landscape Architecture, Urban Forestry, Community & Regional Planning, Public Policy, and Environmental Education (subject to specific graduate school admission requirements)

Programs

- Bachelor of Horticulture Science, Major in Urban Ecosystems (<https://calendar.kpu.ca/programs-az/science-horticulture/urban-ecosystems/urban-ecosystems-bs/>)

Courses

Registration in some course sections is restricted to students in particular programs. See Timetables - [kpu.ca/registration/timetables](http://www.kpu.ca/registration/timetables/) (<http://www.kpu.ca/registration/timetables/>) - for current section information.

Visit the BC Transfer Guide - [bctransferguide.ca](https://www.bctransferguide.ca) (<https://www.bctransferguide.ca/>) - for information about course transfer in B.C.

HORT 1102 3 credits

Botany for Horticulture

Students will study the morphology, anatomy, physiology, and sexual reproduction of plants. They will be introduced to the characteristics of major plant families. Students will work with fresh and preserved plant material, and demonstrate different aspects of plant physiology in the laboratory in order to provide an understanding of current horticultural practices.

Level: UG

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributetext>)

HORT 1104 3 credits

Soils and Growing Media

Students will study the components and properties of soils and growing media. They will discuss the characteristics of organic matter and biological activity within the soil profile. Students will study how plant growth is affected by soil and growing media properties such as pH, nutrient retention, salinity, and the movement and retention of water. They will examine plant nutrient deficiencies, fertilizer types, and liming recommendations. Students will practice basic soil sampling and testing methods and discuss environmental issues involving soil and growing media practices.

Level: UG

Prerequisite(s): Level G1 as defined in the Math Alternatives Table (<https://calendar.kpu.ca/course-information/mathematics-alternatives-table/>).

Attributes: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributetext>), QUAN (<https://calendar.kpu.ca/courses-az/#quantext>)

HORT 1105 1 credit**BC Pesticide Applicator Certification**

Students will learn how to protect human health and minimize the risks to the environment when selecting and applying pesticides. They will study federal and provincial legislation and municipal bylaws that govern pesticide use in British Columbia. Students will learn how pesticides are registered, classified and labeled for legal use in Canada. They will identify components and calibration of pesticide application equipment and perform related calculations. Students will write the BC Ministry of Environment Pesticide Applicator examination upon course completion. Students must achieve a 1 year BC Provincial Pesticide Applicator Certification to pass this course.

Level: UG

Attributes: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributetext>), PW_3 (<https://calendar.kpu.ca/courses-az/#pathwaytext>)

HORT 1110 3 credits**Introduction To Sustainable Horticulture**

Students will consider horticulture within a context of social responsibility, exploring the interrelatedness between environment, society, and economy. They will differentiate between conventional and sustainable practices in different horticultural disciplines: greenhouse production, nursery, turf, and landscape. Students will examine the core issues of water use, soil management, energy consumption and waste, air quality/pollution, and land use. They will analyze the underlying topics of population pressure, pollution, urban land planning, crop diversity, genetic modification, and bioproducts/bioprocessing. Students will investigate sustainability within a frame work of the history of agriculture and horticulture, food and amenity systems, and the rise of ecological approaches to cultivation systems.

Level: UG

Attributes: ASTR (<https://calendar.kpu.ca/courses-az/#astrtext>), SCIH (<https://calendar.kpu.ca/courses-az/#courseattributetext>)

HORT 1118 3 credits**Basic Machinery Operation and Maintenance**

Students will be introduced to horticulture machinery. They will perform preventative maintenance. Students will safely demonstrate machinery operation. Students will complete a Workplace Hazardous Materials Information System (WHMIS) Certificate.

Level: UG

Attributes: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributetext>), PW_3 (<https://calendar.kpu.ca/courses-az/#pathwaytext>)

HORT 1124 3 credits**Landscape Gardening Methods**

Students will be introduced to professional landscape gardening. They will explore products, services, equipment, tools, and resources associated with the landscape horticulture industry. Students will study gardening techniques and standards, and will participate in hands-on activities to develop gardening skills.

Level: UG

Attributes: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributetext>), PW_3 (<https://calendar.kpu.ca/courses-az/#pathwaytext>)

HORT 1132 3 credits**Turf Maintenance Operations**

Students will operate machinery at the School of Horticulture Field Lab to gain practical experience in turf maintenance. They will engage in tasks including mowing, cultivation, topdressing, seeding, sodding, and sand trap maintenance. Students will explore employment opportunities in the turfgrass industry.

Level: UG

Attributes: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributetext>), PW_3 (<https://calendar.kpu.ca/courses-az/#pathwaytext>)

HORT 1155 3 credits**Introduction To Plant Materials**

Students will practise skills that will enable them to identify a wide range of plants used in all segments of horticulture. They will study the physical characteristics used in field identification of plants. Students will learn to recognize patterns of growth common to plant family and genera. They will perform plant classification for a number of plants.

Level: UG

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributetext>)

HORT 1193 3 credits**Crop Production Practices**

Students will explore selected principles and practices of horticulture production. They will perform basic seasonal horticultural crop operations in the greenhouse and nursery facilities. Students will maintain and harvest seasonal flower and vegetable crops. They will also identify plant species important in commercial production. Students will attend field trips to horticulture industry operations as an essential part of this course.

Level: UG

Attributes: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributetext>), PW_3 (<https://calendar.kpu.ca/courses-az/#pathwaytext>)

HORT 1217 3 credits**Foundations of Plant Health**

Students will study the biology of pests (including insects, mites, and vertebrates) to select a combination of biological, cultural, physical, and chemical control methods. They will work with diseases and disorders of plants to demonstrate the spread of disease and the steps of disease diagnosis. Students will examine weed specimens to select appropriate control measures. They will discuss the tenets of integrated pest management and apply them to commercial horticulture situations.

Level: UG

Attributes: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributetext>), PW_3 (<https://calendar.kpu.ca/courses-az/#pathwaytext>)

HORT 1230 3 credits**Sustainable Turf Management**

Students will study and apply principles for the establishment and maintenance of sustainable turf. They will select and apply fertilizers, compost materials, and other amendments. Students will develop cultural programs for low maintenance lawns, lawns in sustainable landscapes, and organic lawns. They will review and discuss current issues affecting the ecology, function, use, and maintenance of turf in modern society.

Level: UG

Attributes: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributetext>), PW_3 (<https://calendar.kpu.ca/courses-az/#pathwaytext>)

HORT 1232 3 credits**Sports Turf Management Practices**

Students will explore management techniques for specialized turf areas such as football, rugby and soccer fields, baseball diamonds, bowling greens, and grass tennis and croquet courts. They will examine the management of alternative sports surfaces such as synthetic turf athletic fields, skinned baseball infields, clay and asphalt tennis courts, and hybrid turf and synthetic sports fields. Students will practice sports turf maintenance. They will prepare abstracts from relevant journal articles.

Level: UG

Prerequisite(s): HORT 1230

Cross-listing: HORT 2335

Attributes: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>), PW_3 (<https://calendar.kpu.ca/courses-az/#pathwaytext>)

HORT 1240 3 credits**Arboriculture I**

Students will study the relationships between plant function, growth, form and structure. They will gain practical experience, as weather permits, in pruning a wide range of trees and shrubs using hand pruning tools, power hedge trimmers, and a chipper.

Level: UG

Prerequisite(s): HORT 1155 or equivalent

Co-requisite(s): HORT 1102

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 1261 3 credits**Plant Propagation**

Students will discuss the main topics of plant propagation with a view towards sustainable practices. They will perform all aspects of seed propagation including seed storage, seed quality, seed dormancy, and the maintenance of environmental factors affecting seed germination. Students will perform micropropagation in a tissue culture laboratory. They will also perform traditional vegetative propagation (cuttings, grafting, division, layering, and specialized stems and roots) and discuss the proper environment used for each technique. Students will discuss plant breeding and contrast propagation methods used for native plants and plant clones.

Level: UG

Prerequisite(s): HORT 1102 or equivalent

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 1293 3 credits**Crop Production Operations**

Students will perform and evaluate basic operations in horticulture crop production systems. They will maintain and harvest seasonal greenhouse crops. Students will evaluate the process of crop selection and scheduling. They will also identify plant species important in commercial production. Students will attend field trips to commercial operations as an essential part of this course.

Level: UG

Attributes: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>), PW_3 (<https://calendar.kpu.ca/courses-az/#pathwaytext>)

HORT 2302 1 credit**Horticulture Work Experience**

Students will engage in paid employment at an instructor-approved landscape, turf or production work setting. They will record workplace activities and insights about their work experiences. Students will document 455 hours of work experience to achieve mastery in this course.

Level: UG

Prerequisite(s): 9 credits from HORT courses at the 1100 level

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 2306 1 credit**Work Experience Report**

Students will summarize their work experience and insights orally and in writing. They will participate in class discussions.

Level: UG

Co-requisite(s): HORT 2302

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 2308 3 credits**Landscape Pest Management**

Students will undertake a detailed study of specific pest and disease problems common to ornamental and native trees, shrubs, ground covers, annuals, and turfgrasses, with an emphasis on diagnosis. They will apply knowledge of pest life cycles, site analysis, and customer expectations to make appropriate control recommendations for various scenarios as consultants. Students will practice the use of a variety of pest control application technologies.

Level: UG

Prerequisite(s): All of the following: HORT 1102, 1105, 1155 and 1217.

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 2327 3 credits**Sustainable Landscape Design I**

Students will learn to document and communicate various aspects of the residential landscape design process. They will study and practice basic drafting techniques and standards for producing residential conceptual and technical landscape drawings. They will measure, document and analyze actual landscape sites for design ideas. Students will create scaled concept and planting plans. They will survey sustainability principles as they apply to urban landscape design.

Level: UG

Prerequisite(s): HORT 1155

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 2330 3 credits**Turfgrass and Environmental Stress**

Students will examine the effects of environmental stresses (including atmospheric, climatic, soil, and biotic stresses) on turfgrass growth, development, and function. They will discuss and apply management techniques, and will study the development of new techniques.

Level: UG

Prerequisite(s): HORT 1104 and 1230, or all of the following: HRTA 1230, 1231 and 1232.

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 2332 3 credits

Environmental Turf Management

Students will explore turfgrass industry environmental issues. They will assess societal positions, conduct site assessments and investigate environmental protection techniques. Students will develop an action plan for the promotion of environmental protection practices on intensely managed turfgrass sites.

Level: UG

Prerequisite(s): HORT 1230 and one of the following: HORT 1132 or 1134. Or equivalent.

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 2333 3 credits

Turfgrass Pest Management

Students will undertake a detailed study of the pests and weeds common to turfgrasses, and plants associated with turfgrass areas. They will examine and discuss pest life cycles, plant symptoms, pest prevention and control, and pesticide storage and use. Students will also learn about the importance of integrated weed, pest, and disease management using a variety of methods including Internet resources, diagnostic CD-ROMs, and interaction with pest management colleagues. Students will practice using pest control equipment on outdoor turfgrass.

Level: UG

Prerequisite(s): All of the following: HORT 1105, 1217 and 1230. Or equivalent.

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 2334 3 credits

Irrigation, Drainage and Lighting

Students will study the soil-water-plant relationship as it applies to landscape irrigation and drainage within the context of water conservation. They will explore the fundamental concepts of irrigation and drainage system design, installation and maintenance. Students will also practice system installation and maintenance of residential and small-scale irrigation and drainage systems.

Level: UG

Prerequisite(s): Both (a) HORT 1104 and (b) Level G1 as defined in the Math Alternatives Table (<https://calendar.kpu.ca/course-information/mathematics-alternatives-table/>)

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 2335 2.5 credits

Sports Turf Management Practices

Students will study and apply management techniques for specialized turf areas such as football, rugby and soccer fields, baseball diamonds, bowling greens, grass tennis and croquet courts. They also examine the management of alternate sports surfaces including synthetic turf athletic fields, skinned baseball infields, clay and asphalt tennis courts, and hybrid turf/synthetic sports fields. Students will practice sports turf maintenance.

Level: UG

Prerequisite(s): HORT 1230 or all of the following: HRTA 1230, 1231 and 1232.

Cross-listing: HORT 1232

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 2355 3 credits

Plant Materials II

Students will develop a general knowledge of plant material suitable for use in landscaped areas. They will identify, compare and classify over 200 different plant species hardy in the Pacific Northwest and other Canadian regions. Students will explain the ecological, cultural, morphological and architectural characteristics of plant material used in landscaped or remediated areas. They will begin to recognize the relationships between the ecological and cultural functions of plants.

Level: UG

Prerequisite(s): HORT 1155 or equivalent

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 2375 3 credits

Production Facilities and Systems

Students will study the essential elements of greenhouse site selection and site layout. They will analyse the features and benefits of common types of greenhouse structures and covering materials. Students will investigate benching types and layouts, irrigation systems, and greenhouse components. Students will monitor and maintain greenhouse facilities and equipment. Students will also explore related greenhouse systems such as heating, cooling and motorized screens/blankets. Students will investigate mechanization and ergonomics in crop production and describe these aspects following visits to commercial greenhouse operations.

Level: UG

Prerequisite(s): HORT 1193 or 1293

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 2378 3 credits

Production Horticulture Pests

Students will study the major pests and diseases (including insects and mites; bacteria, fungi, nematodes, parasitic plants, and viruses) of greenhouse and nursery crops, and mushroom farms. They will learn pest identification in the laboratory and on site by working with live specimens that they have collected. Students will practice monitoring and implementing control methods in crops. They will evaluate integrated pest management programs using a variety of resources.

Level: UG

Prerequisite(s): All of the following: HORT 1102, 1105 and 1217 (or equivalent).

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 2393 3 credits

Crop Production Performance

Students will evaluate production practices used in commercial greenhouse crops. They will examine the horticulture crop production industries in BC and Canada. Students will attend field trips to commercial horticulture operations.

Level: UG

Prerequisite(s): All of (a) HORT 1217, (b) HORT 1104 and (c) HORT 1193 or 1293

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 2412 3 credits**Landscape Estimating and Contract Administration**

Students will learn to prepare, administer and manage contracts and estimates for landscape projects. They will study and practice techniques for writing landscape contracts, and discuss multiple approaches to preparing landscape estimates. Students will summarize insurance, bonds, liens, and explore the relationships between financial, cost and cash flow accounting systems as they relate to the operation and management of a landscape company.

Level: UG

Prerequisite(s): A minimum 6 HORT credits at the 2000 level or higher and one of the following: BUSI 1209, BUSI 1210 or ACCT 1110.

Co-requisite(s): HORT 2426

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 2426 3 credits**Landscape Construction**

Students will explore both the theory and practice of landscape construction. They will practice the construction and installation of landscape elements such as patios, decks, garden walls, fences, arbors, and water features.

Level: UG

Prerequisite(s): One of the following: HORT 1122, 1124, 1132 or 1134

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 2427 3 credits**Sustainable Landscape Design II**

Students will explore conventional and sustainable approaches to landscape design associated with residential sites and small scale spaces. They will draft landscape plans. Students will practice design skills such as client interviews, preparing site inventory and analysis diagrams, and grading sloped sites for level areas. They will assess plant and material choices and design solutions that promote sustainability in landscape design. Students will prepare a portfolio including concept and working drawings such as planting, grading and layout plans, and construction details.

Level: UG

Prerequisite(s): Both (a) HORT 2355 and (b) HORT 2327

Attributes: ASTR (<https://calendar.kpu.ca/courses-az/#astrtext>), SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 2432 3 credits**Grounds Machinery Maintenance**

Students will perform maintenance on turfgrass machinery used on a golf course or in parks facilities. They will repair and maintain machinery used for turf cultivation, renovation, mowing, spraying, and other types of grounds maintenance. Students will design a layout plan of a mechanics shop and storage facility following environmental and safety guidelines.

Level: UG

Prerequisite(s): (HORT 1118 or HORT 1116) and (HORT 1132 or HORT 1134) and HORT 1230 or equivalent

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 2436 3 credits**Golf Course Management**

Students will study the operation and management of the golf course in the context of golf as a recreational activity, a competitive activity, and a business. Students will assess the impacts of the rules of golf, the play of the game, environmental stewardship, the organization of the turf care operations, and the organization of the golf business on golf maintenance operations. They will also analyze best management practices.

Level: UG

Prerequisite(s): HORT 2330

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 2437 3 credits**Golf Course Irrigation Systems, Designs, And Operations**

Students will design, analyze, and maintain golf course and athletic field irrigation systems. They will analyze sprinkler head selection and performance, pumping systems, valves types, controllers, software, and pipe characteristics. Students will discuss issues of water use and water quality. Through laboratory exercises students will perform irrigation audits, calculate water delivery, and schedule irrigation.

Level: UG

Prerequisite(s): HORT 1230 and 2334.

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 2442 3 credits**Arboriculture II**

Students will evaluate the benefits and processes for preserving urban trees. They will discuss and formulate preventative tree preservation strategies. Students will learn basic tree inventory methods and analyze and practice tree risk assessment and plant diagnosis methods.

Level: UG

Prerequisite(s): Both: (a) HORT 1240 and (b) HORT 1217

Attributes: ASTR (<https://calendar.kpu.ca/courses-az/#astrtext>), SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 2463 3 credits**Woody Plant Production and Development**

Students will discuss sustainable methods of tree and shrub production in containers and in the field to produce plant structure and form that meet industry standards. They will examine best methods of nutrient application, irrigation, and weed control. They will demonstrate propagation methods and plant maintenance practices.

Level: UG

Prerequisite(s): HORT 1104

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 2473 3 credits**Greenhouse Climate Control**

Students will study the control of climate factors within a greenhouse including temperature, humidity, air circulation, light, and carbon dioxide. They will monitor and adjust greenhouse climate using various methods, including modern integrated computerized control systems. Students will explore energy management strategies which are critical to sustainability in modern commercial greenhouse operations.

Level: UG

Prerequisite(s): One of the following: HORT 1171, 1193, 1271 or 1293.

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 2477 3 credits**Production Management**

Students will explore the decisions facing a production manager in a commercial greenhouse or nursery business, including crop selection, scheduling, space, time management, and costing. Students will develop a crop production plan as a major term project.

Level: UG

Prerequisite(s): One of (a) HORT 1193, or (b) HORT 1293, or (c) HORT 2393

Co-requisite(s): Either (a) HORT 2463 or (b) HORT 2493

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 2490 3 credits**Organic Crop Production**

Students will differentiate between various crop production systems against a background of traditional systems, sustainability, plant breeding and genetic modification (GM) of organisms. They will examine current organic accreditation standards and processes in Canada. Students will investigate crop rotations, describe characteristics of good quality growing media, and describe common organic crop nutrition inputs. Students will develop an integrated pest management (IPM) plan within organic constraints for a specific greenhouse or field crop and investigate the marketing claims of organic food. Students will examine safe food production practices within the context of organic systems. Students will apply studies in each of these areas to a review of a food system model as typified by a school community or municipality.

Level: UG

Prerequisite(s): 6 credits from HORT courses at the 1100 level or higher, or permission of instructor.

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 2493 3 credits**Crop Production Development**

Students will manage selected greenhouse crops to commercial industry standards. They will research the impact of cultural practices on crop development or investigate potential for new production systems. Students will describe safe food hygiene legislation and practices as related to commercial food production. Students will attend field trips to local greenhouse operations.

Level: UG

Prerequisite(s): HORT 2378 and 2393.

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 2599 3 credits**Special Topics in Horticulture**

Students will engage in an intensive study of a selected topic in horticulture. They will critically analyze relevant literature and develop a working knowledge of particular theories, methods, practices, and themes. Students will question and evaluate recent developments in the topic area. Note: the specific course content will be established in advance by the department. Students may take this course multiple times for further credit on different topics.

Level: UG

Prerequisite(s): 18 credits from courses at the 1100 level or higher.

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 3210 3 credits**Applied Urban Ecosystems**

Students will examine the relationship between people, the urban environment, and green spaces. They will analyze these landscapes for patterns of successful design, biodiversity, and physical connections between urban green patches in the same geographic area. Students will also assess public landscapes for community accessibility and social interaction. They will prepare and present plans which will improve the sustainability and value of urban green spaces.

Level: UG

Prerequisite(s): HORT 1155 and one of the following: 4 credits from BIOL courses or 3 credits from GEOG courses)

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 3230 3 credits**Urban Watershed Planning**

Students will examine watershed function and analyze water flow through urban areas and urban watersheds. They will study innovative watershed and stormwater management techniques and develop sustainable stormwater management solutions by using Low Impact Development (LID) strategies

Level: UG

Prerequisite(s): 30 credits from courses at the 1100 level or higher, including one of the following: (a) HORT 1104, (b) AGRI 2220, (c) ENVI 1121 (d) 4 credits BIOL, or (e) 3 credits GEOG

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 3250 3 credits**Monitoring, Inventory, and Assessment of Plant Communities**

Students will monitor and inventory plant populations and plant communities to assess levels of biodiversity within urban ecosystems. They will design a monitoring study, implement the study in the field, and analyze the results.

Level: UG

Prerequisite(s): HORT 1155

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 3251 3 credits**Landscape and Environment 1**

Students will analyze the convergence between principles of sustainable development and landscape conservation in constructed landscapes. They will perform a site assessment of features, site conditions, and existing plant material. Students will determine the criteria appropriate for analyzing and rating the sustainability of landscape development.

Level: UG

Prerequisite(s): 45 credits or permission from the instructor

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 3270 3 credits**Urban Agriculture**

Students will review the history, scope, and current application of urban agriculture. They will compare the production requirements and techniques for a variety of urban agriculture production models. Students will assess the impacts of urban agriculture on social, economic and environmental sustainability of communities.

Level: UG

Prerequisite(s): 9 credits from courses at the 2000-level

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 3310 3 credits**Entomology**

Students will study the relationship of arthropods to humans and human activities. They will study arthropod morphology, anatomy, physiology, development, classification, nomenclature, and identification. Students will analyze pest scenarios, and national and international quarantine concerns. They will work with live and preserved specimens in the laboratory and field, and will investigate aspects of arthropod physiology and behaviour in the laboratory. Students will prepare an arthropod collection of preserved and pinned specimens and are encouraged to begin the collection prior to the start of course.

Level: UG

Prerequisite(s): 45 credits or permission from the instructor

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 3320 3 credits**Plant Pathology**

Students will work with fresh and preserved specimens to recognize and diagnose plant diseases using a variety of laboratory tools and resources. Students will examine different types of plant parasitism in a variety of situations to evaluate appropriate control strategies. They will measure disease and predict the effects of various control tactics on disease progress and spread. Students will examine current horticultural practices to recommend strategies that reduce losses. They will examine plant protection legislation and apply it to current plant health issues.

Level: UG

Prerequisite(s): 45 credits or permission from the instructor

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 3330 3 credits**Biological Control in Pest Management**

Students will examine the biology, population ecology, reproduction strategies, life cycles, and commercialization of biological control agents. They will demonstrate the mechanisms of biological control using arthropod, fungal, viral, nematode, and bacterial biological control agents. Students will apply biological control agents in various agriculture settings and monitor their establishment and success. They will evaluate existing quality control standards for guarantee, viability, and efficacy. Students will investigate the development, production, and marketing biological control agents. They will work with regulatory agencies and commercial rearing and fermentation facilities.

Level: UG

Prerequisite(s): 45 credits or permission from the instructor

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 3360 3 credits**Scouting, Monitoring, and Assessment of Pests**

Students will utilize the current technologies and techniques to monitor populations of pests (vertebrates, arthropods, disease agents, and weeds) and beneficial organisms. They will analyze data and produce reports that delineate pest introduction, infestation, and spread. Students will monitor field crops, inspect plant shipments, and in conjunction with pest management professionals, they will apply appropriate regulations. Students will model pest population changes using monitoring data, geographic information systems (GIS) data, meteorological data, and other relevant data.

Level: UG

Prerequisite(s): HORT 3310 and MATH 1115

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 4231 3 credits**Riparian Management**

Students will discuss the functions of waterways and wetlands. Students will assess the design and management strategies used for riparian habitats and areas adjacent to these waterways. They will restore waterways, riparian areas, and wetlands including the installation of natural water filtration and waterway bank stabilization systems. The student will evaluate filtration and stabilization installations for ecosystem function as well as erosion control, slope maintenance requirements, and public safety.

Level: UG

Prerequisite(s): HORT 1104 or AGRI 2220

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 4252 3 credits**Landscape and the Environment: Applications**

Students will examine the nature of the interface between social and ecological systems. They will analyze the impact of community land use and climate change on the function and integrity of ecosystems, with a focus on the design of urban landscapes. Students will evaluate the flows of material and energy among social, ecological, and industrial components of the urban landscape. They will formulate recommendations that lead to ecosystem integrity and congruence in the dynamic balance of the planning, design, and construction of urban landscapes.

Level: UG

Prerequisite(s): 45 credits of undergraduate level courses

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 4253 3 credits**Urban Ecology**

Students will compare selected frameworks, models, and theories related to urban ecology. They will evaluate urban ecological research in the study of relationships between humans, their built environment, and biophysical processes. Students will communicate effectively with specific audiences regarding urban ecology and innovations for healthy and desirable urban landscapes.

Level: UG

Prerequisite(s): 45 credits or permission from the instructor

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 4340 3 credits**Pest Management**

Students will examine the control of a variety of pests using cultural, behavioural, biological, physical, mechanical, chemical, genetic, and legal means in diverse horticultural settings. They will discuss the ramifications of control measures from social, economic, environmental, political, and sustainable perspectives. Students will work with infested plants to study the effects of control tactics on pest populations, as well as the relationship between plant injury and damage. They will apply models of pest and disease population spread in a variety of situations. Students will develop integrated management strategies for horticultural commodities with consideration of provincial, federal, and international policies.

Level: UG

Prerequisite(s): HORT 3310, 3320, 3330 and 3360.

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 4350 3 credits

Environmental Effects of Plant Health Management

Students will study the effects of plant health practices on the environment. They will assess the impacts of plant health management tactics in a variety of settings. Students will formulate plant health strategies that mitigate environmental impacts; consider population dynamics, pesticide resistance, pest evolution, habitat biodiversity and preservation. They will compile and evaluate case studies that examine the impacts of a plant health management problem.

Level: UG

Prerequisite(s): HORT 3360 and one of the following: CHEM 1110 or ENVI 1106.

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 4370 3 credits

National and Global Regulatory Issues

Students will study the international movement of potentially destructive plant pests from a global perspective. They will select case studies that focus on the implications of pest movement via waterways, air, and road transportation. Students will also study Canadian legislative, regulation, and certification requirements, as well as regulations for countries that import or export plant material to and from Canada. They will present and discuss innovative methods used to manage or eradicate pests.

Level: UG

Prerequisite(s): 6 credits from HORT courses at the 3000 level.

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 4440 3 credits

Vegetation Management

Students will assess the natural history of plants considered to be weeds; and the economic, social, and environmental impacts of managing weeds. They will examine and choose vegetation management strategies for sites such as public green spaces, built landscapes, commercial horticulture operations, water features, and rights-of-way. Students will debate issues such as escaped, genetically modified plants and plant management regulations.

Level: UG

Prerequisite(s): 45 credits or permission from the instructor

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 4480 3 credits

Society and Horticulture

Students will analyze the social, economic, and ecological effects of horticulture from historical and contemporary perspectives. They will evaluate the implications for the sustainability of the natural resource base, and for present and future levels of production and consumption. Students will analyze issues and divergent intellectual traditions affecting sustainable horticulture. They will formulate horticultural solutions for social, environmental, and economic justice.

Level: UG

Prerequisite(s): 45 credits or permission from the instructor

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 4599 3 credits

Special Topics in Horticulture

Students will engage in an advanced study of a selected topic in horticulture. They will critically analyze relevant literature and develop a working knowledge of particular theories, methods, practices, and themes. Students will question and evaluate recent developments in the topic area. Note: the specific course content will be established in advance by the department. Students may take this course multiple times for further credit on different topics.

Level: UG

Prerequisite(s): 18 credits from courses at the 2000 level or higher

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 4810 3 credits

Applied Research Project 1 Horticulture

Students will design and prepare an applied research plan. They will prepare a budget and prepare a phased implementation plan for their research project. Students will prepare funding proposals. They will prepare and present an evaluation of the cost structure and a final budget. Students will seek a mentor's guidance to help consolidate previous learning and to help advance and broaden their understanding of the business ramifications of their research.

Level: UG

Prerequisite(s): ENGL 1100 and approval of instructor

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

HORT 4820 3 credits

Applied Research Project 2

Students will undertake the applied research project developed in HORT 4810 Applied Research Project 1. They will reflect on the applied research outcomes needed to generate solutions to problems and identify direction for future investigation.

Level: UG

Prerequisite(s): HORT 4810

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)