SUS-8100A -- Sustainable Agriculture: Food, Agricultural Planning and Economics, and Sustainable Land Use Planning

3 credits, 3 hours - 14 weeks + Final

Tuesdays 1:00pm – 3:50pm.
Room: Architecture 3M04.

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DESCRIPTION: Our society’s ability to supply wholesome sustainable food to a growing population in a changing world is one of the most critical challenges of our times. Today’s students of Landscape Architecture and Architecture, as well as the many other disciplines, will become the designers and practitioners of sustainable urban and rural agricultural practices in the near future. Because of this, there is an imperative need to understand the economic, environmental and community enriching methodologies gained through the use of sustainable agricultural practices, especially in the urban sector. This course examines urban-rural farming and agriculture, business development, and the economic methods used in deciding how to integrate sustainable agriculture into our land use and built spaces designs. We will compare agricultural practices, water use and energy needs, and sustainable alternatives to current standard practices. The course is taught within the frame to the triple bottom line of sustainability: Environment, Economy, Community, and is designed to give students a broad range of insights to make sustainable decisions in their professional lives through the lectures, design charretes, field trips, and problem solving exercises.

LEARNING OBJECTIVES:

1. To understand sustainable urban and rural agricultural practices in detail and how they can be a fundamental part of positive project economics and sustainable land use planning through landscape architectural and architectural design.

2. To understand the critical and positive impacts to our communities and environment through the use of sustainable agriculture.

3. To prepare the students with practical methods and factual knowledge to use in making sustainable agricultural design decisions, and to develop an understanding of project economics and the tools used to conduct cost-effective solutions.

TOPICS:

WEEK 1 - Introduction and Overview of Agriculture, Food and Food systems. We will begin by reviewing the state of rural and urban agriculture in the United States and an overview of global agriculture, impacts to the environment, economic challenges, and community imperatives. We will examine food requirements, and touch on
distribution systems and how they are impacted by non-sustainable and sustainable agricultural practices. We will review the principles of sustainability and their application to sustainable agriculture.

WEEK 2 - **Soil, Nutrients, and Crop Needs.** Starting with the soil, we will review soil types and nutrients, soil management with respect to urban and rural agriculture, and nutrient needs for various crops within landscape architectural and architectural design. Erosion control and other land use impacts will be reviewed.

WEEK 3 - **The Farm - How it Works: Productivity, Economics, and Sizes.** This topic frames our understanding of farming on a family-farm, urban farm, to a factory-farm scale, comparative productivity, land use impacts, and economics. This will build a basis for understanding alternative agricultural practices that can lead to sustainable food sources. We will discuss permaculture, hydroponic and aquaponic methods, and set the stage for urban farming practices.

WEEK 4 - **Nutrient Management Planning and Composting.** An examination of sustainable nutrient management planning, including alternatives to commercial fertilizers, scale of operations (individual, urban, rural), economics, and environmental impacts. We will examine in detail composting and recycling methods in fields and hydro- and aquaponics systems, the use of natural biota to augment permaculture urban composting, and how to integrate such practices and designs into these environments.

WEEK 5 - **Agricultural Water Use Requirements and Sources.** We will examine the the volumes of water required for various agricultural projects, both rural and urban, and businesses, sources of that water, and sustainable approaches in water management. We will review rainfall water collection methods, especially applicable to the urban environment and green roofs, as well as aquifer and watershed sources and impacts. Gray and brown wastewater management, treatment and reuse will be discussed. Wetland use in agricultural environments will be touched upon. A spreadsheet helping students calculate volumes, costs, and metrics will be part of homework assignments and in-class workshops.

WEEK 6 - **Dairy, Livestock and Fish Farming and Product Management.** The importance of dairy, livestock and fish farming, land use requirements, scales of operations, economics, and added value product development will be covered. Integration of organic dairy farming and livestock practices into a variety of rural and urban environments will be investigated through homework assignments and in-class projects. The use of hydroponics, aquaponics and greenhouses will be included in the class exercises.

WEEK 7 - **Cash Crops and Agricultural Economics.** We will examine the role of cash crops, such as key vegetables, specialty food products, coffee, rice, soy, sugar, and other critical crops and their economic importance. Example spread sheets will be used, and innovative problem solving will be conducted as part of the lectures and class
time. The class will work on an economic model for a project that introduces them to costing of these choices, integration in to sustainable and practical landscape architectural and architectural design.

WEEK 8 - **Organic Farming: Methods Review, Certification, and Sustainable Practices.** Review of organic and permaculture urban and rural farming and required certification, and the economic benefits of pursuing organic agriculture. We will cost-compare standard practices with organic practices, examine USDA Organic-approved methods of pest control and nutrient management needs, and examine costs of maintenance, production and labor. These will be put into the context of landscape architectural planning through spreadsheet use and design exercises.

WEEK 9 - **Sustainable Alternatives: Energy and Materials Requirements for Sustainable Food Sources.** An overview of renewable and conservation-oriented materials, and energy choices will be presented. This will include an overview of the use of biofuels from crops and livestock manure, and sustainable building materials crops such as bamboo. How these can be integrated into designs will be part of the lecture problem solving exercises.

WEEK 10 - **Field Trip to a the Brooklyn Grange.** This visit shows students a working 1-acre organic roof-top farm in NYC.

WEEK 11 - **Building a Sustainable Agricultural Business.** An overview of how to build a sustainable agricultural business, with a focus on the urban environment, as part of sustainable land use planning and landscape architectural design. We will look at benefits to communities through sustainable agriculture. This will include consideration of value-added products, commercial kitchens, farmer’s markets, groceries, whole sale businesses, native species nurseries and greenhouses, sustainable building and fuel materials crops (bamboo, switchgrass, etc.), and locally supplied food for communities. Students will conduct a design workshop with emphasis on an understanding of the economics and integration of sustainable practices.

WEEK 12 - **Global Warming and Climate Change: Impacts to our food sources and supplies.** We will examine factual scientific data that demonstrates the warming of Earth at an accelerated rate compared to natural processes, and the impact of these local, regional and global changes on our ability to grow and transport sustainable food supplies. This will include how these impacts can be compensated within architectural, landscape architectural and engineering designing of projects.

WEEK 13 - **Field Trip to a Residential Green Roof and Organic Restaurant.** A residential green rooftop garden in Battery Park is a working example of growing food on sky scraper roofs and balconies. We will also visit a working organic restaurant. The trip will show students the integration of agriculture, landscape architectural design, and workable maintenance for growing and preparing one’s own food.

WEEK 14 - **An Integrated Planning Workshop for Sustainable Agriculture Design.**
This class session will act as a student-led planning session to summarize the learned materials from the course, and integrate them into land use and built spaces design decisions. This will be run as a charrette, and role playing as client and consultant will test students knowledge of the issues, agricultural and sustainable practices, and methods of measuring and documenting progress towards sustainability.

COURSE REQUIREMENTS AND GRADING:

Lectures (w/ design charrets & problem sets): 30%  
Field Trips & practical application exercises: 20%  
Quizzes: 10%  
Participation: 10%  
Class Project: 15%  
Final Exam: 15%

READING LIST SAMPLE (Select readings from these and other resources):


