AGRICULTURAL ENGINEERING FOR SUSTAINABLE DEVELOPMENT

ENAE 101

Lecture : 2 **Year : I**
Tutorial : 1 **Part : I**
Practical : 0

Course Objectives:
The course is designed to provide comprehensive concepts of sustainable development, agricultural practices, irrigation practices, energy practices, post-harvest practices, soil and water conservation and farm machinery fostering a holistic approach from farm to fork and agro-food ecosystem.

1 Overview of Sustainable Development (6 hours)

1.1 Introduction and importance of sustainable development
1.2 Three pillars of sustainable development
1.3 Evolution from MDG to SDG
1.4 United nations sustainable development goals and indicators (UN SDGs)
1.5 SDG's goal's linkage with agricultural system and interaction
1.6 The role of agricultural engineering in achieving sustainable development goals
1.7 Application of SDGs in the design and implementation of sustainable project
1.8 Enabling environment for sustainable agricultural system

2 Sustainable Agricultural Practices (8 hours)

2.1 Overview of sustainable agriculture and associated practices
2.2 Concept of conservation agriculture and precision farming
2.3 Integrated pest management (IPM) in agriculture
2.4 Organic farming practices
2.5 Concept of climate smart agriculture
2.6 Life cycle assessment of agro-food ecosystem
2.7 Application of ICA to agro-food ecosystems
2.8 Farm to fork concept
2.9 Roles of agriculture engineering and associated engineering practices in farm to fork concept
2.10 Concept of permaculture farming

3 Sustainable Irrigation Practices (3 hours)

3.1 Concept of agricultural water management
3.2 Importance of sustainable water management in irrigated agriculture in Nepal
3.3 Efficiencies in irrigation system from the water management perspectives
3.4 Water saving technologies in irrigated agriculture like drip and sprinkler irrigation
3.5 Rainwater harvesting and storage for agriculture

4 Sustainable Energy for Agriculture (3 hours)

4.1 Energy use in agriculture processing
4.2 Renewable energy sources for and from agriculture and livestock
4.3 Energy-efficient farming practices in Nepal

5 Sustainable Soil and Water Conservation Practices (4 hours)

5.1 Concept of integrated watershed management plan
5.2 Agroforestry and soil conservation practices for sustainability of watershed
5.3 Soil erosion and conservation measures in practice
5.4 Low cost watershed management practices for sustainable agriculture
5.5 Concept of land use plan and importance of land use planning
5.6 Concept of land fragmentation and land consolidation and its importance in Nepal

6 Sustainable Farm Machinery (3 hours)

6.1 Farm machinery equipment and sustainable agriculture
6.2 Role of machinery in sustainable agriculture
6.3 Energy-efficient farm equipment and practice in Nepal
6.4 Precision farming equipment

7 Sustainable Post-Harvest Practices (3 hours)

7.1 Post-harvest practices for sustainable agriculture
7.2 Post-harvest losses and their impact
7.3 Solar drying and its application
7.4 Low-cost and eco-friendly storage techniques
7.5 Value chain actor's and importance of value chain for sustainability of agro-food eco system in Nepal

Tutorials

1. Case study of local food sustainability practices, focusing on the three sustainability dimensions
2. Case study on food sustainability analysis

3. Group work could be on quantitative or qualitative analysis of sustainability synergies and trade-offs associated with different food options
4. A case study of sustainable practice in agriculture
5. A case study on actor's from field to plate (Like farmer's, pre- and post-harvesting processor, value chain actor's etc.)

Reference

1. https://sustainabledevelopment.un.org/frameworks
2. NPC. (2017). Sustainable Development Goals: status and roadmap 2016-2030. National Planning Commission, Nepal, 2017.
3. Ojha, T. P., Michael, A. M. (2012). Principles of agricultural engineering (12th ed., Vols. 1–2). New Delhi: Jain Brothers.
4. Pradhan, P., Costa, L., Rybski, D., Lucht, W., Kropp, J. P. (2017). A systematic study of sustainable development goal (SDG) interactions. Earth's Future,5(11), 1169-1179