



हिमाचल प्रदेश केन्द्रीय विश्वविद्यालय  
Central University of Himachal Pradesh

(Established under Central Universities Act 2009)

शाहपुर परिसर, जिला कांगड़ा, हिमाचल प्रदेश - 176206

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File No: Plant Sciences/1-1/PG/CUHHP/21/316

Dated: 11/11/2021

**LIST OF INTER DISCIPLINARY COURSES TO BE OFFERED BY THE DEPARTMENT OF PLANT  
SCIENCE UNDER NEP 2020**


**SEMESTER-I**

S. No.	Courses Name	Courses Code	Credits	Name of Faculty Member
<b>Inter Disciplinary / Minor Courses</b>				
1	Advances in Cell Biology	PLS 418	2	Dr. Ashun Chaudhary
2	Principles of Organic and Natural farming	PLS 419	2	Dr. Munish Sharma
3	Fundamentals of Enzymology	PLS 420	2	Dr. Munish Sharma
4	Elements of Plant Breeding	PLS 421	2	Dr. Munish Sharma / Dr. Himadri

  
Head  
Department of Plant Science

**Copy To:**

1. Notice Board.
2. The System Analyst, Central University of Himachal Pradesh, Dharamshala for uploading on the University website.
3. The Dean, School of Life Sciences, Central University of Himachal Pradesh, Academic Block, Shahpur for information.
4. The Controller of Examinations, Central University of Himachal Pradesh, Camp Office, Dharamshala for information.

  
Head  
Department of Plant Science

**Course Name: Advances in Cell Biology**

**Course Code: PLS 418**

**Credits = 02**

**Learning outcomes:**

After the end of the course, the student will be able:

- To understand how these cellular components are used to generate and utilize energy in cells.
- To understand the structural organization of cell and intracellular organelles.
- To understand the general principles of cellular communication and roles of different molecules
- To acquire knowledge of replication, transcription and translation

**UNIT-1**

General structure and constituents of cell, difference between prokaryotic and eukaryotic cell, cell wall, cell membrane, structure and composition of bio membrane, similarities and distinction between plant and animal cell, Cell division and regulation of cell cycle.

**UNIT-2**

Structure and function of major cell organelles: nucleus, chloroplast, mitochondria, ribosomes, lysosomes, peroxisomes, endoplasmic reticulum, microbodies, Golgi apparatus, vacuole etc.

**UNIT-3**

Nucleic acids as a genetic material, structure and properties of DNA and RNA, genome organization of eukaryotes and prokaryotes, chromatin structure and function.

**UNIT-4**

DNA replication in prokaryotes and eukaryotes, transcription and translation in prokaryotes and eukaryotes.

**UNIT-5**

Post transcriptional and post translational modifications.

**Reference Books:**

1. Gupta P.K. 2003. Cell and Molecular Biology. 2<sup>nd</sup> Ed. Rastogi publication.
2. Lodish H. 2003. Molecular Cell Biology. 5<sup>th</sup> Ed. W.H. Freeman & co.
3. Primrose S.B. 2001. Molecular Biotechnology. Panima
4. Nelson DL & Cox MM. 2007. Lehninger Principles of Biochemistry. 5<sup>th</sup> Ed. MacMilan.

**Course Name: Principles of Organic and Natural farming**

**Course Code: PLS 419**

**Credits: 02**

**Learning outcomes:**

By successfully completing the course, the student will be able:

- To gain the theoretical knowledge in Organic Farming Practices
- To Learn a means of self-employment and income generation

**UNIT-1**

**Introduction to Organic Farming:** Why Organic Farming? Concept and Principles of organic farming; Historical development of Organic Farming / Agriculture, Advantages and Disadvantages,

**UNIT-2**

Natural Farming, Integrated and Mixed Farming system, Ecological Farming; Organic Farming Models: Fukuoka (Japan), Permaculture (Australian Organic Farming),

**UNIT-3**

**Role of Bio-fertilizers in Organic Farming:** Bioformulations and Bio-Pesticides, Effective Microbial Technology in Organic Farming

**UNIT-4**

**Harvest and Post-harvest Management under Organic Farming:** Soil Health and Nutrient Management, Integrated Pest and Disease Management; Weed control

**UNIT-5**

Quality Assurance and Certification in Organic Farming, Marketing of Organic Farming Products:

**Reference Books:**

1. Sarath Chandran, Unni M.R and Sabu Thomas. 2018. Organic farming. Woodhead Publishing, UK.
2. Reddy, S.R.2017. Principles of organic farming. Kalyani publishers, India
3. Ranjan Kumar Biswas. 2014. Organic farming in India. New Delhi Publishers, India.
4. Peter Fossil. 2014. Organic Farming: How to Raise, Certify, and Market Organic Crops and Livestock. Reprint edition, Voyageur Press, USA.
5. Organic farming-Theory and Practice by S.P. Palaniappan and K. Annadurai
6. Organic crop production (Principles and practices Vol-I: Principles and General Aspects) by J. P. Sharma

**Course Name: Fundamentals of Enzymology**

**Course Code: PLS 420**

**Credits = 02**

**Learning outcomes:**

After the end of the course, the student will be able:

- To describe structure, functions and mechanism of action of enzymes
- To classify enzymes based on the reactions catalyzed.
- To understand the kinetics, inhibition and regulation of enzyme catalyzed reactions.

**UNIT-1**

Basic concept, Classification and Nomenclature of Enzymes, Chemical nature of enzymes. Protein nature of enzymes and Non protein enzymes - Ribozymes and DNAzymes. Coenzymes and Cofactors, Classification of coenzymes: Isozymes, Abzymes, Synzyme

**UNIT-2**

Lock and key, Induced fit and Transition state Hypotheses. Mechanism of enzyme catalysis- Acid-base catalysis, covalent catalysis, Metal ion catalysis

**UNIT-3**

Enzyme inhibition: Reversible Inhibition- Competitive, Non Competitive, Uncompetitive, Mixed, Substrate, Allosteric and Product Inhibition. Irreversible Inhibition

**UNIT-4**

Factors affecting the enzyme activity- Concentration, pH and temperature. Kinetics of a single-substrate enzyme catalysed reaction, Michealis-Menten Equation, Kinetics of Enzyme Inhibition.

**UNIT-5**

Feedback and Allosteric Regulation, Organization of enzymes in the cell. Mechanisms of enzyme degradation

**Reference Books:**

1. Fundamentals of Enzymology : Nicholas Price & Lewis Stevens
2. Enzymes : Biochemistry, Biotechnology and Clinical Chemistry- Trevor Palmer
3. Biochemistry by Donald Voet, Judith G. Voet, Publisher: John Wiley & Sons (2011), Fourth Edition, ISBN-10: 0071737073, ISBN-13: 978-0071737074.
4. Fundamentals of Biochemistry by J. L. Jain, Sunjay Jain, Nithin Jain (2008), Publishers: S. Chand & Co Ltd ISBN: 81-219-2453-7.
5. Lehninger, Principles of Biochemistry by Nelson, D. L., Lehninger, A. L., & Cox, M. M.(2008), 5thEdition, ISBN: 978-0-230-22699-9, Publisher: W. H. Freeman and Company, New York, p: 677-878.

**Course Name: Elements of Plant Breeding**

**Course Code: PLS 421**

**Credits = 02**

**Learning outcomes:**

After the end of the course, the students will be able:

- To develop conceptual understanding of plant genetic resources, plant breeding, gene bank and gene pool.
- To familiarize with genetic basis of heterosis.
- To understand the different methods of plant breeding for the improvement of crop

**UNIT-1**

Introduction and objectives of Plant Breeding, History of Plant Breeding (Pre and post-Mendelian era), Important characteristics improved by plant breeding, Self- and cross - pollinated crops including mating systems and response to selection

**UNIT-2**

Breeding methods in asexually/clonally propagated crops, Line breeding, pedigree, bulk, backcross, single seed descent and multi-line method; Population breeding in self pollinated crops

**UNIT-3**

Male sterility and self-incompatibility in crop plants and their commercial exploitation, Pure line theory, pure line selection and mass selection methods

**UNIT-4**

Breeding methods in cross pollinated crops; S1 and S2 progeny testing, progeny selection schemes; Genetical and physiological basis of heterosis and inbreeding, Inbreds production, seed production of hybrid and their parent varieties/inbreds

**UNIT-5**

Mutation breeding; Breeding for abiotic and biotic stresses. Cultivar development- testing, release and notification, maintenance breeding, Plant breeders' rights and regulations for plant variety protection and farmers rights

**Reference Books:**

1. Roy D. 2003. Plant Breeding, Analysis and Exploitation of Variation. NarosaPubl.House.
2. Sharma JR. 2001. Principles and Practice of Plant Breeding. Tata McGraw-Hill.
3. Singh P. 2006. Essentials of Plant Breeding. Kalyani.
4. Singh S & Pawar IS. 2006. Genetic Bases and Methods of Plant Breeding. CBS.
5. Das, L.D. Vijendra (2006) Plant Breeding. New Age International Publishers, New Delhi.
6. Singh, B.D. (2012). Plant Breeding: Principles and Methods. Kalyani Publishers. 9th edition.