

SARVAJANIK UNIVERSITY
FACULTY OF SCIENCE



**SARVAJANIK
UNIVERSITY**

INCLUSIVE | INTEGRATED | INNOVATIVE

Faculty of Science

B. Sc. (Honors)

Environmental Science

DETAILED CURRICULUM

(W.E.F. 2024-25)

SARVAJANIK UNIVERSITY
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Semester 3

B.Sc. (Hons) Environmental Science Semester 3			
Sr. No.	Category	Course Title	Course Type
1	Major	Natural Resources and Managment	Compulsory
2		Ecology and Ecosystem Services	Compulsory
3		Sustainable Agricultural Practices	Compulsory
4	SEC	Mushroom Cultivation Technology	Elective
		Economical Arthropods	
5	VAC	Indian Knowledge Systems (Temple Architecture and Design)	Elective
		Indian Knowledge Systems (Gananshastra)	
6	AEC	Communication Skills	Elective
		Mastering Google Drive	
7	Multidisciplinary	Entrepreneurship and Innovation- Indian Context	Elective
		Green Schools	
		Personal Finance and Investment Planning	
		Pharmaceutical Product	

Name of Faculty: Science	Department: Environmental Science
Program: B.Sc. (Hons)	Type: Major
Subject: Natural Resources and Management	Semester: 3
Credits: 03 + 01 = 04	
Course Description: This course will develop student's exploring capacity in natural resources including biomes, land, air, water, energy.	
Student Learning Outcomes (SLOs): At the end of the course, students will be able to: 1. Define the basic concepts of various types of natural resources 2. Understand sources and origin of natural resources 3. Determine different issues and problems with resource utilization 4. Analyze methods of natural resource conservation 5. Evaluate strategies of exploitation of natural resources 6. Create a sustainable plan for the management of natural resources	

UNIT-1: Land resources (7 Lecture)

- 1.1 Classification and types of land resources
- 1.2 Land degradation, soil erosion and desertification
- 1.3 Landscape impact analysis
- 1.4 Principle and methods of soil conservation

UNIT-2 Water resources (7 Lecture)

- 2.1 Use of surface and ground water
- 2.2 Over utilization of water resources
- 2.3 Water storage and problems
- 2.4 Principle and methods of water conservation

UNIT-3 Energy resources (7 Lecture)

- 3.1 Types and need of energy resources
- 3.2 Use and exploitation of renewable energy resources
- 3.3 Use and exploitation of non-renewable energy resources
- 3.4 Principle and methods of conservation energy resources

UNIT-4 Forest resources (7 Lecture)

- 4.1 Types and characteristics of forest resources
- 4.2 nutrient cycle and carbon storage in forest
- 4.3 Deforestation and afforestation
- 4.4 Principle and methods of conservation of forest resources

UNIT-5 Agricultural resources (7 Lecture)

- 5.1 Sources of agriculture resources: animal and crops
- 5.2 overgrazing and effect of modern agriculture
- 5.3 effect of fertilizer and pesticides

5.4 Principle and methods of conservation of agricultural resources

Unit-6 Marine resources (7 Lecture)

- 6.1 Products from marine sources
- 6.2 dependence of fish and other resources.
- 6.3 unsustainable harvesting and resource supply
- 6.4 Issues and challenges

Practicals:

1. Study of vegetation by Chart Quadrant, Frequency and Relative Frequency methods.
2. Estimation of species diversity by Shannon - Weiner diversity index method.
3. Study of fauna of local area / college campus.
4. Preparation of field report based on the survey of local flora.

Suggested References:

1. Francois Ramade 1984. Ecology of Natural Resources. John Wiley & Sons Ltd, ISBN-13 : 978-0471906254.
2. Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA **(Library)**

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FACULTY OF SCIENCE

Faculty: Science	Department: Environmental Science
Program: B. Sc. (Hons)	Type of Subject: Major
Subject: Ecology and Ecosystem Services	
Semester: 3	
Credits: 4	

Student Learning Outcomes (SLOs):

1. The course is designed to provide the basic understanding of ecosystem and its structural and functional aspects.
2. It will explore the interconnectedness among all the biotic and abiotic components of the environment and the dynamic nature of the ecological processes in maintaining equilibrium in nature.

References and Textbooks:

1. P. D. Sharma (Rastogi Publications, New Delhi), Ecology and Environment. ISBN: 978171338143.
2. Junaid Jazib, (Iqra Publications, New Delhi). Basics of Environmental Science. ISBN: 9788193046050.
3. R. Rajagopalan. (Oakbridge Publication). Environment and Ecology: A complete guide. ISBN: 9789350357583

UNIT-1: Basic Concepts in Ecology

(7 hours)

- 1.1 Ecology: Introduction, Definition, History and Terminology
- 1.2 Major divisions of Ecology, Concept of holism
- 1.3 Effect of light on plants and animals, Photoperiodism
- 1.4 Effect of temperature on plants and animals

UNIT-2: Ecological Types and Adaptations

(8 hours)

- 2.1 Concept of SPAC, Water balance problems, Types of water in soil
- 2.2 Ecological groups of plants: Hydrophytes, mesophytes and Xerophytes
- 2.3 Ecological adaptations in plants: morphological, physiological and anatomical features
- 2.4 Ecological adaptations in animals: Hydrocoles, Mesocoles and Xerocoles
- 2.5 Concept of mimicry and echolocation

UNIT-3: Autoecology of Species and Ecological Amplitude

(7 hours)

- 3.1 Ecological clocks and circadian rhythms
- 3.2 Liebig's law of minimum, Shelford's law of tolerance
- 3.3 Genecology, Ecological amplitude, Ecads and Ecotypes
- 3.4 Ecological equivalents and Character displacement

UNIT-4: Ecosystem Types, Structure and Functions

(8 hours)

- 4.1 Habitat Ecology, Freshwater Ecology, Marine Ecology, Estuarine Ecology and Terrestrial Ecology
- 4.2 Types of Ecosystems: Natural and Man-made, Biotic and Abiotic components of ecosystem
- 4.3 Ecological Pyramids
- 4.4 Productivity of ecosystems
- 4.5 Structure of some Ecosystem: Pond, Marine, Grassland, Forest, Cropland and Desert

UNIT-5: Population Ecology

(8 hours)

- 5.1 Population Ecology- Introduction, Definition and Importance, Characteristics of Population
- 5.2 Theories of population growth, plant growth dynamics, Yoda's self-thinning law
- 5.3 Concept of community and community characteristics
- 5.4 Analytical and Synthetic characters for community studies
- 5.5 Methods of community studies, Classification of communities, Concept of Ecotone

UNIT-6: Ecological Succession

(7 hours)

- 6.1 Types, Causes and Trends of succession
- 6.2 Process of Ecological Succession
- 6.3 Hydrosere, Lithosere and Heterotrophic succession
- 6.4 Concept of climax in ecological succession

Practicals:

1. Study of the effect of light and temperature on seedling growth.
2. Study of synthetic (Presence, Constancy, Fidelity) and analytical (frequency, density and abundance) characters of vegetation.
3. Study of Raunkiaer's normal frequency distribution of vegetation.
4. Study of anatomical adaptations of hydrophytes (Roots and petiole), Xerophytes (Stem and Root), Mesophytes (monocot and dicot leaf, stem and root).
5. Determination of porosity, bulk density, water holding capacity and field capacity of soil.
6. Determination of soil color by Munsell chart.

Name of Faculty: Science	Department: Environmental Science
Program: B.Sc. (Hons)	Type: Major
Subject: Sustainable Agriculture Practices	Semester: 3
Credits: 03 + 01 = 04	
Course Description: This course is aimed... 1. To introduce eco-friendly and climate-resilient agricultural and livestock management systems. 2. To develop skills for improving farm productivity through sustainable inputs and practices. 3. To enhance understanding of soil, water, pest, crop, and animal health management. 4. To promote integration of crop and animal systems for efficient land use and livelihood. 5. To encourage entrepreneurship and community participation in sustainable farming.	
Student Learning Outcomes (SLOs): At the end of the course, students will be able to: 1. Define the principles of sustainable agriculture and animal husbandry. 2. Understand ecological techniques to maintain soil fertility and pest control. 3. Apply knowledge of livestock for milk, meat, egg, and manure production sustainably. 4. Correlate government schemes and integrated farming systems for income generation. 5. Evaluate merits and demerit of integrated approaches in agriculture. 6. Participate in field-based learning and practice resource optimization in rural environments.	

Unit 1: Principles of Sustainable Agriculture (7 Hours)

- 1.1 Concept, scope, and need for sustainable agriculture
- 1.2 Comparison: traditional, industrial, and sustainable systems
- 1.3 Agroecology, biodiversity in farming, climate-smart agriculture
- 1.4 Integrated and holistic farm approaches

Unit 2: Soil, Water, and Nutrient Management (8 Hours)

- 2.1 Soil health, composting, vermicomposting, mulching
- 2.2 Rainwater harvesting, drip and sprinkler irrigation
- 2.3 Biofertilizers and green manures
- 2.4 Soil testing and fertility restoration

Unit 3: Crop Management and Organic Practices (7 Hours)

- 3.1 Crop rotation, intercropping, companion planting
- 3.2 Seed selection and preservation
- 3.3 Organic farming certification and marketing
- 3.4 Pest and disease management using botanicals and biologicals

Unit 4: Basics of Animal Husbandry (8 Hours)

- 4.1 Importance of livestock in rural economy
- 4.2 Housing, feeding, breeding, and health management
- 4.3 Common livestock types: cattle, goats, poultry, sheep
- 4.4 Ethnoveterinary practices and clean milk production

Unit 5: Integration of Crop-Livestock Systems (8 Hours)

- 5.1 Benefits of crop-livestock integration
- 5.2 Livestock waste management and use as manure/biogas
- 5.3 Fodder production and rotational grazing

5.4 Integrated Farming System (IFS) models in India

Unit 6: Policies, Programs, and Entrepreneurship in Sustainable Farming (7 Hours)

- 6.1 PM-Kisan, Rashtriya Gokul Mission, PKVY, ATMA
- 6.2 Farmer Producer Organizations (FPOs), SHGs and cooperatives
- 6.3 Rural entrepreneurship and agri-based startups
- 6.4 Digital tools and ICT in agriculture and livestock care

Practicals:

- 1. Preparation of Compost Fertilizer
- 2. Estimation of Soil pH, Electric Conductivity and Organic Matter.
- 3. Interpretation of Soil Health Card
- 4. Preparation of *Panchagavya*

Suggested Readings and References

- 1. Palaniappan, S.P., & Annadurai, K. (2014). *Organic Farming – Theory and Practice*. Scientific Publishers.
- 2. Reddy, T.Y., & Reddy, G.H.S. (2021). *Principles of Agronomy*. Kalyani Publishers.
- 3. Grewal, H.S. (2008). *Animal Husbandry and Dairying*. Kalyani Publishers.
- 4. Singh, C.P. (2012). *Sustainable Agriculture*. Agrotech Publishing Academy.
- 5. ICAR Handbooks on Integrated Farming Systems and Organic Agriculture
- 6. Government of India: Guidelines from MoA&FW on PKVY, RGM, NLM, and FPOs
- 7. FAO (2020). *Climate-Smart Agriculture Sourcebook*

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Faculty of Science

B.Sc. (Hons)

Faculty: Science	Department: Microbiology
Program: B. Sc. (Hons)	Type: Skill Enhancement Course
Subject: Mushroom Cultivation Technology	Credits: 2
Semester: 3	
Learning Outcome: Upon finishing the Mushroom Cultivation Technology course, students will 1. Acquire diverse skills encompassing mushroom cultivation methods, substrate preparation, environmental management, and harvesting practices. Furthermore, they will gain insights into assessing market opportunities and crafting effective strategies for thriving mushroom cultivation enterprises. 2. Aligns with the SKILL INDIA MISSION ('Kaushal Bharat, Kushal Bharat') by fostering professional competency among students, nurturing their entrepreneurial capabilities for sustainable growth.	

Reference:

1. Participant Handbook by Agriculture Skill Council of India.
2. National Horticulture Board (NHB): Cultivation Technology and Technical Standards of Components of Integrated Button Mushroom Unit, Ministry of Agriculture and Farmers Welfare, Government of India.
3. ED, A. M., ED, S. S., & Thakur, M. P. (2016). Mushroom Training Manual. ICAR, India.

Unit 1: Introduction to Mushrooms

(8 hours)

- 1.1 Overview of mushrooms and their importance
- 1.2 Basic biology of mushrooms
- 1.3 Edible vs. non-edible mushrooms
- 1.4 Health benefits of edible mushrooms
- 1.5 Popular edible mushroom species available in India

Unit 2: Cultivation Techniques and Practices

(8 hours)

- 2.1 Overview of cultivation methods
- 2.2 Container selection
- 2.3 Substrate selection, preparation, and sterilization
- 2.4 Preparation of spawn and spawning
- 2.5 Controlling temperature, humidity, and light

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B.Sc. (Hons)

Unit 3: Harvesting and Post-Harvest Handling (7 hours)

- 3.1 Understanding the mushroom growth cycle
- 3.2 Harvesting techniques and timing
- 3.3 Storage

Unit 4: Market Potential of Mushrooms (7 hours)

- 4.1 Overview of the mushroom market and demand
- 4.2 Considerations for scaling up mushroom production
- 4.3 Funding and support options for mushroom cultivation businesses

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Faculty: Science	Department: Environmental Science
Program: B. Sc. (Hons)	Type of Subject: SEC
Subject: Economical Arthropods	
Semester: 3	
Credits: 2	

Student Learning Outcomes (SLOs):

After completing the course, students will be able to:

1. The paper will introduce students to insects economically useful to humans.
2. Students will also learn the classification, morphology and morphology of insects.
3. Students will also gain skilful knowledge regarding rearing, culturing, preservation and processing techniques of various products of selected insects.

References and Textbooks: (With Author, Edition, Publishers, ISBN)

1. Jordan and Verma (2015): Invertebrate Zoology, S.Chand Publication, New-Delhi.
2. Kotpal, R. L (2005): Arthropoda, Rastogi Publication, Meerut.
3. Kotpal, R.L (2011): Invertebrates, Rastogi Publication, Meerut.
4. Upadhyay and Shukla (2002): Economic Zoology, Rastogi Publication, Meerut.

Unit 1: Introduction to Arthropoda

7 Hours

- 1.1 Biological Success
- 1.2 Habits & Habitat
- 1.3 General Characters
- 1.4 Classification of Arthropoda

Unit 2: Apiculture

7 Hours

- 2.1 Species & Social Organization of Honey Bee
- 2.2 External Morphology & Selection of Bees
- 2.3 Appliances & Methods for Bee Keeping
- 2.4 Products & Economic importance of Bee Keeping

Unit 3: Prawn Culture

8 Hours

- 3.1 Types & Species of Prawn
- 3.2 Culturing of Fresh & Marine Water Prawn
- 3.3 Preparation & Methods of Farming
- 3.4 Preservation & Processing of Prawn

Unit 4: Lac Culture

8 Hours

- 4.1 Distribution & Life History
- 4.2 Selection of Host Plant
- 4.3 Cultivation & Processing of Lac
- 4.4 Threats & Economic importance of Lac Industry

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Faculty: Science	Department: Environmental Science
Program: B. Sc. (Hons)	Type of Subject: Value Added Course
Subject: IKS (Temple Architecture and Design)	
Credits: 2	
Semester: 3	

Student Learning Outcomes (SLOs):

After completing the course, students will be able to:

1. Understand architectural diversity of ancient and modern Hindu temples.
2. Learn different parts and styles of Hindu temples.
3. Gain knowledge about history and design of famous Indian temples.

References and Textbooks: (With Author, Edition, Publishers, ISBN)

1. Krishna Dev (1963): Temples of Northern India, National Book Trust of India, Delhi.
2. S. Krimirish (1946): Hindu Temples Part I and II, Calcutta.
3. Shri K.R. Nivason (2016): Dakshin Bharat Ke Mandir, National Book Trust of India, Delhi.
4. Surendra Sahai (2007): Indian Architecture-Hindu, Buddhist, and Jain, Prakash Books, India. ISBN: 9788172341299

Unit 1: Introduction and Fundamentals of Forest Mensuration System (07 hours)

- 1.1 Introduction and basic form of Hindu temple
- 1.2 Terminology of Hindu temple
- 1.3 Key features of Hindu temples

Unit 2: Styles of temple Architecture (07 hours)

- 2.1 Nagara (North Indian) Style
- 2.2 Vesara Style
- 2.3 Dravida (South Indian) Style

Unit 3: Features of temple architecture (08 hours)

- 3.1 Features of Nagara and Dravida Temple Style Architecture of India
- 3.2 Classification of Nagara Temple Style
- 3.3 Classification of Dravida Temple Style
- 3.4 Deccan, Buddhist and Jain temple architecture, Hill temples

Unit 4: Major Hindu temples of India (08 hours)

- 4.1 Meenakshi Amman Temple
- 4.2 Khajuraho Group of Temples
- 4.3 Brihadeeswarar Temple
- 4.4 Puri Jagannath Temple
- 4.5 Shri Somnath Temple

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Faculty of Science

Faculty: Science	Department: Computer Sci
Program: B.Sc. (Hons)	Type: Value Added Course (VAC)
Subject: Indian Knowledge System (Gananshastra)	Credits: 2
Semester: 3	

References:

1. Introduction to Indian Knowledge Systems - Concepts and Application, B. Mahadevan, Vinayak Rajat Bhat, Nagendra Pava R.N., PHI Publication
2. Sivananda S. All about hinduism. Sivananda literature research institute; 1988.
3. Dharampal G. Essential Writings of Dharampal. Publications Division Ministry of Information & Broadcasting; 2017 Nov 3.
4. Bajaj J, Śrīnivāsa MD. Sanatana Bharat, jagrita Bharat= Timeless India, resurgent India: a celebration of the land and people of India. (No Title).

Unit 1: Number System in IKS - Part 1

(07 hours)

- Number System in India - Historical Evidence
- Features of Indian Numeral System - Concept of zero and its importance, Large Number Representation, Place Value Numerals, Decimal System

Unit 2: Number System in IKS- Part 2

(07 hours)

- Unique Approaches to Represent Numbers
 - Bhuta Samkhya System,
 - Katapyadi system
- Pingala and Binary System
- Binary word system

Unit 3: Arithmetic

(08 hours)

- Square of Number,
- Square Root
- Square Root of Imperfect Squares
- Binary Mathematics and Combinatorial Problems in Chanda Shahstra of Pingala 300 BCE
- Magic Squares in India

Unit 4: Series and Progression

(08 hours)

- Series - upaciti
- Sum of Series of Squares and Cubes
- Repeated sum of series - Varasnkalita
- Pi approximation techniques
- Contribution of Indian Mathematicians

Name of Faculty: Science	Department: All
Program: B.Sc. (Hons)	Type: Ability Enhancement Course (AEC)
Subject: Communication Skills	Semester: 3

Credits: 02	Total Learning Hours: 30 Hours
Course Description: • Identify common communication problems that may be holding learners back • Perceive what the non-verbal messages are communicating to others • Understand the role of communication in the teaching-learning process • Learn to communicate through the digital media • Understand the importance of empathetic listening • Explore communication beyond language	
Student Learning Outcome: After completion of the course the student will be able to 1. Get a clear understanding of good communication skills 2. Know what they can do to improve their communication skills.	

Unit – 1 Listening & Speaking Skills

(08 Hours)

- 1.1. Techniques of Effective Listening
- 1.2. Listening and Comprehension
- 1.3. Probing Questions
- 1.4. Barriers to Listening
- 1.5. Pronunciation
- 1.6. Enunciation
- 1.7. Vocabulary
- 1.8. Common Errors

Unit – 2 Reading Skill

(06 Hours)

- 2.1. Techniques of Effective Reading
- 2.2. Gathering Ideas and Information from a Given Text
- 2.3. Evaluating these Ideas and Information
- 2.4. Interpreting the Text

Unit – 3 Writing and Different Modes of Writing

(08 Hours)

- 3.1. The Writing Process
- 3.2. Effective Writing Strategies
- 3.3. Different Modes of Writing
- 3.4. Types of Business Letters - Inquiry, Reply, Complaint
- 3.5. Email, Blogs

Unit – 4 Non – Verbal Communication

(08 Hours)

- 4.1. Meaning of Nonverbal Communication (NVC)
- 4.2. Advantages of Using Nonverbal Communication
- 4.3. Introduction to Modes of Nonverbal Communication
 - 4.3.1. Open and Closed Body Language
 - 4.3.2. Eye Contact and Facial Expression
 - 4.3.3. Hand Gestures
- 4.4. Do's and Don'ts in NVC
- 4.5. Learning from Experts
- 4.6. Activities-based Learning

Recommending Reading:

1. Kumar, S and Pushp Lata. Communication Skills. New Delhi, OUP, 2015.
2. Raman, Meenakshi and Sangeeta Sharma. Technical Communication: Principles and Practice. New Delhi, OUP, 201

Online Resources:

1. <https://www.thoughtco.com/what-is-nonverbal-communication-1691351>
2. <https://www.skillsyouneed.com/ips/nonverbal-communication.html>
3. <https://www.andrews.edu/~tidwell/bsad560/NonVerbal.html>
4. <https://artofeloquence.com/pages/the-importance-of-body-language>
5. https://www.tutorialspoint.com/body_language/body_language_open_closed.htm# Life Skills (Jeevan Kaushal) Facilitators' Manual 2022 39
6. <https://study.com/academy/lesson/facial-expressions-in-nonverbal-communicationimportance-lesson-quiz.html>
7. <https://www.sophia.org/tutorials/eye-contact-and-facial-expression>
8. <https://socialtriggers.com/21-hand-gestures-for-powerful-communication/>
9. <https://www.gqrgm.com/interview-dos-donts-importance-nonverbal-communication/> Video
10. <https://www.lifemasterygym.com/blog/power-of-non-verbal-communication>
11. <https://www.youtube.com/watch?v=vyrGNZ4Lzrw>
12. https://www.youtube.com/watch?v=FU0DkL184_4
13. <https://www.youtube.com/watch?v=qRnwdWXbwDY>
14. <https://www.youtube.com/watch?v=1zs-DRBWLmE>
15. Bailey, Stephen. 2010. Academic Writing: A handbook for International Learners. Routledge
16. Hogue, Ann. 1995. First Steps in Academic Writing. Pearson Longman.
17. Taylor, Shirley. 2006. Communication for Business. Pearson Education.
16. <https://learnenglishteachers.britishcouncil.org/skills/writing>
18. <http://www.sciedu.ca/journal/index.php/ijhe/article/view/9190>
19. <https://www.britishcouncil.in/>
20. <https://literarydevices.net/context/>
21. <https://courses.lumenlearning.com/waymaker-level3-english/chapter/text-inductivereasoning/>
22. <http://www.criticalreading.com/interpretation.htm>
23. <http://www.criticalreading.com/restatement.htm>
24. <http://www.criticalreading.com/description.htm>
25. https://www.britishcouncil.in/sites/default/files/day_3_-_sruti_akula.pptx
26. https://www.cs.kau.se/cs/education/courses/dvad07/Lectures/Critical_Reading.pdf

27. <https://www.youtube.com/watch?v=fOYtzoil2XI> 2.
<https://www.youtube.com/watch?v=VrD9-In6C1o>
28. <https://literarydevices.net/context>
<https://www.strategiesinlanguagelearning.com/how-to-improve-english-pronunciation/>
29. <http://giftarist.expertscolumn.com/article/speech-delivery-importance-enunciation-andpronunciation>
30. <https://www.wikihow.com/Enunciate>
31. <https://englishforeveryone.org/PDFs/Homonyms,%20Homographs,%20Homophones.pdf>
32. <https://learnenglishteens.britishcouncil.org/exams/speaking-exams/fluency>
33. <https://www.learnpick.in/blog/8-common-mistakes-make-speaking-english>
34. <https://www.fluentu.com/blog/english/common-mistakes-in-english>

Faculty: Science	Department: Microbiology
Program: B. Sc. (Hons)	Type: Ability Enhancement Course (AEC)
Semester: 3	
Subject: Mastering Google Drive	
Credit: 02	Total learning hours: 30 hr
Rationale: / Course description: In today's digital age, proficiency with online tools like Google Drive is essential. Google Drive provides a free and accessible platform for storing, sharing, and collaborating on documents. Google Drive is widely used in educational settings for assignments, collaboration among students and teachers, and managing course materials. Mastery of Google Drive can enhance one's professional skill set, making individuals more competitive in the job market and more valuable to employers.	
Students Learning Outcome: Upon completion of the course, students will be able to: 1. Understanding Google Drive Basics 2. Effective File Management Skills 3. Collaborative Editing and Real-Time Collaboration	

References:

1. **Steve, R. (2020).** Google Drive, Docs, and Sheets for Beginners 2021: Using Google Drive, Docs, and Sheets and Utilizing All Its Features. United States: RS Publishing House.
2. **Lamont, I. (2018).** Google Drive & Docs in 30 Minutes: The Unofficial Guide to Google Drive, Docs, Sheets & Slides. United States: I30 Media Corporation. ISBN: 9781641880107
3. **Darbyshire, P., Darbyshire, A. (2010).** Getting StartED with Google Apps. Netherlands: Apress.

Unit-1: Basics of Google drive		
	1.1	Use of Google Drive
	1.2	Interface of Google drive
	1.3	Navigating the main screen of google drive
	1.4	Making of folder, Management of folders
Unit-2: Use of Google Docs		
	2.1	Creating Google Doc, Naming the file
	2.2	Editing the file
	2.3	Understanding of Various Tabs and their function
	2.4	Import, Export and Sharing of Google Docs
Unit-3: Use of Google Sheet		
	3.1	Creating and naming the Google Sheet
	3.2	Importing the data
	3.3	Formatting the sheet
	3.4	Basic Functions in Google sheet and sharing
Unit-4: Use of Google Slide and Google forms		

	4.1	Creating and launching of Google slide
	4.2	Import the presentation and add slide to the presentation
	4.3	Editing the google slide
	4.4	Export, share and present the google slide
	4.5	Creating , editing and formatting google form and quiz
	4.6	Host control; Sharing and collecting the data by Google Form

Name of Faculty: Science	Department: Biotechnology
Program: B.Sc. (Hons)	Type: Theory
Subject: Entrepreneurship and Innovation- Indian Context	Semester: 03
Credit: 04	Total learning hours: 60
Type: Multidisciplinary course	
Course description: This multidisciplinary course is designed to provide students with a comprehensive understanding of entrepreneurship and innovation in the Indian context, equipping them with the knowledge, skills, and networks needed to succeed as entrepreneurs in India's diverse and dynamic market landscape.	
Student learning outcome: 1. Students will be able to demonstrate the ability to recognize market needs and gaps, generate innovative ideas and evaluate the feasibility and viability of entrepreneurial opportunities. 2. Students will be able to create well-structured and actionable business plans that outline the mission, vision, goals, strategies, and financial projections of a new venture, integrating market analysis, competitive positioning, and growth strategies. 3. Students will be able to get idea about to the entrepreneurial landscape in India, historical perspectives, and current trends 4. Students will understanding the Indian startup ecosystem, funding options, and support mechanisms for entrepreneurs 5. Students will developing comprehensive business plans and strategies tailored to the Indian market.	

References:

1. Startup India: Insight for Aspiring Entrepreneurs by Varun Aggarwal (2017) Publisher: Penguin Random House India
2. The lean Start Up: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Business by Eric Ries (2011) Publisher: Crown Business
3. India Startup Ecosystem: An Entrepreneur's Guide to Navigating the Indian Startup Landscape by Mukesh Bansal (2020) Publisher: Harper Collins India

Unit-1 Introduction to Entrepreneurship in India (8 hrs)

- 1.1 Overview of Indian entrepreneurial ecosystem: opportunities, challenges, and key players
- 1.2 Historical evolution of entrepreneurship in India
- 1.3 Role of government policies, regulatory environment and cultural factors in shaping entrepreneurship

Unit-2 Opportunity Recognition and Ideation (8 hrs)

- 2.1 Market research and analysis for identifying unmet needs in the Indian market
- 2.2 Idea generation methods tailored to the Indian context
- 2.3 Identifying opportunities in emerging sectors such as technology, agriculture, healthcare and renewable energy

Unit-3 Indian Startup Ecosystem and Funding Landscape (8 hrs)

- 3.1 Overview of Incubators, accelerators and start up support organization in India
- 3.2 Sources of funding for startups: angel investors, venture capital, government schemes
- 3.3 Case studies of successful Indian startups and their funding journeys

Unit-4 Business planning and strategy (8 hrs)

- 4.1 Component of business plan: market analysis, financial projections, marketing strategy
- 4.2 Adapting global business models to the Indian context
- 4.3 Strategies for navigating regulatory and bureaucratic hurdles in India

Unit-5 Marketing and Sales Strategies for Indian Markets (8 hrs)

- 5.1 Market segmentation and targeting strategies in diverse Indian demographics
- 5.2 Pricing, distribution and promotional strategies tailored to Indian consumer behavior
- 5.3 Digital marketing and e-commerce trends in India

Unit-6 Innovation and Technology in India (6 hrs)

- 6.1 Emerging technologies with potential for disruption in India
- 6.2 Startups leveraging technology to address Indian societal challenges
- 6.3 Government Initiative promoting innovation and technology entrepreneurship

Unit-7 Legal and Regulatory Environment in India (6 hrs)

- 7.1 Business registration, intellectual property protection and compliance requirement in India
- 7.2 Contract Law, employment regulation and taxation for startups
- 7.3 Challenges and opportunities in navigating the Indian legal system

Unit-8 Scaling and Growth Strategies for Indian Startups (8 hrs)

- 8.1 Scaling models and growth strategies for Indian start ups
- 8.2 Accessing international markets and global expansion strategies
- 8.3 Managing organizational growth and maintainin startup culture

Faculty: Science	Department: Environmental Science
Program: B. Sc. (Hons)	Type of Subject: Multidisciplinary
Subject: Green Schools	Semester: 3
Credits: 4	

Student Learning Outcomes (SLOs):

1. The course is designed to provide the basic understanding of teaching methodology for green education.
2. It will be helpful to students to develop teaching capacity to teach school students with understanding nature and sustainable goals to save energy and environment.

References and Textbooks:

1. Towards a Green School on Education for Sustainable Development for Elementary Schools by National Council of Educational Research and Training
2. Joy Palmer, Philip Neal, The handbook of Environmental Education, Routledge.

Unit 1: Green School Concept and Curriculum

1. Green School: Concept and Background
2. Green School and ESD
3. Essential Aspects
4. Towards Green School Curriculum
5. What is Greening of Curriculum?
6. Understanding Green Curriculum

Unit 2: Green Practices

1. The Classroom
2. Common Spaces
3. Conserving Water
4. Conserving Electricity
5. Managing Garbage
6. Plantation

Unit 3: Greening of School Activities

1. School Assembly
2. Occasions and Festivals
3. Safe School Environment
4. Infrastructure Safety Audit

Unit 4: Assessment

1. How Green is a School?
2. Profile of a Green School

Unit-5: Planning and Practices at Primary Level

1. Overall model for teaching and learning
2. Issue-Based themes and topics

Unit-6: Planning and Practices at Secondary Level

1. Lesson plan
2. Individual efforts- litter as an example
3. Concentric Approach
4. Blocking time-table

Unit-7: The Out Of school approach (The Field Work)

1. Out of classroom
2. Local action for a better environment
3. School case studies

Unit-8 Practicalities For Environmental Education

1. Developing policies
2. Implementation of School Policies

Faculty: Science	Department: Microbiology
Program: B. Sc. (Hons)	Type: Multidisciplinary
Subject: Personal Finance and Investment Planning	
Credits: 4	Semester: 3
Course description: The course is designed to provide basic financial literacy which is a prerequisite for the students to manage financial aspects of the life.	
Student learning outcome: 1. To familiarize students with the Financial System, Institutions & Market. 2. To expose students to the various avenues available for effective investment and risk management. 3. Acquire skill to protect assets by insurance planning. 4. Understanding of the Indian tax system. 5. Able to plan financially independent retirement.	

Reference Books:

1. Jeff Madura, Personal Finance, 7th edition, Pearson Education, 2020 (ISBN: 978-0-13-498996-9)
2. Shalu Garg, Personal Financial Planning, 1st Edition (2024) Sultan Chand & Sons, New Delhi (ISBN: 978-93-91820-90-9)
3. M.K. Sarva, Personal Financial Planning, LPU, Excel Books Pvt. Ltd., new Delhi
4. Arthur J. Keown: Personal Finance, Pearson India.
5. Eric Tyson: Personal Finance, 6th Edition Wiley publishing
6. Faith Glasgow: Personal Finance and investing, John Wiley and sons
7. Jack R. Kapoor, Les R. Dlabay, Robert J. Hughes, Melissa Hart: Personal Finance, Tata McGraw Hill India.
8. Lewis Altfest: Personal Financial Planning, Tata McGraw Hill.
9. Sinha. Madhu, Financial Planning: A Ready Reckoner July 2017 McGraw Hill.

Unit-1: Structure of Indian Financial System

(Duration: 08 Hrs)

- 3.1 Features of Indian financial system
- 3.2 Components of Indian financial system
 - 3.2.1 Financial Institutions
 - 3.2.2 Financial markets
 - 3.3.3 Financial Instruments/Assets/Securities
 - 3.3.4 Financial Services
- 3.3 Functions of Indian financial system
- 3.4 Regulators of Indian Financial markets.

Unit-2: Introduction to personal financial planning**(Duration: 07 Hrs)**

- 2.1 Meaning and concept of finance
- 2.2 Different definition of finance
- 2.3 Meaning and concept of financial planning
- 2.4 Importance of financial planning
- 2.5 Financial goals: Types of financial goals & SMART financial goals
- 2.6 Components of financial plan
- 2.7 Process of financial planning

Unit-3: Fundamentals of Investment**(Duration: 07 Hrs)**

- 3.1 Objective of investments
- 3.2 Types of investments
- 3.3 Managing Investment Risk – Types of risk, Measurement of risk
- 3.4 Return from Investment – Types of return and their calculations

Unit-4: Investment Instruments - I**(Duration: 08 Hrs)**

- 4.1 Government Securities & Small Saving Schemes
- 4.2 Fixed income Instruments
- 4.3 Bond
- 4.4 Precious metal
- 4.5 Real estate & REITs
- 4.6 Digital currency
- 4.7 International Investment Avenues

Unit-5: Investment Instruments - II**(Duration: 08 Hrs)**

5.1 Stocks: Stock exchanges, Stock Price Quotations, Purchasing and selling stocks – Selecting broker, Placing an order, Buying stocks on margin, Short selling stock, Analyzing stocks – Firm's Financial and economic condition, Industry condition, Limitation of stock analysis.

5.2 Mutual Fund: Introduction – NAV, Open-End V/s Closed-End fund, Load v/s No load fund, Expense ratio., Types of mutual funds: Stocks, Bonds., Exchange traded funds: Types, Advantage & Disadvantage., Return and risk of mutual fund, Reviewing a Mutual Fund's Prospectus.

Unit-6: Insurance Planning**(Duration: 07 Hrs)**

- 6.1 Need for insurance
- 6.2 Characteristics of Insurance
- 6.3 Rights of the Insurer
- 6.4 Rights of the Insured
- 6.5 Types of Insurance

Unit-7: Personal Tax Planning**(Duration: 07 Hrs)**

- 7.1 Concept of tax structure in India – Direct tax and Indirect tax
- 7.2 Need for tax planning
- 7.3 Objectives & Advantages of tax planning

7.4 Exemption and Deduction

7.5 Tax Saving Options

Unit-8: Retirement Planning

(Duration: 08 Hrs)

8.1 Why plan for retirement

8.2 Retirement assets

8.3 Retirement planning goals

8.4 Process of retirement planning

8.5 Pension plans available in India

8.6 Will

Name of Faculty: Science	Department: Biotechnology
Program: B.Sc. (Hons)	Type: Theory
Subject: Pharmaceutical Product	Semester: 04
Credit: 04	Total learning hours: 60
Type: Multidisciplinary course	Semester: 3
Course description: The objectives of this course are to provide students with a comprehensive understanding of the process involved in developing pharmaceutical products from conception to market launch. This course integrates principles from various fields including pharmacology, chemistry, biology, engineering and marketing to equip students with the necessary knowledge and skills to contribute effectively to the pharmaceutical industry.	
Student learning outcome: 1. Students will develop an understanding of pharmaceutical industry and its products. 2. Students will gain knowledge about techniques of drug formulation, dosage , drug delivery and along with excipients. 3. The units will also focus on and thus provides knowledge of drug stability and shelf life, along with pharmaceutical packaging and labelling. 4. At the end of the course, the students will have sufficient scientific understanding of the subject and have good knowledge of current trends and future direction in pharmaceutical product.	

References:

Pharmaceutical Analysis: A Textbook for Pharmacy Students and Pharmaceutical Chemists" by David G. Watson

Unit-1 Introduction to Pharmaceutical Products

(6 hr)

- 1.1 Overview of the pharmaceutical industry
- 1.2 Historical perspective
- 1.3 Milestone in drug development

Unit-2 Drug formulation and Dosage forms

(8 hr)

- 2.1 Types of drug dosage forms
 - 2.1.1 Solid
 - 2.1.2 liquid
 - 2.1.3 semi solid
 - 2.1.4 parenteral
- 2.2 Principle of drug dosage formulation and dosage form design
- 2.3 Manufacturing process and techniques for different dosage forms

Unit-3 Pharmaceutical Excipients

(6 hr)

- 3.1 Role of excipients in drug formulation
- 3.2 Common excipients used in pharmaceutical products and their fundtions

Unit-4 Drug delivery system

(8 hr)

- 4.1 Controlled release drug delivery system
- 4.2 Targeted drug delivery system

- 4.3 Novel drug delivery techniques – Nasal, Osmosis, RNAi
- 4.4 Personalize medicine and personalize drug target

Unit-5 Drug stability and Shelf life

(8 hr)

- 5.1 Factors affecting drug stability
- 5.2 Method of assessing shelf life of pharmaceutical products
- 5.3 Method of extending shelf life of pharmaceutical products

Unit-6 Quality control and drug stability testing

(8 hr)

- 6.1 Definition and importance of Quality control
- 6.2 Role of QC in pharmaceutical manufacturing
- 6.3 Types and Importance of drug stability testing
- 6.4 Factor affecting stability testing

Unit-7 Pharmaceutical packaging and labelling

(8 hr)

- 7.1 Packaging materials for pharmaceutical products
- 7.2 Packaging techniques for pharmaceutical products
- 7.3 Labelling requirement and regulation

Unit-8 Case studies of popular pharmaceutical products

(8 hr)

- 8.1 Aspirin
- 8.2 Viagra
- 8.3 Lipitor