



Maharaja Surajmal Brij University
Bharatpur (Rajasthan)
Syllabus for Skill Enhancement Course
(Under Graduate Programme)
Semester IV
Session 2024-25 & onwards

SEC-13P-401 – Introduction to SCILAB

Semester	Code of the Course	Title of the Course/Paper		NHEQF Level	Credits
III/IV	SEC-13P-401	Introduction to SCILAB		6	2
Level of Course	Type of the Course	Credit Distribution		Offered to NC Student	Delivery Type of the Course
		Theory	Practical		
Introductory	Skill Enhancement	-	2	No	60 Hours Practical
Prerequisites	No Prerequisite				
Objectives of the Course:	Objectives of the Course – <ul style="list-style-type: none"> • Develop Scilab Proficiency • Master Basic Scilab Syntax • Manipulate Scalars and Vectors • Function Plotting and Data Visualization • Matrix Operations • Understand and Manipulate Polynomials • Apply Linear Programming 				

Examination Scheme-

Regular Students –

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks (CA + EoSE)	Minimum Marks (CA + EoSE)
Practical	SEC-13P-401-Introduction to SCILAB	1 Hrs-CA 1 Hrs-EoSE	10 Marks-CA 40 Marks-EoSE	4 Marks-CA 16 Marks-EoSE

The Practical examination Scheme for **Introduction to SCILAB** should be as follows –

- Two Practical Exercises of 15 Marks each
- Viva-Voce – 5 Marks
- Record – 5 Marks

The duration of the Practical Examination will be 1 Hour


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Detailed Syllabus

SEC-13P-401- Introduction to SCILAB

Unit-I

Downloading and installing Scilab. The Scilab environment: The editor, command window, graphic window, window management and workspace customization. Basic syntax, mathematical operators, predefined constants, built-in functions, variable assignments.

(15 Hours Practical)

Unit-II

Scalars and vectors: Introduction, initializing vectors in Scilab. Mathematical relational and logical operators on vectors. Elementary mathematical functions, mathematical functions on scalars, trigonometric functions, inverse trigonometric functions, hyperbolic functions. Plotting of data and functions.

(15 Hours Practical)

Unit-III

Matrices on Scilab: Introduction, arithmetic operators for matrices, rank of a matrix, determinant, inverse of a matrix, solution of system of linear equations, Eigen-values and Eigen-vectors.

(15 Hours Practical)

Unit-IV

Polynomials: Introduction, creation of polynomials, basic polynomial commands, finding roots of polynomials, polynomial arithmetic, miscellaneous polynomial handling. Linear programming problems: Introduction, solution by Karmarkar algorithm.

(15 Hours Practical)

Suggested Books and References –

1. M. Affouf, Scilab by example, 2012
2. H. Ramachandran, A.S.Nair, Scilab (A free software to Matlab), 2011, S. Chand and Company.
3. Scilab for very beginners-www.scilab-enterprises.com

Course Learning Outcomes:

By the end of the course, students will be proficient in solving a range of Mathematical problems with big data sets using Scilab.


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SEC-13T-402 – Vedic Mathematics

Semester	Code of the Course	Title of the Course/Paper		NHEQF Level	Credits
III/IV	SEC-13T-402	Vedic Mathematics		6	2
Level of Course	Type of the Course	Credit Distribution		Offered to NC Student	Delivery Type of the Course
		Theory	Practical		
Introductory	Skill Enhancement	2	-	Yes	30 Hours Theory
Prerequisites	No Prerequisite				
Objectives of the Course:	This course aims to introduce students to the principles and techniques of Vedic Mathematics, providing them with tools to perform high-speed arithmetic, including addition, subtraction, multiplication, and division using ancient Sutras and Up-Sutras. Students will explore efficient methods for calculating squares, cubes, and their roots, enhancing their mental math skills. Additionally, the course covers Vedic approaches to solving algebraic equations, enabling students to tackle simple, simultaneous, and quadratic equations with ease and precision. Through these techniques, students will gain a deeper appreciation for the power and simplicity of Vedic Mathematics.				

Examination Scheme-

Regular Students –

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks (CA + EoSE)	Minimum Marks (CA + EoSE)
Theory	SEC-13T-402-Vedic Mathematics	1 Hrs-CA 1 Hrs-EoSE	10 Marks-CA 40 Marks-EoSE	4 Marks-CA 16 Marks-EoSE

The question paper for **Vedic Mathematics** will be so set that it has 40 multiple-choice questions (Bilingual) of one mark each. The duration of the question paper will be 1 hour. The examinees will have to give their answers on an OMR sheet only to be provided by the University whose evaluation will be done based on OMR Scanning Technology.

Non-Collegiate Students –

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks (EoSE)	Minimum Marks (EoSE)
Theory	SEC-13T-402-Vedic Mathematics	1 Hrs	50 Marks	20 Marks

The question paper for **Vedic Mathematics** will be so set that it has 50 multiple-choice questions (Bilingual) of one mark each. The duration of the question paper will be 1 hour. The examinees will have to give their answers on an OMR sheet only to be provided by the


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Detailed Syllabus

SEC-13T- 402- Vedic Mathematics

Unit-I

Introduction of Vedic mathematics: History, Sixteen Sutras and up sutra, Base, Subbase, Complementary Numbers and Nikhilam Number. **High-Speed Addition:** Without Carrying and Dot Method, Super-fast **Subtraction:** Nikhilam Navatashcaramam Dashatah. (07 Hours)

Unit-II

Multiplication: Sutra Nikhilam, Sutra Urdhva Tiryak, Magic with 11-19, Multiplication with 99999, Multiplication of Numbers near bases
Magic Division: Nikhilam Method, The Flag Method (08 Hours)

Unit-III

General Squares, Interesting mental Squares: 11-20; 40-50; 50-60; 60-70. Cubing below and above the bases, General Cubes, Square roots by Duplex Method, Digital root and Cube root (07 Hours)

Unit-IV

Vedic Methods of Solution of Algebraic Equations: Sutra Paravartya Yojayet, Sutra Sunyama Samyasamuchaye, Anurupyate Sunyamanyat. Solution of Simple Simultaneous Equations and some special form of quadratic equation (08 Hours)

Suggested Books and References –

1. Vedic Mathematics Made Easy, Dahaval Bathia, Jaico Publishing, New Delhi 2011
2. Vedic Mathematics: Sixteen Simple Mathematical formulae from the Vedas, Jagadguru Swami Sri Bharati Krishna Trithaji, Motilal Banarasidas, New Delhi 2015.
3. Vedic Ganita, Navkar Prakashan, Ajmer, Rajasthan

Course Learning Outcomes:

By the end of the course, students will be proficient in improving mathematical calculation.


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SEC-13T-403 – Entrepreneurship Theory & Practices

Semester	Code of the Course	Title of the Course/Paper		NHEQF Level	Credits
III/IV	SEC-13T- 403	Entrepreneurship Theory & Practices		6	2
Level of Course	Type of the Course	Credit Distribution		Offered to NC Student	Delivery Type of the Course
		Theory	Practical		
Introductory	Skill Enhancement	2	-	Yes	30 Lectures
Prerequisites					
Objectives of the Course:	Objectives of the Course – The course aims at equipping the students with the basic understanding of the Entrepreneurship function, along with the skill sets and knowledge required to establish and run an enterprise successfully.				

Examination Scheme-

Regular Students –

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks (CA + EoSE)	Minimum Marks (CA + EoSE)
Theory	SEC-13T-403 : Entrepreneurship Theory & Practices	1 Hrs-CA 1 Hrs-EoSE	10 Marks-CA 40 Marks-EoSE	4 Marks-CA 16 Marks-EoSE

The question paper for SEC-63T-213: Entrepreneurship Theory & Practices will be so set that it has 40 multiple-choice questions (Bilingual) of one mark each. The duration of the question paper will be 1 hour. The examinees will have to give their answers on an OMR sheet only to be provided by the University whose evaluation will be done based on OMR Scanning Technology.

Non-Collegiate Students –

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks (EoSE)	Minimum Marks (EoSE)
Theory	SEC-13T- 403: Entrepreneurship Theory & Practices	1 Hrs	50 Marks	20 Marks

The question paper for SEC-13T- 403: Entrepreneurship Theory & Practices will be so set that it has 50 multiple-choice questions (Bilingual) of one mark each. The duration of the question paper will be 1 hour. The examinees will have to give their answers on an OMR sheet only to be provided by the University whose evaluation will be done based on OMR Scanning Technology.



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Detailed Syllabus

SEC-13T- 403 : Entrepreneurship Theory & Practices

Unit -I

Entrepreneurship conceptual aspects: Entrepreneurship and economic development, role of Entrepreneurs, theories and concepts, barriers to Entrepreneurship, Entrepreneurs, managers and intrapreneurs.

(8 Lectures)

Unit -II

Entrepreneurial process & entrepreneurship development: Entrepreneurial competencies, traits, characteristics, motives, attitudes, achievement orientation, self-assessment.

(7 Lectures)

Unit - III

Preparing for an entrepreneurial career: Deciding for an entrepreneurial career, identification and selection of business opportunities, market assessment, technology search, production capacity, assessment of infrastructure requirements and other resources, business plan and its importance.

(7 Lectures)

Unit - IV

Institutional infrastructure to promote entrepreneurship: Overview, roles, schemes of promotional, financial, regulatory and other support system institutions

Emerging trends in entrepreneurship: Technopreneurship, entrepreneurs, agripreneurs, Women entrepreneurship, Portfolio entrepreneurship, Franchising.

(8 Lectures)

Suggested Books and References –

1. Charantimath, P.M. Entrepreneurship Development and Small Business Management, Person Education
2. Gupta CB, Srinivasan NP, Entrepreneurship Development in India, Text & Cases, Sultan Chand & Sons, New Delhi.
3. Desai Vasant, Fundamentals of Entrepreneurship and Small Business Management, Himalaya Publishing House.



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Course Learning Outcomes:

By the end of this course, students will have a comprehensive understanding of the role of entrepreneurship in economic development and the critical factors that influence entrepreneurial success. They will be equipped with knowledge of key theories and concepts related to entrepreneurship, including the differences between entrepreneurs, managers, and intrapreneurs, and the various barriers that can hinder entrepreneurial activities. Students will develop essential entrepreneurial competencies such as self-assessment, motivation, and achievement orientation, which are crucial for navigating the entrepreneurial process. Additionally, they will learn to identify and evaluate business opportunities, assess market potential, and understand the importance of technology and infrastructure in launching a successful venture. The course will also provide insights into the institutional support available for entrepreneurs, including promotional, financial, and regulatory frameworks. Finally, students will explore emerging trends in entrepreneurship, such as technopreneurship, agripreneurship, and franchising, preparing them for diverse entrepreneurial careers in the modern economy.



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SEC-13T-404- Global Business Environment

Semester	Code of the Course	Title of the Course/Paper		NHEQF Level	Credits
III/IV	SEC-13T- 404	Global Business Environment		6	2
Level of Course	Type of the Course	Credit Distribution		Offered to NC Student	Delivery Type of the Course
		Theory	Practical		
Introductory	Skill Enhancement	2	-	Yes	30 Lectures
Prerequisites	XII Pass				
Objectives of the Course:	Objectives of the Course – This course aims to provide students with a comprehensive understanding of international business, focusing on the various types of international operations and the external environments that influence global business decisions. The course will explore key international institutions such as the WTO, IMF, and World Bank, along with their significance to Indian businesses. Students will also gain insight into exchange rate mechanisms, the implications of currency convertibility, and the impact of foreign investments. Additionally, the course will address globalization's role in human resource development and social responsibility within the context of regional economic organizations like SAARC and ASEAN.				

Examination Scheme-

Regular Students –

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks (CA + EoSE)	Minimum Marks (CA + EoSE)
Theory	SEC-13T-404 - Global Business Environment	1 Hrs-CA 1 Hrs-EoSE	10 Marks-CA 40 Marks-EoSE	4 Marks-CA 16 Marks-EoSE

The question paper for SEC-63T-214- Global Business Environment will be so set that it has 40 multiple-choice questions (Bilingual) of one mark each. The duration of the question paper will be 1 hour. The examinees will have to give their answers on an OMR sheet only to be provided by the University whose evaluation will be done based on OMR Scanning Technology.

Non-Collegiate Students –

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks (EoSE)	Minimum Marks (EoSE)
Theory	SEC-13T-404- Global Business Environment	1 Hrs	50 Marks	20 Marks

The question paper for SEC-13T- 404-Global Business Environment will be so set that it has 50 multiple-choice questions (Bilingual) of one mark each. The duration of the question paper will be 1 hour. The examinees will have to give



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their answers on an OMR sheet only to be provided by the University whose evaluation will be done based on OMR Scanning Technology.

SEC-13T- 404 - Global Business Environment

Unit I

Introduction: International al Business: An Overview-Types of International Business, The External Environment the Economic, Political, Technological, Legal, Social- psychological

(8 Lectures)

Unit II

WTO and its importance for Indian Business, International Monetary Fund (IMF),
Word Bank: Objectives and Functions

(7 Lectures)

Unit III

Exchange rate determination, fixed and flexible exchange rate, convertibility of rupee and its implication.

(7 Lectures)

Unit IV

Foreign Institutional Investors (FII), Foreign Direct Investment (FDI), Euro – Currency
Globalization and Human Resource Development, Globalization with Social Responsibility,
SAARC, ASEAN

(8 Lectures)

Suggested Books and References –

1. A Lowrth, Julian S. The finance, Investment and taxation decision of Multinational London. Basil Blackwell 1988.
2. Bhalla, V K and S. Shivaramu, International business environment and business New Delhi Anmil 1995.
3. Bhalla V K and International economy, Liberalisation Process, New Delhi, Aninni 1993
4. Daniel, John D and Radebangh, Lee H Internal Business 5thed., New York Addison Wesley, 1989.

Course Learning Outcomes:

By the end of this course, students will be equipped to analyze and navigate the complexities of international business environments, understanding the economic, political, technological, and legal


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factors at play. They will comprehend the roles of global institutions like the WTO, IMF, and World Bank and their relevance to international trade and finance. Students will also be able to explain exchange rate systems, assess the impact of currency convertibility, and understand the dynamics of foreign investments, including FII and FDI. Furthermore, they will appreciate the implications of globalization on human resource development and corporate social responsibility, particularly within the frameworks of regional alliances such as SAARC and ASEAN.

SEC-13T-405- Apiculture

Semester	Code of the Course	Title of the Course/Paper			NHEQF Level	Credits
III/IV	SEC-13T-405	Apiculture			6	2
Level of Course	Type of the Course	Credit Distribution		Offered to NC Student	Delivery Type of the Course	
		Theory	Practical			
6	Skill Enhancement	2	-	NO	15 Hours Lecture +30 Hours Lab Activity / Fieldwork	
Prerequisites		B. Sc II SEM				
Objectives of the Course:		<p>Objectives of the Course – The aim of the study is to know the significance of beekeeping as an economically important agro based industry in agriculture for the rural communities to increase their income and create employment opportunities and entrepreneurial skills required for self-employment. To train students to understand the different species of domesticated honeybees, their biology, behaviour and role in pollination. To help students to learn the techniques of apiculture, optimisation of techniques based on climate and geographical regions and problems related apiculture industry and their management.</p>				

Examination Scheme- Regular Student –

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks (CA + EoSE)	Minimum Marks (CA + EoSE)
Theory	SEC-13T- 405- Apiculture	1 Hrs-CA 1 Hrs-EoSE	10 Marks-CA 40 Marks-EoSE	4 Marks-CA 16 Marks-EoSE


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The theory question paper for SEC-13T-405 Apiculture will be so set that it has 40 multiple choice questions (Bilingual) of one mark each. The duration of the question paper will be 1 hour. The examinees will have to give their answers on an OMR sheet only to be provided by the University whose evaluation will be done based on OMR Scanning Technology.



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Detailed Syllabus

SEC-13T- 405 - Apiculture

Unit - I

BIOLOGY OF BEES

Historical background of apiculture, classification, diversity and biology of honey bees, social organization of bee colony, behavioural pattern (bee dance, swarming, absconding etc.); products of apiculture (honey, bees wax, propolis, royal jelly, pollen etc.) and their uses.

(4 Lectures)

Unit -II

REARING OF BEES

Artificial bee rearing (Apiary), beehive- Newton and Langstronh; bee pasturage; selection of bee species for apiculture (*Apis cerana indica* and *A. mellifera*), methods and equipment (indigenous and modern) for beekeeping and extraction of honey bee products and their processing; apiary management- honey flow and lean period.

(5 Lectures)

Unit -III

PROBLEMS RELATED APICULTURE AND THEIR MANAGEMENT

Bee diseases, control and preventive measures; enemies of bees and their management; effects of pollutions on honeybees.

(3 Lectures)

Unit-IV

ECONOMY OF BEEKEEPING

Pollination: significance of beekeeping in horticultural gardens and agricultural fields; employment opportunities, economics, scope of women empowerment in apiculture industry; role of small- and large-scale beekeeping in growth of Indian economy (honey production in India); honey mission and sweet kranti; organisations and training institutes involved in beekeeping in India.

(3 Lectures)

Practical:

1. Study of specimens and permanent slides: *Apis cerana indica*, *A. mellifera*, *A. dorsata*, *A. florea*, *Melipona sp.*, honeybee enemies, life history and social castes of honey bees: egg, larva, pupa, adult (queen, drone and worker), mouthparts, antenna, wings, sting apparatus and temporary mounts of legs (antenna cleaner, mid leg and pollen basket), honey bee diseases.
2. Study of structure of natural bee hives (different types of cells in honeybee comb) and artificial hive (Longstroth/Newton).
3. Equipment required for beekeeping (models/photograph)



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4. Video demonstration of extraction and processing of honeybee products.
5. Analysis of honey: purity, physical and biochemical parameters.
6. Field visit to an apiary/honey production unit/agriculture field/gardens/orchard.

Suggested Books and References –

1. Singh, S (1962). Beekeeping in India, Indian Council of Agricultural Research, New Delhi.
2. Mishra, R. C. (1995). Honeybees and their management in India. Indian Council of Agricultural Research, New Delhi.
3. Prodt, P. J. (1962). Apiculture. Oxford and IBH, New Delhi.
4. Rahman, A. (2017). Beekeeping in India. Indian Council of Agricultural Research, New Delhi.
5. Gupta, J. K. (2016). Apiculture, Indian Council of Agricultural Research, New Delhi.

Suggested E-resources:

1. Apiculture <https://vidyamitra.inflibnet.ac.in/index.php/content/index/5fd9f1678007bef4453de567>

Course Learning Outcomes:

By the end of the course, students will be able to:

1. Gain knowledge of differentiating high-yielding varieties/species of domesticated honeybees, their biology, social organisation and significance.
2. Perceive the different types of techniques used in apiculture, honey and byproducts production.
3. Identify problems related to apiculture and their management.
4. Develop entrepreneurial skills necessary for self-employment, jobs as beekeepers and worker for collecting and packaging of honey bee products including honey, beeswax and pollen.

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SEC-13T-406— Introduction to Bioinformatics

Semester	Code of the Course	Title of the Course/Paper		NHEQF Level	Credits
III/IV	SEC-13T-406	Introduction to Bioinformatics		5	2
Level of Course	Type of the Course	Credit Distribution		Offered to NC Student	Delivery Type of the Course
		Theory	Practical		
Introductory	Skill Enhancement	2	-	NO	15 Hours of Lectures + 30 Hours of Lab Activity
Prerequisites	XII Pass				
Objectives of the Course:	Objectives of the Course –The objective of this syllabus is to provide students with a foundational understanding of bioinformatics, its applications, and the fundamental tools and techniques used in the field.				

Examination Scheme

Regular Students

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks (Midterm + EoSE)	Minimum Marks (Midterm + EoSE)
Theory	SEC-13T- 406- Introduction to Bioinformatics	1 Hrs-MT 2 Hrs-EoSE	10 Marks-MT 40 Marks-EoSE	4 Marks-MT 16 Marks-EoSE

The theory question paper for SEC-13T- 406- Introduction to Bioinformatics will be so set that it has 40 multiple choice questions (Bilingual) of One mark each. The Question paper will be of duration of 1 hour. The examinees will have to give their answers on an OMR sheet only to be provided by the University whose evaluation will be done based on OMR Scanning Technology-


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Detailed Syllabus

SEC-13T- 406- Introduction to Bioinformatics

Unit – I

Introduction to Bioinformatics

1. Introduction to Bioinformatics
 - o Definition of bioinformatics and its applications.
 - o Importance of bioinformatics in biology and medicine.
2. Data formats used in bioinformatics (FASTA, FASTQ, SAM/BAM, VCF, etc.)

(3 Lectures)

Unit -II

Biological Databases and Tools

1. Overview of biological databases (GenBank, UniProt, NCBI, etc.).
2. Introduction to basic bioinformatics tools (BLAST, ClustalW, etc.).

(4 Lectures)

Unit -III

Pairwise Sequence Alignment

1. Basic introduction about sequence
 - o Introduction to DNA, RNA, and protein sequences.
 - o Basic sequence manipulation (sequence format, length, composition).
2. Pairwise Sequence Alignment
 - o Understanding sequence alignment and its significance.
 - o Introduction to global and local alignment concepts.

(4 Lectures)

Unit-IV

Multiple Sequence Alignment

1. Multiple Sequence Alignment
 - o Understanding the need for multiple sequence alignment.
 - o Introduction to progressive and iterative alignment methods.
2. Phylogenetic analysis
 - o Simple tree-building techniques using sequence data.
 - o Phylogenetic Analysis tool-ClustalW

(4 Lectures)


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Practicals:

(30 Hours Lab Activity)

1. BLAST search using a nucleotide sequence and interpretation of results.
2. Conversion of sequence files between different formats (e.g., FASTA to FASTQ) using command-line tools.
3. Global alignment of two DNA sequences using the Needleman-Wunsch algorithm.
4. Local alignment of two protein sequences using the Smith-Waterman algorithm.
5. Use of ClustalW to perform a multiple sequence alignment of several related protein sequences.
6. Construction of a phylogenetic tree using sequence data from a multiple sequence alignment.

Suggested Books and References –

1. "Bioinformatics: Sequence and Genome Analysis" by David W. Mount
2. "Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins" by Andreas D. Baxevanis and B.F. Francis Ouellette
3. "Essential Bioinformatics" by Jin Xiong
4. "Bioinformatics for Dummies" by Jean-Michel Claverie and Cedric Notredame
5. "Understanding Bioinformatics" by Marketa Zvelebil and Jeremy Baum
6. "Introduction to Bioinformatics" by Arthur Lesk
7. "Bioinformatics: Sequence, Structure, and Databanks" by Des Higgins and Willie Taylor
8. "Biological Sequence Analysis: Probabilistic Models of Proteins and Nucleic Acids" by Richard Durbin et al.
9. "Genomics and Bioinformatics: An Introduction to Programming Tools for Life Scientists" by Tore Samuelsson
10. "Introduction to Computational Biology: Maps, Sequences, and Genomes" by Michael S. Waterman

Course Learning Outcomes:

By the end of the course, students should be able to:

1. Define and explain the concept of bioinformatics and its wide-ranging applications.
2. Identify the data formats, major biological databases and bioinformatics tools commonly used in bioinformatics and understand their purposes.
3. Perform and interpret pairwise and multiple sequence alignment.


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SEC-13T-407 - Herbal Technology

Semester	Code of the Course	Title of the Course/Paper			NHEQF Level	Credits
III/IV	SEC-13T-407	Herbal Technology			6	2
Level of Course	Type of the Course	Credit Distribution			Offered to NC Student	Course Delivery Method
		Theory	Practical	Total		
Intermediate	Skill Enhancement	2	-	2	Yes	15 Hours Lectures + 30 Hours Lab Activity/Fieldwork
Prerequisites		Introductory level Courses				
Objectives of the Course:		<ul style="list-style-type: none"> Students should be able to identify different Medicinal plants and understand MAP values as people move back to Ayurvedic system. Train student in practical laboratory skills for learn to identification of various MAP. Teach the students for Chemical characterisation of some selected MAP. Demonstrate to learn about drug adulteration and Phytochemical screening tests secondary metabolites. 				

Examination Scheme-

Regular students-

Type	Paper Code and Nomenclature	Duration of Examination	Maximum Marks (Midterm + EoSE)	Minimum Marks (Midterm + EoSE)
Theory	SEC-13T- 407-Herbal Technology	01 Hr- MT 01 Hr- EoSE	10 Marks- MT 40 Marks- EoSE	04 Marks- MT 16 Marks- EoSE

The question paper for Herbal Technology will be so set that it has 40 multiple choice questions (Bilingual) of One mark each. The Question Paper will be of duration of 01 Hour. The Examinees will have to give their answers on an OMR sheet only to be provided by the University where evaluation will be done based on OMR Scanning Technology.



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Detailed Syllabus

SEC-13T- 407- Herbal Technology

Unit-I

Herbal medicines: Introduction, history and scope of medicinal plants in Ayurvedic systems.

02 Lectures

Unit-II

Pharmacognosy: Identification and uses of the following medicinal herbs in curing various disorders; Triphala, Ginger, Neem, Giloy, Chirayta and Turmeric.

04 Lectures

Unit-III

Phytochemistry: Active principles and methods of Chemical characterization of following medicinal herbs; *Catharanthus roseus* (anti-cancerous), *Withania somnifera* (tonic & immunity booster) and *Ephedra foliata* (Asthmatic problems).

04 Lectures

Unit-IV

Analytical pharmacognosy: Drug adulteration types, methods of drug evaluation; Biological testing of herbal drugs - Phytochemical screening tests for secondary metabolites (alkaloids, phenolic compounds).

05 Lectures

Practical's

1. Preparing a document of some important medicinal plants used in your locality.
2. Study of MAP in college herbal garden to identify the species.
3. Develop a repository of some common medicinal & aromatic plants.
4. Characterization of active principal of some important medicinal plants.
5. Chemical test of some important medicinal plants.
6. Identify and list precautions for drug adulteration for some common MAP species around your locality.


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7. Chemical characterization of some secondary metabolite compounds.
8. Documentation for important formulation Viz. Triphala, Ashtakavarga, Chyawanprash and dashmularishta.

Suggested Books and References –

- Glossary of Indian medicinal plants, R.N.Chopra, S.L.Nayar and I.C.Chopra, 1956. C.S.I.R, New Delhi.
- The indigenous drugs of India, Kanny, Lall, Dey and Raj Bahadur, 1984. International Book Distributors.
- Herbal plants and Drugs Agnes Arber, 1999. Mangal Deep Publications.
- Ayurvedic drugs and their plant source. V.V. Sivarajan and Balachandran Indra 1994. Oxford IBH publishing Co.
- Ayurveda and Aromatherapy. Miller, Light and Miller, Bryan, 1998. Banarsidass, Delhi.
- Principles of Ayurveda, Anne Green, 2000. Thomsons, London. 7. Pharmacognosy, Dr.C.K.Kokate et al. 1999. Nirali Prakashan.

Course Learning Outcomes:

At the end of the course, students should be able to:

1. Gain a comprehensive understanding of the principles of herbal medicine, including the historical and cultural context of its use.
2. Identify and classify important medicinal plants and herbs based on their botanical characteristics.
3. Explore the therapeutic applications of various herbs and how they can be integrated into modern health practices.
4. Demonstrate to learn about drug adulteration and Phytochemical screening tests secondary metabolites.



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SEC-13T- 408-Mushroom Culture Technology

Semester	Code of the Course	Title of the Course/Paper			NHEQF Level	Credits
III/IV	SEC-13T- 408	Mushroom Culture Technology			6	2
Level of Course	Type of the Course	Credit Distribution			Offered to NC Student	Course Delivery Method
		Theory	Practical	Total		
Intermediate	Skill Enhancement	2	-	2	Yes	15 Hours of Lectures + 30 Hours of Lab Activity/Fieldwork
Prerequisites		Introductory level Courses				
Objectives of the Course:		<ul style="list-style-type: none"> ➤ Students should be able to identify different mushroom species and understand their growth requirements. ➤ Equip students with practical laboratory skills for mushroom culture, including media preparation, sterilization, and inoculation techniques. ➤ Teach the preparation of various substrates and production of mushroom spawn. ➤ Demonstrate how to create and manage the appropriate environmental conditions for mushroom fruiting. 				

Examination Scheme-

Regular students-

Type	Paper Code and Nomenclature	Duration of Examination	Maximum Marks (Midterm + EoSE)	Minimum Marks (Midterm + EoSE)
Theory	SEC-13T-408-Mushroom Culture Technology	01 Hr- MT 01 Hr- EoSE	10 Marks- MT 40 Marks- EoSE	04 Marks- MT 16 Marks- EoSE

The question paper for SEC-13T- 408 Mushroom Culture Technology will be so set that it has 40 multiple choice questions (Bilingual) of One mark each. The Question Paper will be of duration of 01 Hour. The Examinees will have to give their answers on an OMR sheet only to be provided by the University where evaluation will be done based on OMR Scanning Technology.


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Detailed Syllabus

SEC-13T-408-Mushroom Culture Technology

Unit-I

Introduction; Nutritional and medicinal value of edible mushrooms; Poisonous mushrooms. Types of edible mushrooms available in India - *Volvariella volvacea*, *Pleurotus citrinopileatus*, *Agaricus bisporus*.

03 Lectures

Unit-II

Cultivation Technology: Infrastructure: substrates (locally available) Polythene bag, vessels, Inoculation hook, inoculation loop, low-cost stove, sieves, culture rack, mushroom unit (Thatched house) water sprayer, tray, small polythene bag.

03 Lectures

Unit-III

Pure culture: Medium, sterilization, preparation of spawn, multiplication. Mushroom bed preparation - paddy straw, sugarcane trash, maize straw, banana leaves. Factors affecting the mushroom bed preparation.

05 Lectures

Unit-IV

Harvesting, Post Harvest Handling and Storage techniques. Research Centres - National level and Regional level.

04 Lectures


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Practicals

1. Study of basic structure of the edible fruiting body of a mushroom (*Agaricus bisporus*).
2. Understand and practice sterilization methods essential for mushroom culture.
3. Agar plates inoculation with mushroom spores or mycelium.
4. Substrate Preparation for mushroom cultivation.
5. Spawn Production using a prepared substrate.
6. Understanding effect of different factors on growth of fruiting bodies of mushrooms.
7. Understanding Post Harvest handling and storage of mushrooms.

Suggested Books and References –

- Marimuthu, T. Krishnamoorthy, A.S. Sivaprakasam, K. and Jayarajan. R (1991) Oyster Mushrooms, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.
- Swaminathan, M. (1990) Food and Nutrition. Bappco, The Bangalore Printing and Publishing Co. Ltd., No. 88, Mysore Road, Bangalore - 560018.
- Tewari, Pankaj Kapoor, S.C., (1988). Mushroom cultivation, Mittal Publications, Delhi.
- Nita Bahl (1984-1988) Hand book of Mushrooms, II Edition, Vol. I & Vol. II.

Suggested e-resources:

<https://nhb.gov.in/pdf/Cultivation.pdf>

<https://nptel.ac.in/>

Course Learning Outcomes:

At the end of the course, students should be able to:

1. Set up and maintain a sterile culture environment and perform inoculation procedures.
2. Prepare substrates, inoculate them with spawn, and manage the colonization process.
3. Set up and monitor conditions such as temperature, humidity, and light for optimal mushroom growth.
4. Students should understand potential applications of mushroom technology in industry and research settings.

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SEC-13T-409- Documentation of Museum Exhibits

Semester	Code of the Course	Title of the Course/Paper		NIEQF Level	Credits
III/IV	SEC-13T-409	Documentation of Museum Exhibits		6	2
Level of Course	Type of the Course	Credit Distribution		Offered to NC Student	Delivery Type of the Course
		Theory	Practical		
Introductory	Skill Enhancement	2	-	Yes	30 Lectures
Prerequisites	XII Pass				
Objectives of the Course:	Objectives of the Course – This course aims to provide students with a comprehensive understanding of international business, focusing on the various types of international operations and the external environments that influence global business decisions. The course will explore key international institutions such as the WTO, IMF, and World Bank, along with their significance to Indian businesses. Students will also gain insight into exchange rate mechanisms, the implications of currency convertibility, and the impact of foreign investments. Additionally, the course will address globalization's role in human resource development and social responsibility within the context of regional economic organizations like SAARC and ASEAN.				

Examination Scheme-

Regular Students –

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks (CA + EoSE)	Minimum Marks (CA + EoSE)
Theory	SEC-13T-409- Documentation of Museum Exhibits	1 Hrs-CA 1 Hrs-EoSE	10 Marks-CA 40 Marks-EoSE	4 Marks-CA 16 Marks-EoSE

The question paper for SEC-63T-219-Documentation of Museum Exhibits will be so set that it has 40 multiple-choice questions (Bilingual) of one mark each. The duration of the question paper will be 1 hour. The examinees will have to give their answers on an OMR sheet only to be provided by the University whose evaluation will be done based on OMR Scanning Technology.

Non-Collegiate Students –

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks (EoSE)	Minimum Marks (EoSE)
Theory	SEC-13T-409 Documentation of Museum Exhibits	1 Hrs	50 Marks	20 Marks

The question paper for SEC-13T-409-Documentation of Museum Exhibits will be so set that it has 50 multiple-choice questions


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(Bilingual) of one mark each. The duration of the question paper will be 1 hour. The examinees will have to give their answers on an OMR sheet only to be provided by the University whose evaluation will be done based on OMR Scanning Technology.

SEC-13T- 409- Documentation of Museum Exhibits

Unit-I

Museum Documentation – Definition and Objectives

Types of Documentation: Administrative Documentation, Object Documentation, Conservation Documentation, Dissemination (Museum Publications)

(7 Lectures)

Unit-II

Various stages of Documentation – Entry, accessioning, cataloguing, movement, inventory

Standard Methods of Field Documentation: Equipments, Procedures

Information Categories in Field Documentation

Preparing Field Documentation Tags

(8 Lectures)

Unit-III

Museum Exhibits: Numbering Method, Marking Method, Cataloguing, Indexing

Exit Documentation and De-Accessioning

Features of computerized Documentation

Collection Management Softwares

(7 Lectures)

Unit-IV

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Activity-based learning on any one of the documentation methods. The students shall learn to prepare

1. Catalogue of ten objects
2. Detailed Report of a Museum gallery
3. Accession Register Entries of Ten Objects
4. Numbering of Ten Objects of a Gallery Collection

(8 Lectures)

Suggested Books and References –

1. McLean, Kathleen. 2001. Planning for People in Museum Exhibitions. Washington, DC: Association of Science and Technology Centers.
2. Shilpi Roy. 2019. Museum Documentation: A Potent Tool for Collection Management. Delhi: Agam Kala Prakashan
3. Ambrose T. , Paine C. 1993. Museum Basics. London: Routledge
4. Dudley, DH; Bezold, I. 1958. Museum Registration Methods. Baltimore: The Lord Baltimore Press, INC
5. Fahy, A. (ed.). Collection Management. London: Routledge

Suggested e-resources:

- <https://www.nps.gov/museum/publications/MIIII/mh3ch1.pdf>
- <https://cidoc.mini.icom.museum/working-groups/exhibition-and-performance-documentation/>
- https://www.obs-traffic.museum/sites/default/files/ressources/files/EPA_Documentation_Museum_Collections.pdf
- <https://unesdoc.unesco.org/ark:/48223/pf0000141067>

Course Learning Outcomes:

This course shall introduce the students to documentation techniques and areas – accession registers, numbering, catalogues, etc. They shall gain the foundational skill to create comprehensive exhibit documentation by accurately describing objects, detailing provenance, and preparing condition reports. They shall be prepared to utilize digital tools and software effectively to catalogue and manage museum exhibit data, integrating current technologies into documentation practices. They shall be able to produce detailed and engaging interpretive materials such as labels and informational panels that cater to diverse audience needs and enhance visitor understanding.


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SEC-13T-410- Use of Chemicals in Daily Life

Semester	Code of the Course	Title of the Course/Paper		NHEQF Level	Credits
III/IV	SEC-13T- 410	Use of Chemicals in Daily Life		6	2
Level of Course	Type of the Course	Credit Distribution		Offered to NC Student	Delivery Type of the Course
		Theory	Practical		
Introductory	Skill Enhancement	2	-	Yes	30 Lectures
Prerequisites	XII Pass				
Objectives of the Course:	Objectives of the Course – This course aims to provide students with a comprehensive understanding of the chemical aspects of food safety, environmental pollution, and material science. It covers the study of food additives, adulterants, and contaminants, and their impact on health, as well as the principles of air and soil pollution, including the effects of toxic chemicals. Additionally, the course explores the significance of vitamins, oils, fats, and the chemical principles underlying soaps, detergents, corrosion, and energy systems. The course also delves into the classification, properties, and environmental impact of polymers, with a focus on sustainable development.				

Examination Scheme-

Regular Students –

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks (CA + EoSE)	Minimum Marks (CA + EoSE)
Theory	SEC-13T-410 Use of Chemicals in Daily Life	1 Hrs-CA 1 Hrs-EoSE	10 Marks-CA 40 Marks-EoSE	4 Marks-CA 16 Marks-EoSE

The question paper for SEC-63T-220- Use of Chemicals in Daily Life will be so set that it has 40 multiple-choice questions (Bilingual) of one mark each. The duration of the question paper will be 1 hour. The examinees will have to give their answers on an OMR sheet only to be provided by the University whose evaluation will be done based on OMR Scanning Technology.

Non-Collegiate Students –

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks (EoSE)	Minimum Marks (EoSE)
Theory	SEC-13T-410 Use of Chemicals in Daily Life	1 Hrs	50 Marks	20 Marks

The question paper for SEC-13T- 410-Use of Chemicals in Daily Life will be so set that it has 50 multiple-choice questions (Bilingual) of


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one mark each. The duration of the question paper will be 1 hour. The examinees will have to give their answers on an OMR sheet only to be provided by the University whose evaluation will be done based on OMR Scanning Technology.

Detailed Syllabus

SEC-13T- 410- Use of Chemicals in Daily Life

Unit-I

Food additives, adulterants and contaminants- Food preservatives like benzoates, propionates, sorbates, disulphites.

Artificial sweeteners: Aspartame, saccharin, dulcin, sucralose and sodium cyclamate.

Flavours: Vanillin, alkyl esters (fruit flavours) and monosodium glutamate.

Artificial food colorants: Coal tar dyes and non-permitted colours and metallic salts. Analysis of pesticide residues in food.

8 Lectures

Unit-II

Air Pollution: Air pollutants, prevention and control, Greenhouse gases and acid rain. Ozone hole and CFCs. Photochemical smog and PAN. Bhopal gas tragedy.

Toxic chemicals in the environment. Detergents- pollution aspects, eutrophication. Pesticides and insecticides-pollution aspects. Heavy metal pollution. Solid pollutants- treatment and disposal. Treatment of industrial liquid wastes. Sewage and industrial effluent treatment.

Composition of soil – inorganic and organic components in soil-micro and macronutrients.

Fertilisers: Classification of Fertilizers- Straight Fertilizers, Compound/Complex Fertilizers, Fertilizer Mixtures. Manufacture and general properties of Fertilizer products- Urea and DAP.

8 Lectures

Unit-III

Vitamins: Sources, deficiency diseases and importance of Vitamin A, Vitamin B, Vitamin C, Vitamin D, Vitamin E & Vitamin K.

Oils and fats: Composition of edible oils, detection of purity, rancidity of fats and oil..Tests for adulterants like argemone oil and mineral oils.

Soaps & Detergents: Structures and methods of use of soaps and detergents.

7 Lectures

Unit-IV



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Corrosion: Types and prevention, corrosion failure and analysis
Chemical energy system and limitations, principles and applications of primary & secondary batteries and fuel cell. Basics of solar energy, future energy storer.
Polymers: Types and classification of polymers. Source and general characteristics of natural and synthetic polymers. Problems of plastic waste management. Strategies for the development of environment-friendly polymers.

7 Lectures



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Suggested Books and References –

1. B. K. Sharma: Introduction to Industrial Chemistry, Goel Publishing, Meerut (1998)
2. Medicinal Chemistry by Ashtoush Kar.
3. Drugs and Pharmaceutical Sciences Series, Marcel Dekker, Vol. II, INC, New York.
4. Analysis of Foods – H.E. Cox: 13. Chemical Analysis of Foods – H.E. Cox and Pearson.
5. Foods: Facts and Principles. N. Shakuntala Many and S. Swamy, 4th ed. New Age International (1998)
6. Physical Chemistry – P I Atkins and J. de Paula – 7th Ed. 2002, Oxford University Press.
7. Handbook on Fertilizer Technology by Swaminathan and Goswamy, 6th ed. 2001, FAI.
8. Organic Chemistry by I. L. Finar, Vol. 1 & 2.
9. Polymer Science and Technology, J. R. Fried (Prentice Hall).

Course Learning Outcomes:

By the end of this course, students will be able to critically analyze the role of various food additives and contaminants in food safety, understand the environmental and health implications of air and soil pollutants, and evaluate the chemical principles behind the functionality of vitamins, oils, fats, and detergents. They will also gain insights into corrosion mechanisms and prevention, the operation and limitations of chemical energy systems like batteries and fuel cells, and the challenges and strategies associated with polymer waste management. Students will be prepared to apply this knowledge in addressing real-world issues related to food safety, environmental protection, and sustainable materials.



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