B Sc BOTANY

LOCF SYLLABUS 2023

Department of Botany
School of Biological Sciences
St. Joseph's College (Autonomous)
Tiruchirappalli - 620002, Tamil Nadu, India

SCHOOLS OF EXCELLENCE WITH CHOICE BASED CREDIT SYSTEM (CBCS) POSTGRADUATE COURSES

St. Joseph's College (Autonomous), an esteemed institution in the realm of higher education in India, has embarked on a journey to uphold and perpetuate academic excellence. One of the pivotal initiatives in this pursuit is the establishment of five Schools of Excellence commencing from the academic year 2014-15. These schools are strategically designed to confront and surpass the challenges posed by the 21st century.

Each School amalgamates correlated disciplines under a unified umbrella, fostering synergy and coherence. This integrated approach fosters the optimal utilization of both human expertise and infrastructural assets. Moreover, it facilitates academic fluidity and augments employability by nurturing a dynamic environment conducive to learning and innovation. Importantly, while promoting collaboration and interdisciplinary study, the Schools of Excellence also uphold the individual identity, autonomy, and distinctiveness of every department within.

The overarching objectives of these five schools are as follows:

1. Optimal Resource Utilization: Ensuring the efficient use of both human and material resources to foster academic flexibility and attain excellence across disciplines.

2. Horizontal Mobility for Students: Providing students with the freedom to choose courses aligning with their interests and facilitating credit transfers, thereby enhancing their academic mobility and enriching their learning experience.

3. Credit-Transfer Across Disciplines (CTAD): The existing curricular structure, in accordance with regulations from entities such as TANSCHE and other higher educational institutions, facilitates seamless credit transfers across diverse disciplines. This underscores the adaptability and uniqueness of the choice-based credit system.

4. Promotion of Human Excellence: Nurturing excellence in specialized areas through focused attention and resources, thus empowering individuals to excel in their respective fields.

5. Emphasis on Internships and Projects: Encouraging students to engage in internships and projects, serving as stepping stones toward research endeavors, thereby fostering a culture of inquiry and innovation.

6. Addressing Stakeholder Needs: The multi-disciplinary nature of the School System is tailored to meet the requirements of various stakeholders, particularly employers, by equipping students with versatile skills and competencies essential for success in the contemporary professional landscape.

In essence, the Schools of Excellence at St. Joseph's College (Autonomous) epitomize a holistic approach towards education, aiming not only to impart knowledge but also to cultivate critical thinking, creativity, and adaptability – qualities indispensable for thriving in the dynamic global arena of the 21st century.

Credit system

The credit system at St. Joseph's College (Autonomous) assigns weightage to courses based on the hours allocated to each course. Typically, one credit is equivalent to one hour of instruction per week. However, credits are awarded regardless of actual teaching hours to ensure consistency and adherence to guidelines.

The credits and hours allotted to each course within a programme are detailed in the Programme Pattern table. While the table provides a framework, there may be some flexibility due to practical sessions, field visits, tutorials, and the nature of project work.

For undergraduate (UG) courses, students are required to accumulate a minimum of 133 credits, as stipulated in the programme pattern table. The total number of courses offered by the department is outlined in the Programme Structure.

OUTCOME-BASED EDUCATION (OBE)

OBE is an educational approach that revolves around clearly defined goals or outcomes for every aspect of the educational system. The primary aim is for each student to successfully achieve these predetermined outcomes by the culmination of their educational journey. Unlike traditional methods, OBE does not prescribe a singular teaching style or assessment format. Instead, classes, activities, and evaluations are structured to support students in attaining the specified outcomes effectively.

In OBE, the emphasis lies on measurable outcomes, allowing educational institutions to establish their own set of objectives tailored to their unique context and priorities. The overarching objective of OBE is to establish a direct link between education and employability, ensuring that students acquire the necessary skills and competencies sought after by employers.

OBE fosters a student-centric approach to teaching and learning, where the delivery of courses and assessments are meticulously planned to align with the predetermined objectives and outcomes. It places significant emphasis on evaluating student performance at various levels to gauge their progress and proficiency in meeting the desired outcomes.

Here are some key aspects of Outcome-Based Education:

Course: A course refers to a theory, practical, or a combination of both that is done within a semester.

Course Outcomes (COs): These are statements that delineate the significant and essential learning outcomes that learners should have achieved and can reliably demonstrate by the conclusion of a course. Typically, three or more course outcomes are specified for each course, depending on its importance.

Programme: This term pertains to the specialization or discipline of a degree programme.

Programme Outcomes (POs): POs are statements that articulate what students are expected to be capable of by the time they graduate. These outcomes are closely aligned with Graduate Attributes.

Programme Specific Outcomes (PSOs): PSOs outline the specific skills and abilities that students should possess upon graduation within a particular discipline or specialization.

Programme Educational Objectives (PEOs): PEOs encapsulate the expected accomplishments of graduates in their careers, particularly highlighting what they are expected to achieve and perform during the initial years postgraduation.

LEARNING OUTCOME-BASED CURRICULUM FRAMEWORK (LOCF)

The Learning Outcomes-Centric Framework (LOCF) places the learning outcomes at the forefront of curriculum design and execution. It underscores the importance of ensuring that these outcomes are clear, measurable, and relevant. LOCF orchestrates teaching methodologies, evaluations, and activities in direct correlation with these outcomes. Furthermore, LOCF adopts a backward design approach, focusing on defining precise and attainable learning objectives. The goal is to create a cohesive framework where every educational element is in harmony with these outcomes.

Assessment practices within LOCF are intricately linked to the established learning objectives. Evaluations are crafted to gauge students' achievement of these outcomes accurately. Emphasis is often placed on employing authentic assessment methods, allowing students to showcase their learning in real-life scenarios. Additionally, LOCF frameworks emphasize flexibility and adaptability, enabling

educators to tailor curriculum and instructional approaches to suit the diverse needs of students while ensuring alignment with the defined learning outcomes.

Some Important Terminologies

Core Course (CC): *Core Courses represent obligatory elements within an academic programme, imparting fundamental knowledge within the primary discipline while ensuring consistency and acknowledgment.*

Allied Course (AC): *Allied Courses complement primary disciplines by furnishing supplementary knowledge, enriching students' understanding and skill repertoire within their academic pursuit.*

Foundation Course (FC): *Foundation Courses serve to bridge the gap in knowledge and skills between secondary education and college-level studies, facilitating a smoother transition for students entering higher education.*

Skill Enhancement Course (SE): *Skill Enhancement Courses aim to nurture students' abilities and competencies through practical training, open to students across disciplines but particularly advantageous for those in programme-related fields.*

Value Education (VE): *Value education encompasses the teaching of moral, ethical, and social values to students, aiming to foster their holistic development. It instills virtues such as empathy, integrity, and responsibility, guiding students towards becoming morally upright and socially responsible members of society.*

Ability Enhancement Compulsory Course (AE): *Ability Enhancement Compulsory Course is designed to enhance students' knowledge and skills; examples include Communicative English and Environmental Science. These courses are obligatory for all disciplines.*

AE-1: Communicative English: This three-credit mandatory course, offered by the Department of English during the first semester of the degree programme, is conducted outside regular class hours.

AE-2: Environmental Science: This one-credit compulsory course, offered during the second semester by the Department of Human Excellence, emphasizes environmental awareness and stewardship.

Allied Optional (AO): *Allied optional course are elective modules that complement the primary disciplines by providing additional knowledge and skills. These courses allow students to explore areas of interest outside their major field of study, broadening their understanding and enhancing their skill set.*

Discipline Specific Elective (ES): *These courses offer the flexibility of selection of options from a pool of courses. These are considered specialized or advanced to that particular programme and provide extensive exposure in the area chosen; these are also more applied in nature. Four courses are offered, two courses each in semester V and VI*

Note: To offer one ES, a minimum of two courses of equal importance/weightage is a must. A department with two sections must offer two courses to the students.

Generic Elective (EG): *A course chosen from a different discipline or subject area, typically to gain exposure. Students pursuing specific disciplines must select Generic Elective courses from the options available across departments as per the college's course offerings. The breadth of Generic Elective (GE) Courses is directly linked to the diversity of disciplines offered by the college. Two GE Courses are available, one in each semester V and VI, and are open to students from other departments.*

Self-paced Learning (SP): *It is a two-credit course designed to foster students' ability for independent and self-directed learning. With a syllabus structured to be completed within 45 hours, this course*

encourages learners to take control of their own educational journey. Notably, Self-paced Learning is conducted outside of regular class hours, emphasizing autonomy and self-motivation in students.

Internship (IS): *Following the fourth semester, students are required to undertake an internship during the summer break. Subsequently, they must submit a comprehensive report detailing their internship experience along with requisite documentation. Additionally, students are expected to participate in a viva-voce examination during the fifth semester. Credits for the internship will be reflected in the mark statement for the fifth semester.*

Comprehensive Examination (CE): *A detailed syllabus consisting of five units to be chosen from the courses offered over the five semesters which are of immense importance and those portions which could not be accommodated in the regular syllabus.*

Extra Credit Courses: *To support students in acquiring knowledge and skills through online platforms such as Massive Open Online Courses (MOOCs), additional credits are granted upon verification of course completion. These extra credits can be availed across five semesters (2 - 6). In line with UGC guidelines, students are encouraged to enhance their learning by enrolling in MOOCs offered by portals like SWAYAM, NPTEL, and others. Additionally, certificate courses provided by the college also qualify for these extra credits.*

Outreach Programme (OR): *It is a compulsory course to create a sense of social concern among all the students and to inspire them to dedicated service to the needy.*

Course Coding

The following code system (11 alphanumeric characters) is adopted for Under Graduate courses:

23	**UXX**	**0**	**0**	**XX**	**00/X**
Year of Revision	UG Department Code	Semester Number	Part Specification	Course Specific Initials	Running Number/with Choice

Course Specific Initials

GL - Languages (Tamil / Hindi / French / Sanskrit)
GE - General English
CC - Core Theory; CP- Core Practical
AC - Allied Course
AP - Allied Practical
FC - Foundation Course
SE - Skill Enhancement Course
VE - Value Education
WS - Workshop
AE - Ability Enhancement Course
AO - Allied Optional
OP - Allied Optional Practical
ES - Discipline Specific Elective
IS - Internship
SP - Self-paced Learning
EG - Generic Elective
ES - Discipline Specific Elective
PW - Project and Viva Voce
CE - Comprehensive Examination
OR - Outreach Programme

EVALUATION PATTERN
Continuous Internal Assessment

Sl No	Component	Marks Alloted
1	Mid Semester Test	30
2	End Semester Test	30
3	*Three Components (15 + 10 + 10)	35
4	Library Referencing (30 hours)	5
	Total	**100**

Passing minimum: 40 marks

* *The first component is a compulsory online test (JosTEL platform) comprising 15 multiple choice questions (10 questions at K1 level and 5 questions at K2 level); The second and the third components are decided by the course in-charge.*

Question Paper Blueprint for Mid and End Semester Tests

Duration: 2 Hours								**Maximum Marks: 60**
Section		**K levels**						**Marks**
		K1	**K2**	**K3**	**K4**	**K5**	**K6**	
A *(compulsory)*		7						7 × 1 = 7
B *(compulsory)*			5					5 × 3 = 15
C *(either…or type)*				3				3 × 6 = 18
D *(2 out of 3)*	*For courses with K5 as the highest cognitive level, one K4 and one K5 question is compulsory. (Note: two questions on K4 and one question on K5)*				1	1*		2 × 10 = 20
	*For courses with K6 as the highest cognitive level: **Mid Sem:** two questions on K4 and one question on K5; **End Sem:** two questions on K5 and one question on K6)*				Mid Sem			
						End Sem		
					1	1	1*	
							Total	**60**

***** *Compulsory*

Question Paper Blueprint for Semester Examination

Duration: 3 Hours					**Maximum Marks: 100**
UNIT	**Section A** *(Compulsory)*	**Section B** *(Compulsory)*	**Section C** *(Either…or type)*	**Section D** *(3 out of 5)*	
	K1	**K2**	**K3**	**K4**	**K5**
UNIT I	2	2	2	3*	2*
UNIT II	2	2	2		
UNIT III	2	2	2		
UNIT IV	2	2	2		
UNIT V	2	2	2		
Marks	**10 × 1 = 10**	**10 × 3 = 30**	**5 × 6 = 30**	**3 × 10 = 30**	

* *For courses with K5 as the highest cognitive level wherein two K4 and one K5 questions are compulsory. (Note: three questions on K4 and two question on K5)*

Evaluation Pattern for Part IV and One/Two-credit Courses

Title of the Course	CIA	Semester Examination	Total Marks
• Skill Enhancement Course (Non Major Elective) • Foundation Course • Skill Enhancement Course (WS)	20 + 10 + 20 = 50	50 *(A member from the Department other than the course instructors)*	100
• Self-paced Learning • Comprehensive Examination	25 + 25 = 50	50 *(CoE)*	100
• Value Education • Environmental Studies	50	50 *(CoE)*	100
• Skill Enhancement Course: Soft Skills	100	-	100
• Generic Elective	100	100 *(CoE)*	100
• Project Work and Viva Voce	100	100	100

Grading System

The marks obtained in the CIA and semester for each course will be graded as per the scheme provided in Table - 1.

From the second semester onwards, the total performance within a semester and the continuous performance starting from the first semester are indicated by Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA), respectively. These two are calculated by the following formulae:

$$SGPA\ and\ CGPA = \frac{\sum_{i=1}^{n} C_i Gp_i}{\sum_{i=1}^{n} C_i}$$

$$WAM = \frac{\sum_{i=1}^{n} C_i M_i}{\sum_{i=1}^{n} C_i}$$

Where,

Ci - credit earned for the Course i

Gpi - Grade Point obtained for the Course i

Mi - Marks obtained for the Course i

*n - Number of Courses **passed** in that semester*

WAM - Weighted Average Marks

Classification of Final Results

- For each of the first three parts in the UG Programme, there shall be separate classification on the basis of CGPA, as indicated in Table - 2.
- For the purpose of declaring a candidate to have qualified for the Degree of Bachelor of Arts/Science/Commerce/Management as Outstanding/Excellent/Very Good/Good/Above Average/Average, the marks and the corresponding CGPA earned by the candidate in Part III alone will be the criterion, provided the candidate has secured the prescribed passing minimum in all the five Parts of the programme.

- Grade in Part IV and Part V shall be shown separately and it shall not be taken into account for classification.
- A pass in SHEPHERD will continue to be mandatory although the marks will not be counted for the calculation of the CGPA.
- Absence from an examination shall not be considered as an attempt.

Table - 1: Grading of the Courses

Mark Range	Grade Point	Corresponding Grade
90 and above	10	O
80 and above and below 90	9	A+
70 and above and below 80	8	A
60 and above and below 70	7	B+
50 and above and below 60	6	B
40 and above and below 50	5	C
Below 40	0	RA

Table - 2: Grading of the Final Performance

CGPA	Grade	Performance
9.00 and above	O	Outstanding*
8.00 to 8.99	A+	Excellent*
7.00 to 7.99	A	Very Good
6.00 to 6.99	B+	Good
5.00 to 5.99	B	Above Average
4.00 to 4.99	C	Average
Below 4.00	RA	Re-appear

**The Candidates who have passed in the first appearance and within the prescribed duration of the UG programme are eligible. If the Candidates Grade is O/A+ with more than one attempt, the performance is considered "Very Good".*

Vision

Forming globally competent, committed, compassionate and holistic persons, to be men and women for others, promoting a just society.

Mission

- Fostering learning environment to students of diverse background, developing their inherent skills and competencies through reflection, creation of knowledge and service.
- Nurturing comprehensive learning and best practices through innovative and value- driven pedagogy.
- Contributing significantly to Higher Education through Teaching, Learning, Research and Extension.

Programme Educational Objectives (PEOs)

- Graduates will be able to accomplish professional standards in the global environment.
- Graduates will be able to uphold integrity and human values.
- Graduates will be able to appreciate and promote pluralism and multiculturalism in working environment.

Programme Outcomes (POs)

1. Graduates will be able to comprehend the concepts learnt and apply in real life situations with analytical skills.
2. Graduates with acquired skills and enhanced knowledge will be employable/ become entrepreneurs or will pursue higher Education.
3. Graduates with acquired knowledge of modern tools communicative skills and will be able to contribute effectively as team members.
4. Graduates are able to read the signs of the time analyze and provide practical solutions.
5. Graduates imbibed with ethical values and social concern will be able to understand and appreciate social harmony, cultural diversity ensure sustainable environment.

Programme Specific Objectives (PSOs)

1. Graduates will acquire the basic concepts to utilize them for lifelong learning, communicative skills and to imbibe ethical values to create a better world.
2. Graduates will learn about the systematics, structure and functions of plants for effective management of cultivation practices for improved plant performance.
3. Graduates will develop laboratory skills utilizing modern tools, techniques and protocols to collect and process data to design innovative scientific problems and solutions.
4. Graduates will apply the skills for the benefit of the society through teamwork and project management practices for employability and entrepreneurship.
5. Graduates will exploit the knowledge gained through various courses for sustainable environment and human welfare.

PROGRAMME STRUCTURE					
Part	**Semester**	**Specification**	**No. of Courses**	**Hours**	**Credits**
1	1- 4	Languages (Tamil / Hindi/ French/ Sanskrit)	4	17	12
2	1 - 4	General English	4	20	12
3	1 - 6	Core Course	11	51	40
	1 - 6	Core Practical	7	22	14
	1 - 6	Allied Course	2	8	6
		Allied Practical	2	4	2
	3, 4	Allied Optional	2	8	6
	3, 4	Allied Optional Practical	1	4	2
	5, 6	Discipline Specific Elective	4	20	12
	5	Internship	1	-	1
	5	Self-paced Learning	1	-	2
	5	Project Work and Viva Voce	1	-	2
	5	Comprehensive Examination	1	-	2
4	1	Foundation Course	1	2	1
	1	Skill Enhancement Course (Non-Major Elective)	1	2	1
	5	Skill Enhancement Course (Soft Skills)	1	2	1
	6	Skill Enhancement Course (WS)	1	2	1
	1 - 4	Value Education	4	8	4
	1, 2	Ability Enhancement Compulsory Course	2	2(6)	4
	5, 6	Generic Elective	2	8	4
5	2 - 6	Outreach Programme (SHEPHERD)	-	-	4
	2 - 6	Extra Credit Courses (MOOC)/Certificate Courses	5	-	(15)
		Total	**58**	**180(6)**	**133(15)**

PROGRAMME PATTERN								
Course Details						Scheme of Exams		
Sem	Part	Course Code	Title of the Course	Hours	Credits	CIA	SE	Final
1	1	23UTA11GL01A	General Tamil - 1	5	3	100	100	100
		23UFR11GL01	French - 1					
		23UHI11GL01	Hindi - 1					
		23USA11GL01	Sanskrit - 1					
	2	23UEN12GE01	General English - 1	5	3	100	100	100
	3	23UBO13CC01	**Core Course - 1:** Plant Diversity - 1 (Algae)	5	4	100	100	100
		23UBO13CP01	**Core Practical - 1:** Algae	3	2	100	100	100
		23UBO13AC01	**Allied Course - 1:** Allied Zoology - 1	4	3	100	100	100
		23UBO13AP01	**Allied Practical - 1**: Invertebrates and Vertebrates	2	1	100	100	100
	4	23UBO14FC01	**Foundation Course**: Basics of Botany	2	1	100	-	100
		-	**Skill Enhancement Course - 1: (Non-Major Elective):** Refer ANNEXURE 1	2	1	100	-	100
		23UHE14VE01	**Value Education - 1**: Essentials of Humanity*	2	1	50	50	50
		23UEN14AE01	**Ability Enhancement Compulsory Course - 1:** Communicative English	(6)	3	100	-	100
			Total	**30(6)**	**22**			
2	1	23UTA21GL02	General Tamil - 2	4	3	100	100	100
		23UFR21GL02	French - 2					
		23UHI21GL02	Hindi - 2					
		23USA21GL02	Sanskrit - 2					
	2	23UEN22GE02	General English - 2	5	3	100	100	100
	3	23UBO23CC02	**Core Course - 2:** Bryophytes, Fungi, Lichens and Plant Pathology	4	3	100	100	100
		23UBO23CC03	**Core Course - 3:** Pteridophytes, Gymnosperms, Anatomy and Embryology	4	3	100	100	100
		23UBO23CP02	**Core Practical - 2:** Bryophytes, Fungi, Lichens, Plant Pathology, Pteridophytes, Gymnosperms, Anatomy and Embryology	3	2	100	100	100
		23UBO23AC02	**Allied Course - 2:** Agricultural Entomology	4	3	100	100	100
		23UBO23AP02	**Allied Practical - 2:** Agricultural Entomology	2	1	100	100	100
	4	23UHE24VE02	**Value Education - 2**: Fundamentals of Human Rights*	2	1	50	50	50
		23UHE24AE01	**Ability Enhancement Compulsory Course - 2:** Environmental Studies*	2	1	50	50	50
		-	Extra Credit courses (MOOC/ Certificate course) - 1	-	**(3)**			
			Total	**30**	**20(3)**			
3	1	23UTA31GL03	General Tamil - 3	4	3	100	100	100
		23UFR31GL03	French - 3					
		23UHI31GL03	Hindi - 3					
		23USA31GL03	Sanskrit - 3					
	2	23UEN32GE03	General English - 3	5	3	100	100	100
	3	23UBO33CC04	**Core Course - 4:** Taxonomy of Angiosperms	5	4	100	100	100
		23UBO33CC05	**Core Course - 5:** Plant Breeding and Evolution	5	4	100	100	100
		23UBO33CP03	**Core Practical - 3:** Taxonomy of Angiosperm, Plant Breeding and Evolution	3	2	100	100	100
		23UBO33AO01A	**Allied Optional - 1:** Chemistry for Biologists - 1	4	3	100	100	100
		23UBO33AO01B	**Allied Optional- 1:** Biometrics and Computer Applications - 1					
		@	**Allied Optional Practical:** Chemistry for Biologists	2	-	-	-	-
		@	**Allied Optional Practical:** Biometrics and Computer Applications					
	4	23UHE34VE03A	**Value Education - 3**: Social Ethics - 1*	2	1	50	50	50
		23UHE34VE03B	**Value Education - 3**: Religious Doctrine - 1*					
		-	Extra Credit Courses (MOOC/Certificate Courses) - 2		**(3)**			
			Total	**30**	**20(3)**			
4	1	23UTA41GL04B	General Tamil - 4 *அறிவியல் தமிழ்* (Scientific Tamil)	4	3	100	100	100
		23UFR41GL04	French - 4					
		23UHI41GL04	Hindi - 4					
		23USA41GL04	Sanskrit - 4					
	2	23UEN42GE04	General English - 4	5	3	100	100	100
	3	23UBO43CC06	**Core Course - 6:** Cell Biology and Genetics	5	4	100	100	100
		23UBO43CC07	**Core Course - 7:** Ecology and Climate Change	5	4	100	100	100

		23UBO43CP04	**Core Practical - 4:** Cell Biology, Genetics, Ecology and Climate Change	3	2	100	100	100
		23UBO43AO02A	**Allied Optional - 2:** Chemistry for Biologists - 2	4	3	100	100	100
		23UBO43AO02B	**Allied Optional - 2:** Biometrics and Computer Applications - 2					
		23UBO43OP01A	**Allied Optional Practical:** Chemistry for Biologists	2	2	100	100	100
		23UBO43OP01B	**Allied Optional Practical:** Biometrics and Computer Applications					
	4	23UHE44VE04A	**Value Education - 4**: Social Ethics - 2*	2	1	50	50	50
		23UHE44VE04B	**Value Education - 4**: Religious Doctrine - 2*					
		-	Extra Credit courses (MOOC/Certificate Courses) - 3		(3)			
			Total	**30**	**22(3)**			
5	3	23UBO53CC08	**Core Course - 8:** Biophysics and Biostatistics	5	4	100	100	100
		23UBO53CC09	**Core Course - 9:** Microbiology and Immunology	5	4	100	100	100
		23UBO53CP05	**Core Practical - 5:** Biophysics, Biostatistics, Microbiology and Immunology	4	2	100	100	100
		23UBO53ES01A	**Discipline Specific Elective - 1:** Molecular Biology	5	3	100	100	100
		23UBO53ES01B	**Discipline Specific Elective - 1:** Bioinformatics and Bionanotechnology					
		23UBO53ES02A	**Discipline Specific Elective - 2:** Research Methodology	5	3	100	100	100
		23UBO53ES02B	**Discipline Specific Elective - 2:** Biopesticides					
		23UBO53IS01	Internship	-	1	100	-	100
		23UBO53SP01	**Self-paced Learning:** Economic Botany*	-	2	50	50	50
	4	-	**Generic Elective - 1:** Refer ANNEXURE 2	4	2	100	100	100
		23USS54SE01	**Skill Enhancement Course - 2:** Soft Skills	2	1	100	-	100
		-	Extra Credit courses (MOOC/Certificate Courses) - 4		(3)			
			Total	**30**	**22(3)**			
6	3	23UBO63CC10	**Core Course - 10:** Plant Physiology	4	3	100	100	100
		23UBO63CP06	**Core Practical - 6:** Plant Physiology	3	2	100	100	100
		23UBO63CC11	**Core Course - 11:** Genetic Engineering and Biotechnology	4	3	100	100	100
		23UBO63CP07	**Core Practical - 7:** Genetic Engineering and Biotechnology	3	2	100	100	100
		23UBO63ES03A	**Discipline Specific Elective - 3:** Biochemistry	5	3	100	100	100
		23UBO63ES03B	**Discipline Specific Elective - 3:** Agricultural Botany					
		23UBO63ES04A	**Discipline Specific Elective - 4:** Medicinal Botany	5	3	100	100	100
		23UBO63ES04B	**Discipline Specific Elective - 4:** Biological Techniques					
		23UBO63PW01	Project Work and Viva Voce	-	2	100	100	100
		23UBO63CE01	Comprehensive Examination*	-	2	50	50	50
	4	-	**Generic Elective - 2:** Refer ANNEXURE 3	4	2	100	100	100
		-	**Skill Enhancement Course - 3 (WS):** Refer ANNEXURE 4	2	1	100	-	100
		-	Extra Credit courses (MOOC/Certificate Courses) - 5		(3)			
			Total	**30**	**23(3)**			
2 - 6	5	23UCW65OR01	Outreach Programme (SHEPHERD)	-	4			
1 - 6			**Total (3 years)**	**180**	**133 (15)**			

@ - year end practical

*- for grade calculation 50 marks are converted into 100 in the mark statements

Passed by	***Board of Studies held on 18.12.2023***
Approved by	***48th Academic Council Meeting held on 27.03.2024***

ANNEXURE 1
Skill Enhancement Course - 1: (Non-Major Elective)*

Department	Course Code	Title of the Course
Computer Science	23UCS14SE01	Skill Enhancement Course - 1: (Non-Major Elective): Office Automation
BCA	23UBC14SE01	Skill Enhancement Course - 1: (Non-Major Elective): Fundamentals of Information Technology
Mathematics	23UMA14SE01	Skill Enhancement Course - 1: (Non-Major Elective): Mathematics for Competitive Examinations
Statistics	23UST14SE01	Skill Enhancement Course - 1: (Non-Major Elective): Basics of Statistics
Vis Com	23UVC14SE01	Skill Enhancement Course - 1: (Non-Major Elective): Digital Storytelling and Scriptwriting
English	23UEN14SE01	Skill Enhancement Course - 1: (Non-Major Elective): English for Communication
History	23UHS14SE01	Skill Enhancement Course - 1: (Non-Major Elective): Introduction to Tourism
Tamil	23UTA14SE01	Skill Enhancement Course - 1: (Non-Major Elective): பேச்சுக்கலைத் திறன் (Oratory Skills)
BBA	23UBU14SE01A	Skill Enhancement Course - 1: (Non-Major Elective): Practical Advertising
	23UBU14SE01B	Skill Enhancement Course - 1: (Non-Major Elective): Digital Marketing
B. Com	23UCO14SE01A	Skill Enhancement Course - 1: (Non-Major Elective): Introduction to Accounting
	23UCO14SE01B	Skill Enhancement Course - 1: (Non-Major Elective): Consumer Protection and Rights
B. Com CA	23UCC14SE01	Skill Enhancement Course - 1: (Non-Major Elective): Entrepreneurship Skills
Economics	23UEC14SE01	Skill Enhancement Course - 1: (Non-Major Elective): Demography
Chemistry	23UCH14SE01	Skill Enhancement Course - 1: (Non-Major Elective): Role of Chemistry in Daily Life
Electronics	23UEL14SE01	Skill Enhancement Course - 1: (Non-Major Elective): Consumer Electronics
Physics	23UPH14SE01A	Skill Enhancement Course - 1: (Non-Major Elective): Physics for Everyday Life
	23UPH14SE01B	Skill Enhancement Course - 1: (Non-Major Elective): Home Electrical Installation

**Offered to students from other Departments*

ANNEXURE 2
Generic Elective - 1*

Department	Course Code	Title of the Course
Computer Science	23UCS54EG01	Generic Elective - 1: Ethical Hacking
BCA	23UBC54EG01	Generic Elective - 1: Fundamentals of Data Science
Mathematics	23UMA54EG01	Generic Elective - 1: Numerical Ability
Statistics	23UST54EG01	Generic Elective - 1: Actuarial Statistics
Vis Com	23UVC54EG01	Generic Elective - 1: Media Education
English	23UEN54EG01	Generic Elective - 1: Film Studies
History	23UHS54EG01	Generic Elective-1: Tamil Heritage and Culture
Tamil	23UTA54EG01	Generic Elective - 1: தமிழிலக்கியத்தில் மனித உரிமைகள் (Human rights in Tamil literature)
BBA	23UBU54EG01A	Generic Elective - 1: Global Supply Chain Management
	23UBU54EG01B	Generic Elective - 1: Starts-ups and small Business Management
B.Com.	23UCO54EG01A	Generic Elective - 1: Computerised Accounting
	23UCO54EG01B	Generic Elective - 1: Basics of Excel
	23UCO54EG01C	Generic Elective - 1: Personal Investment Planning
B. Com CA	23UCC54EG01	Generic Elective - 1: E-commerce and E Business Management
Economics	23UEC54EG01	Generic Elective - 1: Principles of Economics
Chemistry	23UCH54EG01	Generic Elective - 1: Health Science
Electronics	23UEL54EG01A	Generic Elective - 1: Everyday Electronics
	23UEL54EG01B	Generic Elective - 1: Wireless Communication
Physics	23UPH54EG01A	Generic Elective-1: Everyday Physics
	23UPH54EG01B	Generic Elective-1: Renewable Energy Physics

**Offered to students from other Departments*

ANNEXURE 3
Generic Elective - 2*

Department	Course Code	Title of the Course
Computer Science	23UCS64EG02	Generic Elective - 2: 3D Printing and Design
BCA	23UBC64EG02	Generic Elective - 2: Industry 4.0
Mathematics	23UMA64EG02	Generic Elective - 2: Quantitative Techniques
Statistics	23UST64EG02	Generic Elective - 2: Applied Statistics
Vis Com	23UVC64EG02	Generic Elective - 2: Digital Media Production
English	23UEN64EG02	Generic Elective - 2: English for the Media
History	23UHS64EG02	Generic Elective - 2: Intellectual Revivalism in Tamil Nadu
Tamil	23UTA64EG02	Generic Elective - 2: தமிழர் மருத்துவம் (Tamil Medicine)
BBA	23UBU64EG02A	Generic Elective - 2: Personality Development
	23UBU64EG02B	Generic Elective - 2: NGO Management
B. Com	23UCO64EG02A	Generic Elective - 2: Rural Marketing
	23UCO64EG02B	Generic Elective - 2: Entrepreneurship Development
	23UCO64EG02C	Generic Elective - 2: Digital Marketing
B. Com CA	23UCC64EG02	Generic Elective - 2: Total Quality Management
Economics	23UEC64EG02	Generic Elective - 2: Economics for Competitive Exams
Chemistry	23UCH64EG02	Generic Elective - 2: Solid Waste Management
Electronics	23UEL64EG02A	Generic Elective - 2: CCTV and Smart Security Systems
	23UEL64EG02B	Generic Elective - 2: Entrepreneurial Electronics
Physics	23UPH64EG02A	Generic Elective - 2: Laser Technology and its applications
	23UPH64EG02B	Generic Elective - 2: Physics of Earth

**Offered to students from other Departments*

ANNEXURE 4
Skill Enhancement Course - 3 (WS)*

School	Course Code	Title of the Course
SBS	23UBO64SE02	Skill Enhancement Course - 3 (WS): Herbal Technology

**Offered to students from other Departments within School*

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	23UTA11GL01A	General Tamil - 1	5	3

கற்றலின் நோக்கங்கள்
தமிழ்ச் செவ்வியல் இலக்கியங்களையும் காப்பியங்களையும் மாணவர்கள் அறிந்துகொள்ளல்
தமிழர் பேணி வளர்த்த அறம்சார் விழுமியங்களை மாணவர்கள் தம் வாழ்வில் பின்பற்றுதல்
தமிழில் பக்திஇயக்கப் பங்களிப்பையும் பகுத்தறிவுச் சிந்தனை மரபையும் உணர்தல்
மாணவர்கள் தம் எழுத்தாற்றலையும் மொழிப்புலமையையும் வளர்த்தெடுத்தல்
போட்டித்தேர்வுகளை எதிர்கொள்ளும் வகையில் இலக்கணம், இலக்கியம் கற்றல்

அலகு - 1 தமிழ் இலக்கிய, இலக்கண வரலாறு அறிமுகம். **(10 மணி நேரம்)**

1. இலக்கணம் :

அ.தொல்காப்பியம், இறையனார் களவியல் உரை , நம்பியகப் பொருள், புறப்பொருள் வெண்பா மாலை, நன்னூல், தண்டியலங்காரம், யாப்பருங்கலக்காரிகை- நூல்கள்

ஆ.மொழிப் பயிற்சி- ஒற்றுப்பிழை தவிர்த்தல்

- வல்லினம் மிகும் இடங்கள்
- வல்லினம் மிகா இடங்கள்
- ஈரொற்று வரும் இடங்கள்
- ஒரு, ஓர் வரும் இடங்கள்
- அது, அஃது வரும் இடங்கள்
- தான், தாம் வரும் இடங்கள்

பயிற்சி : வல்லினம் மிகும் இடங்கள், மிகா இடங்கள் தவறாக வரும்வகையில் ஒரு பத்தி கொடுத்து ஒற்றுப் பிழை திருத்தி எழுதச் செய்தல்.

2. சங்க இலக்கியம் - எட்டுத்தொகை, பத்துப்பாட்டு
3. அற இலக்கியம்-பதினெண்கீழ்கணக்கு நூல்கள்
4. காப்பிய இலக்கியம் - ஐம்பெருங் காப்பியங்கள், ஐஞ்சிறு காப்பியங்கள், சமயக் காப்பியங்கள்
5. பக்தி இலக்கியமும் (பன்னிரு திருமுறைகள், நாலாயிர திவ்வியப் பிரபந்தம் -- பகுத்தறிவு இலக்கியமும் (சித்தர் இலக்கியங்கள், புலவர் குழந்தையின் இராவண காவியம்)

அலகு - 2 சங்க இலக்கியம் **(15 மணி நேரம்)**

எட்டுத்தொகை :

6. நற்றிணை-முதல் பாடல் -நின்ற சொல்லர்
7. குறுந்தொகை 3 ஆம் பாடல் -நிலத்தினும் பெரிதே
8. ஐங்குறுநூறு –நெல் பல பொலிக! பொன் பெரிது சிறக்க!' (முதல் பாடல்)-வேட்கைப் பத்து
9. கலித்தொகை- 51 - சுடர்த்தொடீஇக் கேளாய் -குறிஞ்சிக் கலி
10. புறநானூறு -189 தெண்கடல் வளாகம் பொதுமையின்றி, நாடா கொன்றோ -187

பத்துப்பாட்டு:

முல்லைப்பாட்டு (முழுவதும்)

அலகு - 3 அற இலக்கியம் **(10 மணி நேரம்)**

12. திருக்குறள் -அறன் வலியுறுத்தல் அதிகாரம்
13. நாலடியார்-பாடல்: 131 (குஞ்சியழகும்)
14. நான்மணிக்கடிகை-நிலத்துக்கு அணியென்ப
15. பழமொழி நானூறு- தம் நடை நோக்கார்
16. இனியவை நாற்பது- 37. இளமையை மூப்பு என்று

அலகு - 4 காப்பிய இலக்கியம் **(20 மணி நேரம்)**

17. சிலப்பதிகாரம் – வழக்குரைகாதை
18. மணிமேகலை- பாத்திரம் பெற்ற காதை

19. *பெரியபுராணம் - பூசலார் நாயனார்புராணம்*
20. *கம்பராமாயணம்- குகப் படலம்*
21. *சீறாப்புராணம் – மானுக்குப் பிணை நின்ற படலம்*
22. *இயேசு காவியம் -ஊதாரிப்பிள்ளை*

அலகு - 5 பக்தி இலக்கியமும், பகுத்தறிவு இலக்கியமும் **(15 மணி நேரம்)**

23. **பக்தி இலக்கியம்:**

- *திருநாவுக்கரசர் தேவாரம் - நாமார்க்கும் குடியல்லேம் எனத் தொடங்கும் பாடல் மட்டும்*
- *மாணிக்கவாசகர் திருவாசகம் - நமச்சிவாய வாஅழ்க நாதன்தாள் வாழ்க முதல் சிரம்குவிவார் ஓங்குவிக்கும் சீரோன் கழல் வெல்க வரை*
- *பொய்கையாழ்வார்-வையந் தகளியா வார்கடலே*
- *பூதத்தாழ்வார்-அன்பே தகளியா*
- *பேயாழ்வார்-திருக்கண்டேன் பொன்மேனி கண்டேன்*
- *ஆண்டாள் – திருப்பாவை மார்கழித் திங்கள் (முதல் பாடல்)*

24. **பகுத்தறிவு இலக்கியம் :**

- *திருமூலர் – திருமந்திரம்* (270,271, 274, 275 285)
- *பட்டினத்தார் -திருவிடை மருதூர் (காடே திரிந்து – எனத் தொடங்கும் பாடல்*
- *பா.எண்.*279, 280)
- *கடுவெளி சித்தர் - பாபஞ்செய் யாதிரு மனமே* (பாடல் முழுவதும்)
- *இராவண காவியம் –* **தாய்மொழிப் படலம்** - 18. (*ஏடுகை யில்லா ரில்லை முதல்* - 22. *செந்தமிழ் வளர்த்தார் வரை*)

கற்பித்தல் முறை	***விரிவுரை*** *(Lecture),* ***காணொளிக் காட்சி*** *(Videos),* ***விளக்கக் காட்சி*** *(PPT presentation)*

பாடநூல்

1. ***பொதுத்தமிழ்****-1 (* ***தமிழ் இலக்கிய வரலாறு****-1),* ***தமிழாய்வுத்துறை, தூய வளனார் தன்னாட்சிக் கல்லூரி, திருச்சிராப்பள்ளி*** *– 620 002,* ***முதற்பதிப்பு*** *- 2023*
2. ***பார்வை நூல்கள்***
3. *வரதராசன்.மு., தமிழ் இலக்கிய வரலாறு, சாகித்ய அக்காதெமி, புதுடெல்லி. 2021*
4. *விமலானந்தன். மது. ச., தமிழ் இலக்கிய வரலாறு, முல்லை நிலையம், சென்னை, 2019*
5. *தமிழண்ணல், புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு, பாரி நிலையம், சென்னை, 2022*
6. *சிற்பி பாலசுப்பிரமணியன் & சேதுபதி.சொ., தமிழ் இலக்கிய வரலாறு, கவிதா வெளியீடு, சென்னை, 2015*
7. *சிற்பி பாலசுப்ரமணியம், & பத்மநாபன். நீல., புதிய தமிழ் இலக்கிய வரலாறு (3 தொகுதிகள்), சாகித்ய அக்காதெமி, புதுடெல்லி,2013*
8. *பெருமாள். அ.கா., தமிழ் இலக்கிய வரலாறு, சுதர்சன் புக்ஸ், நாகர்கோவில், 2014*
9. *ஏசுதாசன். ப.ச., தமிழ் இலக்கிய வரலாறு, நியூ செஞ்சுரி புக் ஹவுஸ்,சென்னை, 2015*
10. *ஸ்ரீகுமார். எஸ்., தமிழ் இலக்கிய வரலாறு, ஸ்ரீசெண்பகா பதிப்பகம், சென்னை, 2014*
11. *பாக்கியமேரி எஃப்., வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு, பூவேந்தன் பதிப்பகம், சென்னை,*2022
12. *சுப்புரெட்டியார்.ந., தமிழ் பயிற்றும் முறை, மணிவாசகர் நூலகம், சிதம்பரம், 1980*

Websites and eLearning Sources

1. https://www.chennailibrary.com/
2. https://www.sirukathaigal.com
3. https://www.tamilvirtualuniversity.org
4. https://www.noolulagam.com
5. https://www.katuraitamilblogspot.com

Course Outcomes		
CO No.	**CO-Statements** ***இப்பாடத்தின் நிறைவில் மாணவர்கள்***	**Cognitive Levels (K - Level)**
CO1	*சங்க இலக்கியங்கள்வழி பண்டைத்தமிழரின் வாழ்வியலையும் பண்பாட்டையும் அறிந்து கொள்வர்*	**K1**
CO2	*அற இலக்கியங்கள், காப்பியங்கள் வெளிப்படுத்தும் அறம்சார் விழுமியங்களைத் தம் வாழ்வில் பின்பற்றுவர்*	**K2**
CO3	*இலக்கணக் கோட்பாடுகளை இக்கால வாழ்வியலோடு பொருத்திப் பார்ப்பர்*	**K3**
CO4	*மொழியறிவோடு பெறுவர் திறன் பகுத்தாராயும் இலக்கியங்களைப்*	**K4**
CO5	*பக்தி இயக்கங்களின் செல்வாக்கையும், தமிழரின் பகுத்தறிவு மரபையும் மதிப்பிடுவர்*	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
1	**23UTA11GL01A**			General Tamil - 1						**5**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO 1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	1	2	3	2	2	3	3	2	2	2	**2.2**
CO2	2	2	3	2	2	2	3	2	3	2	**2.3**
CO3	1	2	2	3	2	2	2	3	3	3	**2.3**
CO4	2	2	3	2	2	3	2	3	3	2	**2.4**
CO5	3	1	2	2	2	2	3	2	3	3	**2.3**
										Mean Overall Score	**2.3 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	**23UFR11GL01**	French - 1	**5**	**3**

Course Objectives
Identify the basic French sentence structure
Define and describe the various grammatical tenses and use them to communicate in French
Examine the various documents presented and discuss and reply to the questions asked on it
Analyze and interpret expressions used to convey the cause, the effect, the purpose, and the opposition in French
Evaluate the grammatical nature present in passages

UNIT I **(15 Hours)**

- Salut ! Enchanté

UNIT II **(15 Hours)**

- J'adore

UNIT III **(15 Hours)**

- Tu veux bien ?

UNIT IV **(15 Hours)**

- On se voit quand ?

UNIT V **(15 Hours)**

- Bonne idée

Teaching Methodology	Videos, Audios, PPT presentation, Role-play, Quiz

Book for Study

1. Mérieux, R. & Loiseau, Y. (2017). *Latitudes* -1- (A1 /A2), méthode de français, Didier. (Units 1 - 6 only)

Books for Reference

1. P.Dauda,L.Giachino and C.Baracco, *Generation A1*, Didier, Paris 2020.
2. J.Girardet and J.Pecheur, *Echo A1*, CLE International, 2^{e}edition ,2017
3. Isabelle Fournier, *Talk French*, Goyal Publishers, 2011

Websites and eLearning Sources

1. https://www.wikihow.com/Pronounce-the-Letters-of-the-French-Alphabet
2. https://francais.lingolia.com/en/grammar/tenses/le-present
3. https://www.lawlessfrench.com/grammar/articles/
4. https://www.frenchpod101.com/french-vocabulary-lists/10-lines-you-need-for-introducing-yourself
5. https://www.tolearnfrench.com/exercises/exercise-french-2/exercise-french-3295.php

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	recall and remember the usage of grammatical tenses in constructing sentences in a dialogue.	**K1**
CO2	apply the learnt grammar rules in practice exercises to improve their understanding	**K2**
CO3	explain the nuances in the usage of various grammatical tenses and their aspects	**K3**
CO4	demonstrate knowledge of various expressions used to express opinions, emotions, cause, effect, purpose, and hypothesis in French	**K4**
CO5	communicate in French and summarize a given text	**K5**

Relationship Matrix											
Semester	**Course Code**	**Title of the Course**							**Hours**		**Credits**
1	**23UFR11GL01**	French - 1							**5**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	1	3	1	3	3	2	3	2	**2.4**
CO2	2	3	3	2	1	3	3	3	3	2	**2.5**
CO3	1	3	2	1	2	2	2	2	3	2	**2.0**
CO4	3	3	3	3	3	3	3	2	3	2	**2.8**
CO5	3	3	3	3	2	3	3	3	3	2	**2.8**
										Mean Overall Score	**2.5 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	23UHI11GL01	Hindi - 1	5	3

Course Objectives
To understand the basics of Hindi Language
To make the students to be familiar with the Hindi words
To enable the students to develop their effective communicative skills in Hindi.
To introduce the socially relevant subjects in Modern Hindu Literature
To empower the students with globally employable soft skills

UNIT I: Buniyadi Hindi **(15 Hours)**

- Swar
- Vyanjan
- Barah Khadi
- Shabd aur
- Vakya Rachna

UNIT II: Hindi Shabdavali **(15 Hours)**

- Rishto ke Naam
- Gharelu padartho ke Naam

UNIT III: Vyakaran **(15 Hours)**

- Sadharan Vakya aur Sangya
- Sarvanam
- Visheshan
- Kriya aadi shabdo ka prayog

UNIT IV: Chote Gadyansh ka pattan **(15 Hours)**

- Bacho ki Kahaniya
- Patra-Patrikao mein prakashit Gadyansho ka Pathan

UNIT V: Nibandh **(15 Hours)**

- Sant Tiruvalluvar
- E.V.R Thandai Periyar
- Naari Sashaktikaran
- Paryavaran Sanrakshan
- Vibhinna pratiyogi parikshao ke bare mein jaankari dena
- Pratiyogi priksha par adharit nibandho dwara bhasha ki kshamta badhane vale prashikshan kary.

Teaching Methodology	Videos, PPT, Quiz, Group Discussion, Project Work.

Books for Study

1. Gupth, M.K. (2020). *Hindi Vyakaran*, Anand Prakashan, Kolkatta.
2. Tripaty, V. (2018). *Kuchh Kahaniyan*, Rajkamal Prakashan Pvt. Ltd, New Delhi.
3. Jain, S.K. (2019). *Anuwad: Siddhant Evam Vyavhar*, Kailash Pustak Sadan, Madhya Pradesh.

Books for Reference

1. Abdul Kalam, A. P.J. (2020). *Mere sapnom ka Bharath*, Prabath Prakashan, Noida.
2. Singh, L.P. (2017). *Kavya ke sopan*, Bharathy Bhavan Prakashan.

3. Kumar, A. (2019). *Sampoorna Hindi Vyakaran our Rachana*, Lucent publisher.
4. (2018). *Adhunik Hindi Vyakaran our Rachana*, Bharati Bhavan Publishers & distributors.
5. Shukla, A.R. (2022). *Hindi Sahitya Ka Itihas*, Prabhat Prakashan.

Websites and e-Learning Sources

1. https://learningmole.com/hindi-alphabet-letters-pronunciation-guide/
2. https://www.careerpower.in/hindi-alphabet-varnamala.html
3. https://www.youtube.com/watch?v=b0UvXnIC8qc
4. https://www.importanceoflanguages.com/learn-hindi-language-guide/
5. https://parikshapoint.com/hindi-sahitya/

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, the students will be able to	**Cognitive Levels (K - Level)**
CO1	introduction to Hindi sounds	**K1**
CO2	acquisition of Hindi Vocabulary	**K2**
CO3	sentence formation in Hindi	**K3**
CO4	reading of stories and other passages	**K4**
CO5	modules to increase language ability through general essays based on competitive exams	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**				**Hours**		**Credits**	
1	**23UHI11GL01**			Hindi - 1				**5**		**3**	
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	2	1	3	3	3	1	3	2	**2.3**
CO2	2	3	2	3	1	2	3	3	3	2	**2.4**
CO3	3	2	2	2	1	3	2	3	2	3	**2.3**
CO4	3	1	2	3	2	3	2	3	3	2	**2.4**
CO5	2	3	3	2	3	2	3	3	1	3	**2.5**
									Mean Overall Score		**2.38 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	**23USA11GL01**	Sanskrit - 1	**5**	**3**

Course Objectives
To help the students learn the alphabets of Sanskrit.
To understand the Sanskrit grammar and sabdas.
To have an idea of the epics.
To closely understand the literary works in Sanskrit with special reference toPancamahakavyas.
To understand the Raghuvasa Mahakava and Kalidasa.

UNIT I **(15 Hours)**

Introduction to Sanskrit (Alphabets, Two letter words and three letter words)

Grammar:

akārāntaḥpuṁliṅgaḥśabda-s - 1. बाल (*Bāla*) and 2. देव (*Deva*) *ākārāntaḥstrīliṅgaḥśabda-s* - 1. बाला (*Bālā*) and 2. लता (*Latā*)*akārāntaḥnapuṁsakaliṅgaḥśabda-s* -

1. फल (*Phala*) and 2. वन (*Vana*)

UNIT II **(15 Hours)**

Introduction to *Rāmāyana,Kālidāsa* and his poetic works

Text: *Raghuvaṁśa* (Canto I) Verses 1-15

UNIT III **(15 Hours)**

Introduction to the works of *Bhāravi* -

Text: *Raghuvaṁśa* (canto I) Verses 16-30

UNIT IV **(15 Hours)**

Introduction to the works of *ŚrīHarṣha* -

Text: *Raghuvaṁśa* (Canto I) Verses 31-45

UNIT V **(15 Hours)**

Grammar:

Conjugations -*Laṭlakāra-s* – (Present tense)

(i) गच्छतत (*Gacchati*) (ii) ततष्ठतत (*Tiṣṭhati*) (iii) पठतत (*Paṭhati*)

(iv) नृत्यतत (*Nṛtyati*) (v) कु प्यतत (*Kupyati*) (vi) कथयतत (*Kathayati*)

(vii) गणयतत (*Gaṇayati*) (viii) अततत (*Asti*)

(ix) करोतत (*Karoti*) (x) शृणोतत (*Śṛṇoti*)

Indeclinables (Avyayaani) - अतप (*api*), कदा (*kadā*), च (*ca*), अद्य (*adya*), तवना (*vinā*),सह (*saha*), तत्र (*tatra*), ककम् (*kim*), यकद (*yadi*) - तर्ह (*tarhi*), यथा (*yathā*) - तथा (*tathā*) Prefixes (*Upasargas*) - आङ् (*āṅ*), तव (*vi*), परर (*pari*), अनु (*anu*),

अति (*adhi*), उत् (*ut*), प्रतत (*prati*), उप (*upa*), प्र (*pra*) तनर् (*nir*)

Teaching Methodology	Videos, PPT, demonstration.

Book for Study

1. Murugan, C., et al. (eds.). (2022). *Kalasala Samskrta Sukha Bodhini I* (for under graduate foundation course) Published by University of Madras.

Book for Reference

1. Vadhyar, R.S. (2017). *Shabdha manjari*, R.S. Vadyar & Sons, Palakkad.

Websites and e-Learning Sources

1. https://www.arlingtoncenter.org/Sanskrit%20Alphabet.pdf

2. https://courses.lumenlearning.com/suny-hccc-worldcivilization/chapter/sanskrit/
3. https://www.newworldencyclopedia.org/entry/Sanskrit_literature
4. https://archive.org/details/AShortHistoryOfsanskritLiterarure
5. https://archive.org/details/raghuvamsha_with_sanjivini_edited_by_mr_kale

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	remember the usage of grammatical tenses inconstructing sentences in dialogue.	**K1**
CO2	apply the rules of usage in practice exercises and identify errors	**K2**
CO3	explain the nuances in the usage of various grammatical tenses and aspects	**K3**
CO4	demonstrate knowledge of various expressions of opinion, emotions, cause, effect, purpose, and hypothesisin French	**K4**
CO5	communicate in French and summarize the given text	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**	**Credits**	
1	**23USA11GL01**			Sanskrit - 1					**5**	**3**	
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	1	3	2	3	1	3	2	3	2	2	**2.1**
CO2	2	3	2	3	1	2	2	3	2	3	**2.5**
CO3	3	2	2	2	2	2	3	2	3	2	**2.1**
CO4	3	2	3	2	2	3	3	2	3	2	**2.4**
CO5	3	2	3	3	2	2	3	2	3	3	**2.3**
									Mean Overall Score		**2.34 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	23UEN12GE01	General English - 1	5	3

Course Objectives
To enable learners to acquire self awareness and positive thinking required in various life situations
To help them acquire the attribute of empathy
To assist them in acquiring creative and critical thinking abilities
To enable them to learn the basic grammar
To assist them in developing LSRW skills

UNIT I: Self-awareness ELF-A (WHO) & Positive Thinking (UNICEF) (15 Hours)

Life Story

1. Chapter 1 from Malala Yousafzai, I am Malala
2. An Autobiography or The Story of My Experiments with Truth (Chapters 1, 2 & 3) M.K. Gandhi

Poem

3. Where the Mind is Without Fear – Gitanjali 35 – Rabindranath Tagore
4. Love Cycle – Chinua Achebe

UNIT II: Empathy (15 Hours)

Poem

5. Nine Gold Medals – David Roth
6. Alice Fell or poverty – William Wordsworth

Short Story

7. The School for Sympathy – E.V. Lucas
8. Barn Burning – William Faulkner

UNIT III: Parts of Speech (15 Hours)

9. Articles
10. Noun
11. Pronoun
12. Verb
13. Adverb
14. Adjective
15. Preposition

UNIT IV: Critical & Creative Thinking. (15 Hours)

Poem

16. The Things That Haven't Been Done Before – Edgar Guest
17. Stopping by the Woods on a Snowy Evening – Robert Frost

Readers Theatre

18. The Magic Brocade – A Tale of China
19. Stories on Stage – Aaron Shepard (Three Sideway Stories from Wayside School" by Louis Sachar)

Unit V: Paragraph and Essay Writing (15 Hours)

20. Descriptive
21. Expository
22. Persuasive
23. Narrative
24. Reading Comprehension

Teaching Methodology	Interactive methods, and multimedia presentations

Books for Study

1. Yousafzai, M. (2013). *I am Malala, Little.* Brown and Company.
2. Gandhi, M. K. (2011). *An Autobiography or The Story of My Experiments with Truth (Chapter - I).* Rupa Publications.
3. Tagore, R. (1913). *"Gitanjali 35" from Gitanjali (Song Offerings): A Collection of Prose Translations Made by the Author from the Original Bengali.* MacMillan.
4. Shepard, A. (2017). *Stories on Stage.* Shepard Publications.

Books for Reference

1. Krishnasamy. N. (1975). *Modern English: A Book of Grammar, Usage and Composition.* Macmillan.
2. Nesfield, J. C. (2019). *English Grammar Composition and Usage.* Macmillan.

Websites and eLearning Sources

1. https://archive.org/details/i-am-malala
2. https://www.indiastudychannel.com/resources/146521- Book-Review-An- Autobiography-or-The-story-of-my-experiments-with-Truth.aspx
3. https://www.poetryfoundation.org/poems/45668/gitanjali-35
4. https://amzn.eu/d/9rVzlNv
5. https://archive.org/details/in.ernet.dli.2015.44179

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	discover self awareness and positive thinking required in various life situations	**K1**
CO2	classify the attributes of empathy	**K2**
CO3	apply creative and critical thinking skills	**K3**
CO4	focus on grammar for functional purposes	**K4**
CO5	integrate the LSRW skills for effective communication	**K5**

Relationship Matrix											
Semester	**Course Code**	**Title of the Course**							**Hours**		**Credits**
1	**23UEN12GE01**	General English - 1							**5**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	3	3	3	3	3	3	3	3	**3**
CO2	2	3	3	3	2	3	3	3	3	3	**2.5**
CO3	3	3	3	2	3	3	3	3	3	2	**2.8**
CO4	3	3	3	3	3	3	3	3	3	3	**3**
CO5	3	2	3	3	3	3	3	3	3	3	**2.8**
										Mean Overall Score	**2.82 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	23UBO13CC01	**Core Course - 1**: Plant Diversity - 1 (Algae)	5	4

Course Objectives
To provide a comprehensive knowledge on the biology of algae.
To provide a basis for better understanding of the evolution higher of plants.
To understand reproductive biology, ecology of plants by studying the simpler systems in algae.
To understand the role of algae in ecosystems as primary producers of nutrition.
To understand importance of algae to animals and humans.

UNIT I **(15 Hours)**

General characters of Algae: algal distribution; criteria for classification; classification of Algae (Fritsch-1935-1945).

UNIT II **(15 Hours)**

Thallus organization (unicellular-Chlorella, Diatoms, colonial-Volvox, filamentousAnabaena, Oedogonium, siphonous-Caulerpa, parenchymatous- Sargassum, Gracilaria).

UNIT III **(15 Hours)**

Reproduction-Vegetative, asexual, sexual reproduction and life histories (haplontic- Oedogonium and Chara, diplontic-Diatoms and Sargassum, diplohaplontic-Ulva and diplobiontic-Gracilaria.

UNIT IV **(15 Hours)**

Algal cultivation methods, Algal production systems; indoor cultivation methods and largescale cultivation of algae, harvesting of algae.

UNIT V **(15 Hours)**

Algae as food and feed: Agar-agar, Alginic acid and Carrageenan; Diatomite. Resource potential of algae: Application of algae as fuel, agriculture and pharmaceutical. Phycoremediation. Role of algae in CO_2 sequestration, Algae as indicator of water pollution, algal bioinoculants, Bioluminescence.

Teaching Methodology	Chart, PPT, chalk and talk

Books for Study

1. Lee, R. E. (2018). *Phycology,* (5th Ed.). Cambridge University Press.
2. Kumar, H. D. (1999). *Introductory phycology*. Affiliated East-West Press.
3. Singh, V., Pande, P. C. & Jain, D. K. (2020). *A textbook of botany,* (5th Ed.). Rastogi Publication.
4. Morris, I. (1977). *An introduction to the algae*. Hutchinson & Co (Publishers) Ltd.

Books for Reference

1. Das, M. K. (2010). *Algal biotechnology: New vistas*. Daya Publishing House.
2. Chapman, V. J. & Chapman, D. J. (2013). *The algae*. Alpha Numera.
3. Fritsch, F. E. (1945). *The structure and reproduction of the algae*. Cambridge University press.
4. Round, F. E. (1984). *The Ecology of algae*. Cambridge University Press.
5. Lee, R. E. (2008). *Phycology,* (4th Ed.). Cambridge University Press.
6. Bold, H. C. & Wynne, M. J. (1978). *Introduction to the algae: Structure and function*. Prentice Hall of India.

Websites and eLearning Sources

1. https://www.crcpress.com/Therapeutic-and-Nutritional-Uses-of-Algae/Pereira/p/book/9781498755382
2. https://www.crcpress.com/Therapeutic-and-Nutritional-Uses-of-Algae/Pereira/p/book/9781498755382
3. https://www.crcpress.com/Algae-Anatomy-Biochemistry-and-Biotechnology-SecondEdition/Barsanti-Gualtieri/p/book/9781439867327

4. https://www.crcpress.com/Marine-Algae-Biodiversity-Taxonomy-EnvironmentalAssessment-and-Biotechnology/Pereira-Neto/p/book/9781466581678
5. https://www.kopykitab.com/Botany-For-Degree-Students-ALGAE-by-B-R-Vashishta-DrA-K-Sinha-Dr-V-P-Singh
6. https://www.wileyindia.com/a-textbook-of-algae.html
7. https://www.kobo.com/in/en/ebook/algae-biotechnology
8. https://www.ikbooks.com/books/book/life-sciences/botany/a-textbook-algae/ 9788188237449/

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, the students will be able to	**Cognitive Levels (K-Level)**
CO1	relate to the structural organization, reproduction and significance of algae.	**K1**
CO2	demonstrate knowledge in understanding the various life cycle patterns and the fundamental concepts in algal growth	**K2**
CO3	explain the benefits of various algal technologies on the ecosystem.	**K3**
CO4	compare and contrast the thallus organization and modes of reproduction in algae.	**K4**
CO5	determine the emerging areas of Algal Biotechnology for identifying commercial potentials of algal products and their uses.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
1	**23UBO13CC01**			**Core Course - 1**: Plant Diversity - 1 (Algae)						**5**	**4**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	3	2	2	3	2	2	3	2	**2.4**
CO2	2	3	2	3	2	3	2	3	2	1	**2.3**
CO3	2	2	3	2	1	3	3	2	3	1	**2.2**
CO4	3	3	2	3	2	3	3	2	3	2	**2.6**
CO5	2	2	3	2	1	3	2	3	2	1	**2.1**
										Mean Overall Score	**2.4 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	23UBO13CP01	**Core Practical - 1:** Algae	3	2

Course Objectives
To develop skills to identify algae based on habitat, thallus structure and the internal organization.
To identify microalgae in a mixture.
To develop skills to prepare the microslides of algae.
To study the economic importance of few species.
To understand importance of algae to animals and humans.

Experiments

1. Micro-preparation of the types prescribed in the syllabus.
2. Identifying the micro slides relevant to the syllabus.
3. Identifying types of algal mixture.
4. Field visit to study fresh water/marine water algal habitats.
5. Visit to nearby industry actively engaged in algal technology.

Teaching Methodology	PPT, microslide preparation, models, chalk and talk, diagrams

Books for Study

1. Kumar, H. D. (1999). *Introductory phycology*. Affiliated East-West Press.
2. Bendre, A. & Kumar, A. (2020). *A textbook of practical botany-1*, (10th Ed.). Rastogi Publications.
3. Round, F. E. (1984). *The ecology of algae*. Cambridge University Press.
4. Singh, V., Pande, P. C & Jain, D. K. (2020). *A textbook of botany*, (5th Ed.). Rastogi Publication.

Books for Reference

1. Serediak, N. & Huynh, M. L. (2011). *Algae identification lab guide: accompanying manual to the algae identification field guide*. Agriculture and Agri-Food.
2. Chapman, V. J. & Chapaman, D. J. (1960). *The algae*. ELBS & MacMillan.
3. Lee, R. E. (2008). *Phycology*, (4th Ed.). Cambridge University Press.
4. Lee, R. E. (2018). *Phycology*, (5th Ed.). Cambridge University Press.

Websites and eLearning Sources

1. https://www.amazon.in/Practical-Manual-Algae-Sundara-Rajan/dp/8126106492
2. https://books.google.co.in/books/about/Practical_Manual_of_Algae.html?id=
3. 8d5DAAAACAAJ&redir_esc=
4. https://freebookcentre.net/biology-books-download/Concepts-of-Botany-Algae(PDF-21P).html
5. https://www.ebooks.com/en-in/book/210152662/algae/sachin-kumar-mandotra/
6. https://books.google.co.in/books/about/Algae.html?id=s1P855ZWc0kC&redir_esc=y

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, the students will be able to	**Cognitive Levels (K-Level)**
CO1	recall and identify algae using key identification characters.	**K1**
CO2	demonstrate practical skills in preparation of fresh mount and identification of algal forms from algal mixture.	**K2**
CO3	describe the internal structure of algae prescribed in the syllabus.	**K3**
CO4	decipher the algal diversity in fresh/marine water and their economic significance.	**K4**
CO5	evaluate the various techniques used to culture algae for commercial purposes	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
1	**23UBO13CP01**			**Core Practical - 1:** Algae						**3**	**2**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	3	2	2	3	2	2	3	2	**2.4**
CO2	2	3	2	3	2	3	2	3	2	1	**2.3**
CO3	2	2	3	2	1	3	3	2	3	1	**2.2**
CO4	3	3	2	3	2	3	3	2	3	2	**2.6**
CO5	2	2	3	2	1	3	2	3	2	1	**2.1**
Mean Overall Score											**2.4 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	23UBO13AC01	**Allied Course - 1:** Allied Zoology - 1	4	3

Course Objectives
To acquire a basic knowledge of diversity and organization of Protozoa, Coelenterata, Helminthes and Annelida.
To acquire a basic knowledge of diversity and organization of Arthropoda, Mollusca and Echinodermata.
To comprehend the taxonomic position and diversity among Protochordata, Pisces and Amphibia.
To comprehend the taxonomic position and diversity among Reptilia, Aves and Mammalia.
To acquire detailed knowledge of select invertebrate and chordate forms.

UNIT I: Diversity of Invertebrates - I **(12 Hours)**

Principles of taxonomy. Criteria for classification - Symmetry and Coelom - Binomial nomenclature. Classification of Protozoa, Coelenterata, Helminthes and Annelida upto classes with two examples.

UNIT II: Diversity of Invertebrates - II **(12 Hours)**

Classification of Arthropoda, Mollusca and Echinodermata up to class level with examples

UNIT III: Diversity of Chordates - I **(12 Hours)**

Classification of Prochordata, Pisces and Amphibia up to orders giving two examples

UNIT IV: Diversity of Chordates - II **(12 Hours)**

Classification of Reptilia, Aves and Mammalia up to orders giving two examples

UNIT V: Animal organisation **(12 Hours)**

Structure and organization of (i)Earthworm (ii)Rabbit (iii)Prawn

Teaching Methodology	PPT, videos, demonstration using specimens, models and charts.

Book for Study

1. Ayyar, M. E. (1972). *Outlines of zoology*. Viswanathan Publication.

Books for Reference

1. Ayyar, M. E., & Ananthakrishnan, T. N. (1991). *A manual of zoology: Invertebrata* (Vol. 1). Viswanathan Publishers.
2. Ayyar, M. E., & Ananthakrishnan, T. N. (1992). *A manual of zoology: Invertebrata* (Vol. 2). Viswanathan Publishers.
3. Ayyar, M. E., & Ananthakrishnan, T. N. (1981). *A manual of zoology: Chordata*. Viswanathan Publishers.
4. Jordan, E. L. & Verma, P. S. (2015). *Invertebrate zoology*. S. Chand & Co.

Websites eLearning Sources

1. https://www.sanctuaryasia.com
2. https://www.iaszoology.com

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, the students will be able to	**Cognitive Levels (K-Level)**
CO1	recall the characteristic features invertebrates and chordates.	**K1**
CO2	classify invertebrates up to class level and chordates up to order level.	**K2**
CO3	explain and discuss the structural and functional organisation of some invertebrates and chordates.	**K3**
CO4	relate the adaptations and habits of animals to their habitat.	**K4**
CO5	analyse the taxonomic position, structure and organisation of animals.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
1	**23UBO13AC01**			**Allied Course - 1:** Allied Zoology - 1						**4**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	3	2	2	3	2	2	3	2	**2.4**
CO2	2	3	2	3	2	3	2	3	2	1	**2.3**
CO3	2	2	3	2	1	3	3	2	3	1	**2.2**
CO4	3	3	2	3	2	3	3	2	3	2	**2.6**
CO5	2	2	3	2	1	3	2	3	2	1	**2.1**
Mean Overall Score											**2.4 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	23UBO13AP01	**Allied Practical - 1:** Invertebrates and Vertebrates	2	1

Course Objectives
To understand the concept of taxonomy and systematic position of selected invertebrates.
To understand the feeding behaviour of different insects with reference to their mouth parts.
To prepare mounting of body and penial setae in earthworm and different appendages of prawn.
To acquire skill in dissection and displaying the different system in earthworm and cockroach.
To identify the campus fauna and apply the knowledge to classify them.

Experiments

1. **Earthworm**: External features and dissection of digestive and nervous systems; Mounting of body and Penial setae, Ovary and Spermatheca
2. **Cockroach**: External features and dissection of digestive system, nervous system and Reproductive system.
3. **Spotters**: NNRepresentative animal for each class in vertebrate and invertebrate phyla.
4. Temporary mounting of Mouth parts of Cockroach, House fly and mosquito.
5. Temporary mounting of Prawn appendages
6. Campus fauna identification.
7. Visit to a vermi- compost farm / sericulture research station and submission of report.

Teaching Methodology	Charts, slides, specimens, models and mounting dissection.

Books for Study

1. Wallace, R. L., Taylor, W. K., & Beck, D. E. (2004). *Invertebrate zoology: a laboratory manual*, (5th Ed).
2. Verma, P. S., & Agarwal, V. K. (2003). *A manual of practical zoology*, (6th Ed.). S. Chand Publication.

Books for Reference

1. Lal, S. S. (2015). *A text book of practical zoology - Vertebrate*. Oscar Publication.
2. Jordan, E. L., & Verma, P. S. (1995). *Chordata zoology and elements of animal physiology*. S. Chand and Co.
3. Ayyar, M. E., & Ananthakrishnan, T. N. (1992). *A manual of zoology: Invertebrata* (Vol. 1, Part 1). Viswanathan Publishers.
4. Kotpal, R. L. (1992). *Animal diversity* (Protozoa, Porifera, Coelenterata, Helminthes, Arthropoda, Molluscs, Echinodermata). Rastogi Publications.

Websites and eLearning Sources

1. https://www.biodiversitylibrary.org/item/63900
2. https://fordham.libguides.com/Biology/Zoology
3. https://www.austincc.edu /sziser/ Zoology Lab

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, the students will be able to	**Cognitive Levels (K-Level)**
CO1	identify and draw the external features of selected invertebrates and vertebrates.	**K1**
CO2	prepare the temporary mounting of mouth parts of insects and appendages of prawn.	**K2**
CO3	illustrate and labelling the digestive, nervous and reproductive system of dissected animals.	**K3**
CO4	dissect and identify different systems in earthworm and cockroach.	**K4**
CO5	explore the biological role of earthworm and silkworm from the field exposure.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
1	**23UBO13AP01**			**Allied Practical - 1:** Invertebrates and Vertebrates						**2**	**1**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	3	2	2	3	2	2	3	2	**2.4**
CO2	2	3	2	3	2	3	2	3	2	1	**2.3**
CO3	2	2	3	2	1	3	3	2	3	1	**2.2**
CO4	3	3	2	3	2	3	3	2	3	2	**2.6**
CO5	2	2	3	2	1	3	2	3	2	1	**2.1**
Mean Overall Score											**2.4 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	23UBO14FC01	**Foundation Course:** Basics of Botany	2	1

Course Objectives
To learn about the classification, distinguishing traits, geographic distribution, and reproductive cycle of algae, fungi, lichens, and bryophytes.
To understand the biodiversity by describing and explaining the morphology and reproductive processes of algae, fungi, bryophytes and microorganisms.
To investigate the classification, distinctive traits, distribution and reproduction and life history of the various classes and major types of Pteridophytes and Gymnosperms.
Enable to learn various cell structures and functions of prokaryotes and eukaryotes and understand the salient features and functions of cellular organelles.
Understanding of laws of inheritance, genetic basis of loci and alleles.

UNIT I: Biodiversity **(6 Hours)**

Systematics: Two Kingdom and Five Kingdom systems - Salient features of various Plant Groups: Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms- Viruses - Bacteria.

UNIT II: Cell Biology **(6 Hours)**

Cell as the basic unit of life - Prokaryotic and Eukaryotic Cell (Plant Cell) - Light Microscope and Electron Microscope Ultra Structure of Prokaryotic and Eukaryotic Cells - Cell Wall - Cell Membrane Plastids, Ribosomes.

UNIT III: Plant Morphology **(6 Hours)**

Structure and Modification of Root, Stem and Leaf - Structure and Types of Inflorescences - Structure and Types of Flowers, Fruits and Seeds.

UNIT IV: Genetics **(6 Hours)**

Concept of Heredity and Variation - Mendel's Laws of Inheritance.

UNIT V: Plant Physiology **(6 Hours)**

Cell as a Physiological Unit: Water relations -Absorption and movement: Diffusion, Osmosis, Plasmolysis, Imbibition -Permeability, Water Potential - Transpiration - Movement - Mineral Nutrition.

Teaching Methodology	Charts, PPT, chalk and talk.

Books for Study

1. Singh, V., Pande, P. C. & Jain, D. K. (2021). *A textbook of botany*. Rastogi Publications.
2. Bhatnagar, S. P. & Moitra, A. (2020). *Gymnosperms*. New Age International (P) Ltd.
3. Sharma, O. P. (2017). *Bryophyta*, MacMillan India Ltd.
4. Lee, R. E. (2008). *Phycology*, (4th Ed.). Cambridge University Press.
5. Pandey, B. P. (1986). *Textbook of botany (College Botany)* (vols.: 1-2). S. Chand and Co.
6. Rao, K., Krishnamurthy, K. V. & Rao, G. S. (1979). *Ancillary botany*. S. Viswanathan Pvt. Ltd.

Books for Reference

1. Parihar, N. S. (2012). *An introduction to embryophyta -Pteridophytes.* Surjeet Publications.
2. Alexopoulos, C. J. (2013). *Introduction to mycology*. Willey Eastern Pvt. Ltd.
3. Vashishta, P. C. (2014). *Botany for degree students: Gymnosperms*. Chand & Company Ltd.
4. Coulter, M. J. (2014). *Morphology of gymnosperms*. Surjeet Publications.
5. Vashishta, P. C. (2014). *Botany for degree students: Algae*. Chand & Company Ltd.
6. Parihar, N. S. (2013). *An introduction to embryophyta -Bryophytes*. Surjeet Publications.

Websites and eLearning Sources

1. https://www.kobo.com/us/en/ebook/the-algae-world
2. http://www.freebookcentre.net/biology-books-download/Fungi-(PDF-15P).html
3. http://scitec.uwichill.edu.bb/bcs/bl14apl/bryo1.htm
4. https://www.toppr.com/guides/biology/plant-kingdom/pteridophytes/

5. https://arboretum.harvard.edu/wp-content/uploads/2013-70-4-beyond-pine-cones anintroduction-to-gymnosperms.pdf
6. https://www.us.elsevierhealth.com/medicine/cell-biology
7. https://www.us.elsevierhealth.com/medicine/genetics
8. https://www.kobo.com/us/en/ebook/plant-biotechnology-1

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, the students will be able to	**Cognitive Levels (K-Level)**
CO1	increase the awareness and appreciation of human friendly algae and their economic importance.	**K1**
CO2	develop an understanding of microbes and fungi and appreciate their adaptive strategies	**K2**
CO3	develop critical understanding on morphology, anatomy and reproduction of Bryophytes, Pteridophytes and Gymnosperms.	**K3**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
1	**23UBO14FC01**			**Foundation Course:** Basics of Botany						**2**	**1**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	3	2	2	3	2	2	3	2	**2.4**
CO2	2	3	2	3	2	3	2	3	2	1	**2.3**
CO3	2	2	3	2	1	3	3	2	3	1	**2.2**
									Mean Overall Score		**2.32 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	23UHE14VE01	**Value Education - 1:** Essentials of Humanity	2	1

Course Objectives
To identify one's own potentials, strengths and weaknesses
To identify various challenges (physical, emotional, and social) in adolescence
To consciously overcome one's challenges and move towards self-esteem
To maximize one's own potential in enabling a holistic development
To assimilate human values comprehensively

UNIT I: Principles of Value Education **(6 Hours)**

Introduction to values - Characteristics and Roots of Values - Value Education & Value Clarification - Moral Characters - Kinds of Values - Objectives of Values

UNIT II: Development of Human Personality **(6 Hours)**

Personality: Introduction, Theories, Integration & Factors influencing the development of personality - SEL Series - Discovering self - Defence Mechanism Power of positive thinking - Why worry?

UNIT III: The Dimensions of Human Development **(6 Hours)**

Areas of Development: Physical, Intellectual, Emotional, Social Development, Moral & Spiritual development

UNIT IV: Responsible Parenthood **(6 Hours)**

Human Sexuality - Marriage and Family - Sex and Love - Characteristics of Responsible parent - Causes of Marriage disharmony - Art of wise parenting

UNIT V: Gender Equality and Empowerment **(6 Hours)**

Historical perspective - Women in Independence struggle - Women in Independent India - Education & Economic development - Crimens against Women - Women rights - Time-line of Women achievements in India

Teaching Methodology	Chalk and Talk, Power point

Book for Study

1. Department of Human Excellence. (2021). *Essentials of Humanity.* St. Joseph's College.

Books for Reference

1. Xavier, A. (2012). *You Shall Overcome,* (6th Ed.). ICRDE Publication.
2. Alex, K. (2009). *Soft Skills.* S. Chand.
3. Kalam, A.A. P. J. (2012). *You Are Unique.* Punya Publishing.

Websites and eLearning Sources

1. http://livingvalues.net. Accessed 05 March 2021.
2. http://www.apa.org/topics/personality#. Accessed 05 March 2021.
3. http://www.peacecorps.gov/educators/resources/global-issues-gender-equaligy-and-womens-empowerment/. Accessed 05 March 2021.

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	recall the prescribed values and their dimensions.	**K1**
CO2	examine themselves by learning the developmental changes happening in the course of their lifetime.	**K2**
CO3	Apply the trained values in the day-to-day life.	**K3**

Relationship Matrix											
Semester	**Course Code**	**Title of the Course**								**Hours**	**Credits**
1	**23UHE14VE01**	**Value Education - 1:** Essentials of Humanity								**2**	**1**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO 4**	**PSO5**	
CO1	3	3	3	3	2	3	3	2	3	3	**2.8**
CO2	3	2	2	3	3	2	3	3	2	2	**2.5**
CO3	2	3	3	3	2	3	3	3	3	3	**2.8**
Mean Overall Score											**2.7 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	23UEN14AE01	**Ability Enhancement Compulsory Course - 1:** Communicative English	6	3

Course Objectives
To recognize and identify the components of a formal letter.
To summarize the main points of a given letter and identify the intended meaning.
To use appropriate grammatical structures in context within their own writing.
To compare and contrast the elements of successful and unsuccessful letters.
To create well-structured letters with clear purpose and effectively evaluate and revise their own writing.

Basic Level

UNIT I **(18 Hours)**

1) A letter to avail college hostel
2) A requisition letter to provide fee concession
3) A requisition letter to provide Bonafide certificate
4) A letter to avail resources in college library
5) An On Duty Permission Letter
6) Nouns
7) Pronouns
8) Adjectives
9) Verbs
10) Adverbs

UNIT II **(18 Hours)**

11) A letter to provide conduct certificate
12) A letter to provide new ID card
13) A Permission letter for Name Correction in Mark sheet
14) A permission letter for Sports Events
15) A letter to avail permission for the Shepherd programme
16) Prepositions
17) Conjunctions
18) Articles
19) Conjugation of present form ‘Be’ verbs
20) Conjugation of past form ‘Be’ verbs

UNIT III **(18 Hours)**

21) A letter to avail the College Hostel
22) A permission letter to join the sport team
23) A request letter to access college Wi-Fi
24) A letter to vice principal requesting to change Elective course
25) A permission letter for project extension
26) Conjugation of future form ‘Be’ verbs
27) Conjugation of present continuous ‘Be’ verbs
28) Conjugation of Past continuous ‘Be’ verbs
29) Conjugation of Future continuous ‘Be’ verbs
30) Conjugation of Present Perfect ‘Be’ verbs

UNIT IV **(18 Hours)**

31) An apology letter to Dean for using mobile phone

32) A request letter to repair fan and tube light
33) A letter to invite Chief guest for Bibliophile Club meeting
34) A requisition Letter to issue the Transfer certificate
35) A permission letter for group exam coaching class
36) Conjugation of Past Perfect 'Be' verbs
37) Conjugation of Future Perfect 'Be' verbs
38) Conjugation of Present Perfect Continuous 'Be' verbs
39) Conjugation of Past Perfect Continuous 'Be' verbs
40) Conjugation of Future Perfect Continuous 'Be' verbs

UNIT V **(18 Hours)**

41) A letter seeking help to find the missing laptop
42) A letter to the editor regarding frequent power cut
43) A medical leave letter
44) A requesting OD Letter to issue invitation to other colleges
45) A requisition letter to change Shift
46) Conjugation of present form 'Action' verbs
47) Conjugation of past form 'Action' verbs
48) Conjugation of Present form 'do verbs
49) Conjugation of Past form 'do' verbs
50) Conjugation of Future form 'have' verbs

Teaching Methodology	Chalk and Talk, discussion, Training

Book for Study

1. Jayapaul, V.L. (2023). *Begin to Learn English.* St. Joseph's College (Autonomous), Tiruchirappalli.

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	compose various types of letters (request, permission, and apology) demonstrating clarity, coherence, and correctness.	**K1**
CO2	exhibit a sound understanding of nouns, pronouns, adjectives, verbs, and adverbs, utilizing them accurately in written and spoken English.	**K2**
CO3	apply language skills in real-life college scenarios, gaining confidence in communicating effectively with peers, faculty, and administrative staff.	**K3**

Relationship Matrix											
Semester	**Course Code**	**Title of the Course**							**Hours**		**Credits**
1	**23UEN14AE01**	**Ability Enhancement Compulsory Course - 1:** Communicative English							**6**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	3	2	2	3	2	3	2	3	2	**2.4**
CO2	2	2	3	2	3	3	2	3	2	2	**2.3**
CO3	2	3	2	3	2	2	3	2	3	2	**2.4**
									Mean Overall Score		**2.37 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	23UEN14AE01	**Ability Enhancement Compulsory Course - 1:** Communicative English	6	3

Course Objectives
To recognize and identify common punctuation marks and their usage in paragraphs.
To summarize the main topics introduced in a paragraph and demonstrate understanding.
To apply the learned concepts to construct paragraphs that convey ideas effectively.
To analyze paragraphs to identify the role of prefixes, suffixes, and noun types in enhancing meaning.
To synthesize information to create paragraphs, evaluate their own writing, and engage in role-playing scenarios to demonstrate understanding.

Intermediate Level

UNIT I **(18 Hours)**

1) Paragraph Punctuation
2) Introducing a Topic
3) Rhyming Words
4) Word Association
5) Going To
6) What Will Happen

UNIT II **(18 Hours)**

7) Every Drop Counts
8) Prefix
9) Suffix
10) Comprehending Characters
11) Complimenting & Thanking
12) Proper & Common Nouns

UNIT III **(18 Hours)**

13) Noun Substitution Table
14) A, Some
15) Visual Comprehension
16) Singular to Plural
17) Making & Responding
18) Pronoun Classification

UNIT IV **(18 Hours)**

19) Pronoun I, Me, He, Him, She, Her, We.
20) Singular to Plural
21) Responding
22) Pronoun Classification
23) Using Preposition of Movement
24) Preposition: Visual Talk

UNIT V **(18 Hours)**

25) Prepositional Phrases
26) Storytelling
27) Asking For Opinion
28) Using Things Creatively
29) Transition Sequencing
30) Role Play

Book for Study

1. Joy, J. L. (2020). *Learning to Communicate*. St. Joseph's College (Autonomous), Tiruchirappalli.

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	demonstrate proficiency in paragraph construction, rhyming words, and the use of prefixes and suffixes.	**K1**
CO2	apply advanced grammar rules, including proper/common nouns and pronoun usage, in both written and spoken communication.	**K2**
CO3	express opinions, compliments, and gratitude effectively, showcasing an enhanced ability to articulate thoughts and emotions.	**K3**

Relationship Matrix											
Semester	**Course Code**	**Title of the Course**							**Hours**		**Credits**
1	**23UEN14AE01**	**Ability Enhancement Compulsory Course - 1:** Communicative English							**6**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	3	2	2	3	2	3	2	3	2	**2.4**
CO2	2	2	3	2	3	3	2	3	2	2	**2.3**
CO3	2	3	2	3	2	2	3	2	3	2	**2.4**
										Mean Overall Score	**2.37 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	23UEN14AE01	**Ability Enhancement Compulsory Course - 1:** Communicative English	6	3

Course Objectives
To recognize and demonstrate basic self-introduction strategies.
To summarize information from listening and reading exercises, demonstrating understanding.
To apply learned concepts to construct essays, actively contribute to group discussions, and create coherent narratives.
To analyze reviews to understand how different elements contribute to a comprehensive evaluation.
To synthesize information to create compelling presentations, actively participate in debates, interviews, and assess their own communication proficiency.

Advance Level

UNIT I **(18 Hours)**

1) Self Introduction
2) Listening
3) Reading

UNIT II **(18 Hours)**

4) Essay Writing
5) Group Discussion
6) Story Building, Story Writing & Story Narration

UNIT III **(18 Hours)**

7) Book Review
8) Film Review

UNIT IV **(18 Hours)**

9) News Paper Reading and Analysis
10) Public speaking: Drafting and Speaking

UNIT V **(18 Hours)**

11) Debate
12) Interview Skills

Websites and eLearning Resources

1. https://ielts-up.com/listening/ielts-listening-practice.html
2. https://www.bestmytest.com/ielts/speaking
3. https://ielts-up.com/speaking/ielts-speaking-practice.html
4. https://learnenglishteens.britishcouncil.org/skills/writing/a2-writing/film-review

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	exhibit high-level language skills in self-introduction, listening, reading, and diverse writing tasks such as essay writing and storytelling.	**K1**
CO2	critically evaluate and analyze literature through book reviews, film reviews, and newspaper reading, demonstrating an ability to articulate informed opinions.	**K2**
CO3	showcase proficiency in public speaking, group discussions, debates, and interviews, reflecting a comprehensive mastery of advanced communication skills.	**K3**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**						**Hours**		**Credits**
1	**23UEN14AE01**		**Ability Enhancement Compulsory Course - 1:** Communicative English						**6**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	3	2	2	3	2	3	2	3	2	**2.4**
CO2	2	2	3	2	3	3	2	3	2	2	**2.3**
CO3	2	3	2	3	2	2	3	2	3	2	**2.4**
Mean Overall Score											**2.37 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	23UTA21GL02	General Tamil - 2	4	3

கற்றலின் நோக்கங்கள்
தமிழ் இலக்கிய வரலாற்றை அறிதல்.
எழுத்து, சொல் இலக்கணங்களின் அடிப்படைகளைக் கண்டறிதல்.
அயலகக் கவிதை வடிவங்களை விளங்கிக் கொள்ளுதல்.
மொழிபெயர்ப்புக் கவிதைகளின் வாயிலாக மொழிபெயர்ப்புத் திறனை வளர்த்தெடுத்தல்.
போட்டித் தேர்வுகளை எதிர்கொள்வதற்கான இலக்கண அறிவு பெறுதல்.

அலகு – 1 **(12 மணிநேரம்)**

பாரதியார் கவிதைகள் – குயில்பாட்டு (குயில் தன் பூர்வ ஜென்மக் கதை உரைத்தல்)

பாரதிதாசன் கவிதைகள் – சஞ்சீவி பர்வதத்தின் சாரல்

நற்றமிழ்க்கோவை – முதல் மூன்று கட்டுரைகள்

அலகு - 2 **(12 மணிநேரம்)**

வெ.இராமலிங்கனார் – சொல், தமிழன் இதயம்
முடியரசனார் – உயிர் வெல்லமோ, மனத்தூய்மை
பெருஞ்சித்திரனார் – அஞ்சாதீர், மொழி,இனம்,நாடு
பட்டுக்கோட்டை கலியாண சுந்தரனார் – வருங்காலம் உண்டு, உழைக்காமல் சேர்க்கும் பணம்
இலக்கணம் – எழுத்து
இலக்கிய வரலாறு – புதுக்கவிதை, தமிழில் புதிய கவிதை வடிவங்கள்

அலகு–3 **(12 மணி நேரம்)**

சுரதா - நல்ல தீர்ப்பு
கண்ணதாசன் - ஒரு பானையின் கதை
அப்துல் ரகுமான்- வீடு
மேத்தா - ஒரேகுரல்
இலக்கிய வரலாறு – தமிழ்ச்சிறுகதைகள், இருபதாம் நூற்றாண்டு உரைநடை வளர்ச்சி
சிறுகதை – முதல் மூன்று சிறுகதைகள்

அலகு – 4 **(12 மணிநேரம்)**

அரசியல் கவிதைகள்

ஈரோடு தமிழன்பன்- அகல் விளக்காக இரு
ஆதவன் தீட்சண்யா– இன்னும் இருக்கும் சுவர்களின் பொருட்டு
சுகிர்தராணி– என் கண்மணியே இசைப்பிரியா
சக்தி ஜோதி – யுகாந்திர உறக்கம்
பழநி பாரதி- வெள்ளைக்காகிதம்
லிவிங்ஸ்மைல் வித்யா – நினைவில் பால்யம் அழுத்தம்
இலக்கணம் - சொல்

அலகு – 5 **(12 மணிநேரம்)**

அயலகக் கவிதைகள்

ஓசேரிசால் (தமிழில் நெய்தல்)- விடைகொடு என்தாய் மண்ணே
ஹைபுன் கவிதைகள்
சிறுகதை – நான்கு முதல் ஆறு சிறுகதைகள்
நற்றமிழ்க் கோவை – நான்கு முதல்ஆறு கட்டுரைகள்

கற்பித்தல் முறை (Teaching Methodology)	விரிவுரை (Lecture), காணொளிக் காட்சி (Videos), விளக்கக் காட்சி (PPT presentation)

பாடநூல்கள்

1. தமிழாய்வுத்துறை (2023). பொதுத்தமிழ் -2, தூய வளனார் தன்னாட்சிக் கல்லூரி.
2. தமிழாய்வுத்துறை (2021). நற்றமிழ்க் கோவை, தூய வளனார் தன்னாட்சிக் கல்லூரி.

Websites and eLearning Sources

1. https://www.chennailibrary.com/bharathiyar/kuyilpattu.html
2. www.tamildigitallibrary.in
3. https://eluthu.com/kavithai
4. https://podhutamizh.blogspot.com/2017/09/blog-post_42.html
5. https://thamizhsudar.com
6. https://ta.wikipedia.org/wiki

Course Outcomes		
CO No.	**CO-Statements** ***இப்பாடத்தின் நிறைவில் மாணவர்கள்***	**Cognitive Levels (K - Level)**
CO1	***தமிழ் இலக்கிய நூல்கள் பற்றிய அறிவைப் பெறுவர்.***	**K1**
CO2	***தமிழ் இலக்கண வளர்ச்சியைப் புரிந்து கொள்வர்.***	**K2**
CO3	***பிழையின்றி எழுதும் திறன் பெறுவதோடு கற்றல் திறனையும் வளர்த்துக்கொள்வர்.***	**K3**
CO4	***பிற கவிதை வடிவங்களைக் கையாளும் திறன் பெறுவர்.***	**K4**
CO5	***போட்டித் தேர்வுகளை எதிர்கொள்ளும் திறனைப் பெறுவர்.***	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
2	**23UTA21GL02**			General Tamil - 2						**4**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO 1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	1	2	2	3	3	3	2	3	2	**2.3**
CO2	2	1	2	2	2	3	2	2	2	2	**2.0**
CO3	2	1	2	2	3	3	3	2	3	2	**2.3**
CO4	1	2	1	2	2	3	2	2	3	2	**2.0**
CO5	1	1	2	2	3	3	3	2	3	2	**2.2**
										Mean Overall Score	**2.16 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	**23UFR21GL02**	French - 2	**4**	**3**

Course Objectives
To construct simple phrases with pronominal verbs
To apply the different types of articles
To understand the usage of pronouns
To analyse the French culture through French culinary art
To evaluate and compare the French fashion in current scenario

UNIT I **(12 Hours)**

- TITRE: Les Loisirs
- GRAMMAIRE : les adjectifs interrogatifs, les nombres ordinaux, les verbes pronominaux
- LEXIQUE : les différentes activités quotidiennes, les loisirs, les activités quotidiennes, les matières
- PRODUCTION ORALE : parler sur votre passe-temps
- PRODUCTION ECRITE : décrire sa journée

UNIT II **(12 Hours)**

- TITRE: La routine
- GRAMMAIRE : les pronoms personnels COD, les verbes du premier groupe en e/er/eler/eter, le verbe prendre
- LEXIQUE : exprimer ses goûts et ses préférences, le temps, l'heure, la fréquence
- PRODUCTION ORALE : savoir comment dire l'heure
- PRODUCTION ECRITE : écrire vos préférences en quelques lignes

UNIT III **(12 Hours)**

- TITRE: Où Faire Ses Courses?
- GRAMMAIRE : les articles partitifs, le pronom en (la quantité), très ou beaucoup
- LEXIQUE : inviter et répondre à une invitation, les commerces et les commerçants, demander et dire le prix, les quantités
- PRODUCTION ORALE : faire des courses pour une soirée
- PRODUCTION ECRITE : écrire un message en acceptant l'invitation

UNIT IV **(12 Hours)**

- TITRE: Découvrez et Dégustez
- GRAMMAIRE : l'impératif, il faut, les verbes devoir, pouvoir, savoir, vouloir
- LEXIQUE : Commander et commenter sur un plat de la carte, les aliments, les services, les moyens de paiement
- PRODUCTION ORALE : Jeu de rôle – au restaurant (entre vous et le garçon)
- PRODUCTION ECRITE : faire une comparaison avec la carte française et indienne

UNIT V **(12 Hours)**

- TITRE: Tout le monde s'amuse/ les ados au quotidien
- GRAMMAIRE : les adjectifs démonstratifs, le pronom indéfini on, le futur proche, le passé composé, les verbes en –yer, voir et sortir
- LEXIQUE : connaître les marques connues sur les vêtements, les sorties, situer dans le temps, les vêtements et les accessoires
- PRODUCTION ORALE : décrire une tenue

- PRODUCTION ECRITE : écrire une lettre amicale, une carte postale

Teaching Methodology	Chalk and talk, visual cues like flashcards, one to one conversation

Book for Study

1. Dauda, P., Giachino, L. & Baracco, C. (2016). *Generation A1*. Didier.

Books for Reference

1. Girardet, J. & Pecheur, J. (2017). *Echo A1*. CLE International, (2nd Ed.).
2. Mérieux, R. & Loiseau, Y. (2012). *Latitudes A1*. Didier.
3. Fournier, I. (2011). *Talk French.* Goyal Publishers.

Websites and eLearning Sources

1.https://www.frenchtoday.com/blog/french-verb-conjugation/french-reflexive-verbs-list- exercises/

2.https://www.fluentu.com/blog/french/french-subject-pronouns/

3.https://grammarist.com/french/french-partitive-article/

4.https://www.talkinfrench.com/guide-french-food-habits/

5.https://www.fluentu.com/blog/french/talking-about-clothes-in-french/

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	relate pronominal verbs in expressing one's day today activity	**K1**
CO2	compare the different types of articles – article partitif and contracte	**K2**
CO3	construct texts using pronouns – passages and dialogues	**K3**
CO4	discover the food habits of the French culture	**K4**
CO5	appraise the French fashion	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**						**Hours**		**Credits**
2	**23UFR21GL02**		French - 2						**4**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	3	3	1	3	1	2	2	2	**2.2**
CO2	2	1	2	3	2	3	1	2	2	2	**2.0**
CO3	3	2	3	2	2	3	3	1	3	2	**2.4**
CO4	3	2	2	1	3	3	3	1	1	3	**2.2**
CO5	2	1	2	2	3	3	3	2	2	2	**2.2**
										Mean Overall Score	**2.2 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	23UHI21GL02	Hindi - 2	4	3

Course Objectives
To understand the basics of Hindi Language
To make the students to be familiar with the Hindi words
To enable the students to develop their effective communicative skills in Hindi
To introduce the socially relevant subjects in Modern Hindi Literature
To empower the students with globally employable soft skills

UNIT I **(12 Hours)**

- Kafan
- Letter Writing - Chutti Patra
- Bakthikal - Namakarn
- Sarkari Kariyalayom Ka Naam

UNIT II **(12 Hours)**

- Baathcheeth - Dookan Mein
- Kriya
- Letter Writing - Rishthedarom Ko Patra
- Bakthikal - Samajik Paristhithiyam

UNIT III **(12 Hours)**

- Vah Thodthi Patthar
- Adverb
- Letter Writing - Naukari Keliye Avedan Patra
- Bakthikal - Sahithyik Paristhithiyam

UNIT IV **(12 Hours)**

- Mukthi
- Samas
- Letter Writing - Kitab Maangne Keliye Patra
- Bakthikal - Salient Features, Main Divisions

UNIT V **(12 Hours)**

- Anuvad
- Sandhi
- Letter Writing - Nagarpalika Ko Patra
- Bakthikal - Visheshathayem

Teaching Methodology	Peer Instruction Exercise, Videos, PPT, Quiz, Group Discussion

Books for Study

1. Viswanath Tripaty. (2018). *Kuchh Kahaniyan*, Rajkamal Prakashan Pvt. Ltd.
2. Kamathaprasad Gupth, M. (2020). *Hindi Vyakaran*. Anand Prakashan.
3. Sadananth Bosalae. (2020). *kavya sarang*, Rajkamal Prakashan.

Books for Reference

1. Acharya Ramchandra Shukla. (2021). *Hindi Sahitya Ka Itihas*. Prabhat Prakashan.
2. Krishnakumar, G. (2016). *Anuvad vigyan ki Bhumika*. Rajkamal Prakashan.
3. Aravind Kumar. (2019). *Sampoorna Hindi Vyakaran our Rachana*, Lucent publisher.
4. Lakshman Prasad Singh. (2017). *Kavya ke sopan*. Bharathy Bhavan Prakashan.

Websites and e-Learning Sources

1. https://hindigrammar.in/sandhi.html
2. https://www.successcds.net/class10/hindi/samas-in-hindi
3. https://mycoaching.in/kriya-ke-bhed-verb-in-hindi
4. https://namastesensei.in/adverb-in-hindi-examples/
5. https://viahindi.in/hindi-vyakaran/sandhi-paribhasha-prakar-or-udaharan

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, the students will be able to	**Cognitive Levels (K - Level)**
CO1	Find out the Terms & Expressions related to letter writing.	**K1**
CO2	Explain the works of Hindi writers.	**K2**
CO3	Complete the sentences in Hindi using basic grammar.	**K3**
CO4	Analyze the social & political conditions of Devotional period in Hindi Literature.	**K4**
CO5	Justify the human values stressed on the works of the following authors “Premchand, Nirala, etc.”.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**				**Hours**		**Credits**	
2	**23UHI21GL02**			**HINDI - 2**				**4**		**3**	
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	3	3	2	2	3	3	3	2	2	**2.5**
CO2	1	3	1	2	2	3	3	3	2	3	**2.3**
CO3	3	2	3	2	2	3	2	3	2	2	**2.4**
CO4	2	3	3	1	3	2	3	2	1	2	**2.2**
CO5	3	2	2	2	3	2	3	2	3	2	**2.4**
										Mean Overall Score	**2.36 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	23USA21GL02	Sanskrit - 2	4	3

Course Objectives
To bring out the salient aspects of classical Sanskrit poetry
To introduce court epics in Sanskrit
To train students in declensions of pronouns in Sanskrit
To coach the students in the conjugation patterns of verbs in Sanskrit
To offer coaching in morpho-phonemic rules and their applications in Sanskrit

UNIT I **(12 Hours)**

Asmathi usmath tat kim (MFN) sarvanaam asabdaha

UNIT II **(12 Hours)**

Sandhi Niyamaah Abhyaash (Guna , Visarga , Dirgha , Vrddhi)

UNIT III **(12 Hours)**

Lang lakaarah Kriyapadaani Prayoga Vivaranam

UNIT IV **(12 Hours)**

Raguvamsaha Pratama sargaha (1 -15 slokas)

UNIT V **(12 Hours)**

Suvacanani Vakya Prayoga Vivaranam

Teaching Methodology	Videos, PPT, Blackboard, Demonstration, Exercises

Books for Study

1. Saralasamkritham Skisha. (2021).
2. Dhaatu Manjari. (2021).

Books for Reference

1. Paindrapuram Ashram, Srirangam. (2019).
2. Vadhyar, R. S., & Sons, Book - Seller and Publishers. (2021).
3. Kulapthy, K. M. (2018). *Saral Sanskrit Balabodh*. Bharathiys Vidya Bhavan.

Websites and eLearning Sources

1. https://www.meritnation.com
2. https://www.aplustopper.com
3. https://mycoaching.in/lang-lakar
4. https://sanskritdocuments.org/sites/giirvaani/giirvaani/rv/sargas/01_rv.htm
5. https://resanskrit.com/blogs/blog-post/sanskrit-shlok-popular-quotes-meaning-hindi-english

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	Remembering names of different objects, remembering different verbal forms and sandhi	**K1**
CO2	Contrast different verbal forms Explain good sayings, Relate good saying to life.	**K2**
CO3	Apply and build small sentences	**K3**
CO4	Analyze different forms of Verbs and nouns	**K4**
CO5	Appreciate subhashitas and Sanskrit poetry	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**							**Hours**	**Credits**
2	**23USA21GL02**		Sanskrit - 2							**4**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	1	3	2	2	2	3	3	2	1	**2.1**
CO2	3	2	3	2	2	3	2	3	3	2	**2.5**
CO3	2	2	3	2	2	2	2	3	3	1	**2.1**
CO4	3	2	3	3	1	2	3	3	3	1	**2.4**
CO5	3	2	2	2	3	2	2	3	3	1	**2.3**
									Mean Overall Score		**2.28 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	23UEN22GE02	General English - 2	5	3

Course Objectives
To develop an expanded and specialised vocabulary related to diverse themes such as education, entertainment, career, and society through activities like word grids, reading, and discussions.
To enhance problem-solving abilities through activities like debates, role-playing, and scenario analysis.
To enable students to express ideas with precision and clarity by practising different forms of expressing quality, comparison, and actions in various contexts.
To equip students with language skills relevant to professional settings.
To encourage students to explore language as a tool for creative expression and communication.

UNIT I **(15 Hours)**

01. Education Word Grid
02. Reading Problems and Solutions
03. Syllabification
04. Forms for Expressing Quality
05. Expressing Comparison
06. Monosyllabic Comparison
07. Di/polysyllabic Comparison
08. The Best Monosyllabic Comparison
09. The Best Di/Polysyllabic Comparison
10. Practising Quality Words

UNIT II **(15 Hours)**

11. Wh Words
12. Yes/No Recollection
13. Unscramble Wh Questions
14. Wh Practice
15. Education and the Poor
16. Controlled Role Play
17. Debate on Education
18. Education in the Future
19. Entertainment Word Grid
20. Classify Entertainment Wordlist
21. Guess the Missing Letter
22. Proverb-Visual Description
23. Supply Wh Words
24. Rearrange Questions
25. Information Gap Questions

UNIT III **(15 Hours)**

26. Asking Questions
27. More about Actions
28. More about Actions and Uses
29. Crime Puzzle
30. Possessive Quiz
31. Humourous News Report
32. Debate on Media and Politics
33. Best Entertainment Source

UNIT IV **(15 Hours)**

34. Career Word Grid
35. Job-Related Wordlist
36. Who's Who?
37. People at Work
38. Humour at Workplace
39. Profession in Context
40. Functions and Expressions
41. Transition Fill-in
42. Transition Word Selection
43. Professional Qualities
44. Job Procedures
45. Preparing a Resume
46. Interview Questions
47. Job Cover Letter Format
49. Emailing an Application
50. Mock Interview

UNIT V **(15 Hours)**

51. Society Word Grid
52. Classify Society Wordlist
53. Rearrange the Story
54. Storytelling
55. Story Cluster
56. Words Denoting Time
57. Expressing Time
58. What Can You Buy?
59. Noise Pollution
60. Positive News Headlines
61. Negative News Headlines
62. Matching Conditions
63. What Would You Do?
64. If I were the Prime Minister
65. My Dream Country

Teaching Methodology	Lecture Method, Use of ICT Tools and Interactive method

Book for Study

1. Joy, J.L. & Peter, F.M. (2014). *Let's Communicate 2*, Trinity Press.

Books for Reference

1. Ahrens, Sönke. (2017). *How to Take Smart Notes: One Simple Technique to Boost Writing, Learning and Thinking*. Create Space.
2. Aspinall, Tricia. (2002). *Test Your Listening.* Pearson.
3. Bailey, Stephen. (2004). *Academic Writing: A Practical Guide for Students*. Routledge.
4. Fitikides, T.J. (2002). *Common Mistakes in English*, (6th Ed.). Longman
5. Wainwright., Gordon. (2007). *How to Read Faster and Recall More: Learn the Art of Speed Reading with Maximum Recall*, (3rd Ed.). How to Books.

Websites and eLearning Sources

1. https://learnenglish.britishcouncil.org/
2. https://oneminuteenglish.org/en/best-websites-learn-english/
3. https://www.dailywritingtips.com/best-websites-to-learn-english/

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	write paragraphs with apt punctuation marks	**K1**
CO2	discuss basic issues with friends, relatives and members of the family	**K2**
CO3	use polite expressions in appropriate ways	**K3**
CO4	evaluate the language and communication aspects of the topics	**K4**
CO5	create and produce various forms of communication, including professional documents like resumes and cover letters, debates	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
2	**23UEN22GE02**			**General English - 2**						**5**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	3	2	2	3	2	3	2	3	2	**2.4**
CO2	2	2	3	2	3	3	2	3	2	2	**2.3**
CO3	2	3	2	3	2	2	3	2	3	2	**2.4**
CO4	2	2	3	2	3	3	2	3	2	3	**2.5**
CO5	2	2	2	3	2	2	2	3	2	2	**2.2**
									Mean Overall Score		**2.36 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	23UBO23CC02	**Core Course - 2:** Bryophytes, Fungi, Lichens and Plant Pathology	4	3

Course Objectives
To provide a comprehensive knowledge of the Bryophytes.
To impart the knowledge on the cell wall, nutrition pattern and classification of fungi.
To understand the concept about the reproduction of fungi.
To understand the role of lichens with the special reference to its ecosystems and Economic importances
To enable them to understand the defense mechanism of plants.

UNIT I **(12 Hours)**

Bryophytes: General characteristics of Bryophytes, Various natural habitats of Bryophytes, Classification (Rothmaler, 1951), vegetative reproduction and economic importance. Evolution of gametophytes and sporophytes among Bryophytes.

UNIT II **(12 Hours)**

Fungi: General characteristics - mode of nutrition and reproduction. Outline on the Classification of fungi (G. C Ainsworth, 1973; C. JAlexopoulos and C. W. Mims, 1983). Economic importance.

UNIT III **(12 Hours)**

Fungi: detailed study of morphology and reproduction of the following: (a) Mastigimycotina - *Albugo; (b)* Zygomycotina - *Rhizopus; (c)* Ascomycotina - *Penicillium; (d)* Basidiomycotina - *Puccinia; (e)* Deuteromycotina - *Cercospora.*

UNIT IV **(12 Hours)**

Lichens: occurrence, distribution, classification, structure, vegetative and sexual reproduction(with reference to fruticose lichen - *Usnea*). Ecological and Economic importance of Lichens.

UNIT V **(12 Hours)**

Plant Pathology: Definition of terms used in plant pathology; plant diseases: concept and classification of plant diseases-methods of control of plant diseases: mechanical, chemical and biological. Defence mechanism in plants: structural, morphological and biochemical.

Teaching Methodology	Chart, PPT, Chalk and talk.

Books for Study

1. Singh, V., Pande, P.C., & Jain, D. K. (2020). *A Text Book of Botany* (5th Ed.). Rastogi Publication.
2. Pandey, B. P. (2018). *College Botany* Volume I, 20/e, S. Chand and Company.
3. Pandey, B. P. (2005). *Simplified Course in Botany.* S. Chand and Company.

Books for Reference

1. Sharma, O. P. (1989). .*Text Book of fungi.* Tata McGraw Hill.
2. Vasishta, B. R., & Sinha, A. K. (2003). *Botany for degree students Fungi.* S Chand.
3. Mehrotra, R.S. (1991). .*Plant Pathology.*Tata McGraw-Hill Publishing.
4. Hale, M.E. (1983). *The Biology of Lichens.* New Age International publishers.
5. Prem Puri. (1981). *Bryophytes-Morphology growth and differentiation.* Atma Ram & Sons.
6. Smith, G.M. (1955). *Cryptogamic Botany* Vol-1 & II. McGraw Hill.

Websites and eLearning Sources

1. https://www.geeksforgeeks.org/bryophyta/
2. https://bio.libretexts.org/Bookshelves/Introductory_and_General_Biology/Book%3A_General_Biology_(Boundless)/24%3A_Fungi/24.01%3A_Characteristics_of_Fungi/24.1A%3A_Characteristics_of_Fungi
3. https://www.pharmaguideline.com/2007/02/morphology-classification-reproduction-cultivation-of-fungi.html
4. https://bio.libretexts.org/Bookshelves/Microbiology/Microbiology_(OpenStax)/05%3A_The_Eukaryotes_of_Microbiology/5.05%3A_Lichens
5. https://sites.google.com/a/uasd.in/ecourse/plant-pathology

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K - Level)**
	On successful completion of this course, the students will be able to	
CO1	acquire thorough knowledge on the salient features of Fungi and Bryophytes	**K1**
CO2	learn the major classes, types, structure and reproduction of various forms of lichens.	**K2**
CO3	acquire the basic knowledge of the evolutionary relationship between fungi and cichans bryophytes.	**K3**
CO4	identify the economic importance of Bryophytes, fungi and lichens	**K4**
CO5	attain basic Knowledge about plant defense mechanism	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
2	**23UBO23CC02**			**Core Course - 2:** Bryophytes, Fungi, Lichens and Plant Pathology					**4**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	1	2	2	3	2	2	2	2	**2.1**
CO2	3	2	1	2	2	3	2	2	2	2	**2.1**
CO3	3	2	1	2	2	2	3	2	1	2	**2.0**
CO4	2	3	2	2	1	2	2	2	1	2	**1.9**
CO5	2	3	1	3	2	2	3	2	2	1	**2.1**
Mean Overall Score											**2.1 (Medium)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	23UBO23CC03	**Core Course - 3:** Pteridophytes, Gymnosperms, Anatomy and Embryology	4	3

Course Objectives
To learn the economic importance of Pteridophytes and gymnosperms.
To acquire knowledge on fossils and fossilization process.
To understand the salient features of Pteridophytes and gymnosperms.
To understand the primary and secondary structure of dicots and monocots with reference to root, stem and leaves.
To attain basic knowledge of the types of embryo sac and endosperm.

UNIT I **(12 Hours)**

Pteridophytes: general characteristics, classification (Reimer's System, 1954). Telome theory. Stelar evolution and economic importance. Morphology, anatomy and reproduction of *Selaginella*. Fossils, types (compression, impression, petrifaction, coal balls). Geological time scale. Morphology, anatomy and reproduction in *Rhynia*.

UNIT II **(12 Hours)**

Gymnosperms: general characteristics, distribution and classification (Sporne, 1965). Morphology, anatomy and reproduction of Cycas. Economic importance. Fossil Gymnosperms: Morphology, anatomy and reproduction of *Calamites*.

UNIT III **(12 Hours)**

Tissues - definition, types - simple tissues: parenchyma, collenchyma, sclerenchyma, fibres and sclerieds - structure and functions. Complex tissues: xylem and phloem. Meristems - classifications. Vegetative shoot apex and the theories: apical cell and tunica-corpus. Root apex: Korper - Kappe theory.

UNIT IV **(12 Hours)**

The stem - primary and secondary structure of dicotyledonous and monocotyledonous stem. Leaf anatomy: monocot and dicot**.** The root: primary and secondary structure of dicotyledonous and monocotyledonous roots. Nodal anatomy: Unilacunar, Trilacunar and Multilacunar. Anomalous secondary growth.

UNIT V **(12 Hours)**

Fertilization. Double fertilization. Structure and types of ovules; Types of embryo sacs**.** Development of dicot embryo (Capsella) & development of monocot embryo (Sagittaria). Endosperm: structure, function and types. Apomixis and polyembryony - types and significance. Parthenogenesis and its significance.

Teaching Methodology	Chart, PPT, Chalk and talk.

Books for Study

1. Sharma, O. P. (2017). *Pteridophyta.* McGraw Hill Education.
2. Bhatnagar, S.P., & Moitra, A. (2020). *Gymnosperms*. New Age International (P) Ltd, Publishers.

Books for Reference

1. Rashid, A. (2007). *An Introduction to Pteridophyta*. Vikas publications.
2. Johri, R.M., Lata, S., & Tyagi, K. (2005). *A text book of Gymnosperms*. Dominate pub and Distributer.
3. Vasista, P. C., Sinha, A.K., & Anil kumar. (2005). *Botany for degree students, Gymnosperms,* S Chand.
4. Bard, J. (1990). *Morphogenesis.* Cambridge University Press.

5. Agarwal, S.B. (1990). *Embryology of Angiosperms - a fundamental approach*. Sahitya Bhawan.
6. Pandey, B.P. (1989). *Plant Anatomy.* S. Chand and Co. Ltd.

Websites and eLearning Sources

1. https://www.youtube.com/watch?v=VA2LNWkZNWo
2. https://www.youtube.com/watch?v=DH65cGLvLws
3. https://www.youtube.com/watch?v=gdGbTk-4dLs
4. https://www.youtube.com/watch?v=fRg1-zhtMYU
5. https://www.youtube.com/watch?v=PKaabF8u8RM

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K - Level)**
	On successful completion of this course, the students will be able to	
CO1	familiar with the knowledge on tissues of plant stem, root and leaves.	**K1**
CO2	differentiate of the structure of dicots and monocots with reference to root, stem and leaves.	**K2**
CO3	value the properties and economic importance of Pteridophytes and Gymnosperms.	**K3**
CO4	differentiate the types of embryosac and endosperm.	**K4**
CO5	value the importance of polyembryony.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**				**Hours**			**Credits**
2	**23UBO23CC03**			**Core Course - 3:** Pteridophytes, Gymnosperms, Anatomy and Embryology				**4**			**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	3	2	2	3	2	2	2	2	**2.3**
CO2	2	3	2	3	3	2	3	2	2	2	**2.4**
CO3	2	2	3	2	3	3	3	2	3	3	**2.7**
CO4	3	3	2	1	2	3	2	3	1	2	**2.3**
CO5	2	3	2	2	3	2	3	2	2	3	**2.6**
									Mean Overall Score		**2.5 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	23UBO23CP02	**Core Practical - 2:** Bryophytes, Fungi, Lichens, Plant Pathology, Pteridophytes, Gymnosperms, Anatomy and Embryology	3	2

Bryophytes:
Marchantia, *Anthoceros* and *Funaria*.
Fungi:
Plasmodiophora, *Albugo*, *Puccinia* and *Cercospora*.
Lichen:
Usnea
Plant Pathology:
Tobacco Mosaic Virus, Citrus Canker, Late Blight of Potato, Red Rot of Sugarcane, BunchyTop of Banana, Little Leaf of Brinjal, Paddy Blast
Pteridophytes:
Selaginella.
Paleobotany (Fossils):
Rhynia and *Calamites*.
Gymnosperms:
Cycas.
Anatomy
Study of simple and complex tissue.
Internal structure of dicot and monocot stem. Internal structure of dicot and monocot root.
Anomalous secondary thickening in *Boerhaavia* and *Dracaena*.
Nodal anatomy: Uni, tri and multi lacunar.
Embryology
T.S of mature anther. Types of ovule, dissection and isolation of developmental stages of dicot embryos.

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	23UBO23AC02	**Allied Course - 2:** Agricultural Entomology	4	3

Course Objectives
To acquire the knowledge about the classification and morphology of insects.
To understand the functions of internal anatomy of insects.
To aware about the economical importance of selected orders.
To know about the skills involved in entrepreneur development.
To acquire the knowledge about stored and field pest and their control measures.

UNIT I **(12 Hours)**

General classification of insects. Morphology of insects: head, external structure. Mouth parts, tentorium, compound eye, types of antennae- thorax-tergum, sternum, pleuron. Wing structure, wing venation and coupling mechanism, Legs and their modification, Abdomen - abdominal appendages, male and female external genitalia.

UNIT II **(12 Hours)**

Physiology of digestive, respiratory, circulatory, nervous and reproductive systems, Immature stages of insects - metamorphosis, types and hormonal regulation.

UNIT III **(12 Hours)**

Economically important insect (orders): Coleoptera, Dictyoptera, Diptera, Hemiptera, Hymenoptera, Isoptera, Orthoptera and Lepidoptera. General characters and classification (up to Orders). Social behaviour/life of insects.

UNIT IV **(12 Hours)**

Economic classification of insects: beneficial insects (predators, parasites, pollinators, weed killers and scavengers). Destructive insects, a general knowledge of apiculture, sericulture and lac culture. Insects' role in forensic science. Recent trends in Integrated Pest Management. Plant protection - physical, chemical and biological methods of pest control.

UNIT V **(12 Hours)**

Pests of stored food materials (*Sitophilus oryzae*, *Rhizopertha dominica*, *Tribolium castaneum*) and their control, Study of Bionomics and control of pests of Paddy (*Tryporyza incertulas*, *Chilopoly charysa*, *Spodopter amauritia*), Sugarcane (*Chiloinfus catellus*, *C. sacchariphagas*, *Tryporyza nivella*), Cotton (*Aphis gossypii*, *Amaras cabiguttula*, *Thrips tabaci*), Coconut (*Orycytes rhinoceros*, *Rhynchophorus ferrugineus*) and Spices pests. Locust and their role in agriculture.

Teaching Methodology	Chart, PPT, Chalk and talk, Models and Field Visit

Book for Study

1. Ambrose, P. D. (2004). *The Insect: Structure, function and biodiversity*, (1st Ed.). Kalyani Publishers.

Books for Reference

1. Rajan, K. (2024). *Manual of agricultural entomology - theory and practical*, Department of Botany, St. Joseph's College.
2. Nagarajan, K., Rajan, K., & Palavesam, A. (2017). *A Farmers Hand Book on Pest and Diseases Management in Cardamom (Elettaria cardamomum Maton)*, (1st Ed.). Wise Pub International (P) Ltd., Publishers.

3. Nagarajan, K., & Rajan, K. (2019). *Sericulture Theory and Practice*, (1st Ed.). Wise Pub International (P) Ltd., Publishers.
4. Vasantharaj, D.B., & Kumaraswami, T. (1978). *Elements of Economic Entomology*. Popular Book Department.
5. Nayar, K.K., Ananthakrishnan, T.N., & David, B.V. (1976). *General and Applied Entomology*, Tata McGraw Hill.
6. Imms, A.D. (1963). *General Text Book of Entomology*, Asia Publ House.

Websites and eLearning Sources

1. https://agriculture.nmims.edu/agricultural-entomology/
2. https://www.nal.usda.gov/animal-health-and-welfare/beekeeping
3. https://egov.uok.edu.in/elearning/tutorials/1011020512BR15103CR15Apiculture%20Lac%20cul ure%20and%20%20sericultureapiculture%20lac%20culture%20and%20%20sericulture%20upload.pdf
4. https://www.gov.nl.ca/ecc/files/env-protection-pesticides-business-manuals-applic-chapter7.pdf

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K - Level)**
	On successful completion of this course, the students will be able to	
CO1	identify insects based on morphology	**K1**
CO2	identify beneficial and harmful insects.	**K2**
CO3	understand the physiology of insects.	**K3**
CO4	apply integrated pest management in field.	**K4**
CO5	categorize the insects based on its economic importance.	**K5**

Relationship Matrix											
Semester	**Course Code**	**Title of the Course**					**Hours**				**Credits**
2	**23UBO23AC02**	**Allied Course - 2:** Agricultural Entomology					4				3
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	2	3	2	2	2	2	2	3	2	**2.2**
CO2	2	3	2	1	2	2	3	2	2	3	**2.2**
CO3	2	2	3	2	1	2	3	2	2	2	**2.1**
CO4	1	2	2	2	2	2	3	2	3	2	**2.1**
CO5	1	2	2	3	2	2	3	2	2	3	**2.2**
									Mean Overall Score		**2.16 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	23UBO23AP02	**Allied Practical - 2:** Agricultural Entomology	2	1

Detailed Study:

* Study of distinguishing features of insects studied in theory and making sketches.
* Field collection, identification and preservation of insects of agricultural importance, predators, pollinators, and weed killers - plant galls.
* Study of different categories of insect pests and types of damage done by them in the field, godown and warehouses.
* Dissection of Cockroach to study the mouthparts, digestive, nervous and reproductive systems, Salivary gland and Haemocytes. Modification of Antenna, legs & mouth parts.
* Light trap collection and identification.
* Visit to a local sericulture centre and submission of report.

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	23UHE24VE02	**Value Education - 2:** Fundamentals of Human Rights	2	1

Course Objectives
To sensitize students about various human rights and their importance
To empower them with the right understanding of human rights
To enable them to understand the Fundamental rights and the duties in the constitution of India
To help them comprehend the background, principles and the articles of UDHR
To make them involved in activities to defend human rights

UNIT I: Human Rights - An Introduction **(6 Hours)**

Introduction- Classification of Human Rights- Scope of Human Rights-Characteristics of Human Rights - Challenges for Human Rights in the 21st Century.

UNIT II: Historical Development of Human Rights **(6 Hours)**

Human Rights in Pre-World War Era- Human Rights in Post-World War Era- Evolution of International Human Rights Law - the General Assembly Proclamation- Institution Building, Implementation and the Post- Cold War Period. The ICC.

UNIT III: India and Human Rights **(6 Hours)**

Introduction- Preamble to Indian Constitution - Classification of Fundamental Rights-Salient Features of Fundamental Rights-and Fundamental Duties.

UNIT IV: Human Rights of Women and Children **(6 Hours)**

Women's Human Rights- Issues related to women's rights - and Rights of Women's and Children

UNIT V: Human Rights Violations and Organizations **(6 Hours)**

Human Rights Violations - Human Rights Violations in India - the Human Rights Watch Report, January 2012- Human Rights Organizations - NHRC - SHRC.

Teaching Methodology	Chalk and Talk, Power point, Handouts and Group discussion

Book for Study

1. Department of Human Excellence, (2021). *Techniques of Social Analysis: Fundamentals of Human Rights.*

Books for Reference

1. Venkatachalem. (2005). *The Constitution of India, Giri Law House.*
2. Naik, V. & Shany, M. (2011). *Human rights education and training*, Crescent Publishing Corporation.
3. Neera, B. (2011). *Human Rights Content and Extent.* Swastika Publications.

Websites and eLearning Sources

1. https://www.un.org/en/universal-declaration-human-rights/
2. https://www.ilo.org/global/lang--en/
3. https://www.amnesty.org/en/

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	Identify the importance and the values of human rights	**K1**
CO2	Understand the historical background and the development of Human Rights and the related organizations	**K2**
CO3	Apply the provisions of National and International human rights to themselves and the society	**K3**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**	**Credits**	
2	**23UHE24VE02**			**Value Education - 2:** Fundamentals of Human Rights					**2**	**1**	
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO 2**	**PSO3**	**PSO 4**	**PSO5**	
CO1	3	2	1	2	2	3	2	2	2	2	**2.1**
CO2	3	2	1	2	2	3	2	2	2	2	**2.1**
CO3	3	2	2	2	2	2	3	2	1	2	**2.1**
Mean Overall Score											**2.1 (Medium)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	23UHE24AE01	**Ability Enhancement Compulsory Course - 2:** Environmental Studies	2	1

Course Objectives
To enable students connect themselves with nature
To Impart knowledge of the concept of Biodiversity
To create awareness of the causes and consequences of various pollution
To help them recognize the available natural resources and the need to sustain them
To enable them to Identify the environmental problems and offer alternatives by making interventions both individually and collectively

UNIT I: Introduction to Environmental Studies **(6 Hours)**

Introduction - Scope and Importance - Subsystems of Earth - Various recycling Methods - Environmental Movements in India - Eco- Feminism - Public awareness - Suggestions to conserve environment

UNIT II: Natural Resources **(6 Hours)**

Food Resources - Land Resources - Forest resources - Mineral Resources - Water Resources - Energy Resources

UNIT III: Ecosystems, Biodiversity and Conservation **(6 Hours)**

General structure of ecosystem - Functions of Ecosystem - Energy flow and Ecological pyramids - Levels of Biodiversity - Hot spots of Biodiversity - Endangered and Endemic Species - Value of Biodiversity - Threats to Biodiversity - Conservation of Biodiversity

UNIT IV: Environmental Pollution **(6 Hours)**

Air Pollution - Water Pollution - Oil Pollution - Soil Pollution - Marine Pollution - Noise Pollution - Thermal Pollution - Radiation Pollution

UNIT V: Environmental Organizations and Treatise **(6 Hours)**

United Nations Environment Program (UNEP) - International treaties on Environmental protection - Ministry of Environment, Forest and Climate Change - Important National Environmental Acts and rules- Environmental Impact assessment - Issues deals with Population growth.

Teaching Methodology	Chalk and Talk, Power point and Field visit

Book for Study

1. Department of Human Excellence, (2021). *Environmental Studies.*

Books for Reference

1. Rathor, V.S. & Rathor B. S. (2013). *Management of Natural Resources for Sustainable Development*. Daya Publishing House.
2. Sharma P.D. (2010). *Ecology and Environment*, (8th Ed.). Rastogi Publications.
3. Agrawal, A & Gibson, C.C. (2001). *Introduction: The Role of Community in Natural Resource Conservation.* Rutgers University Press.

Websites and eLearning Sources

1. https://www.unep.org/
2. http://moef.gov.in/en/
3. https://www.ipcc.ch/reports/

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	Identify the concepts related to global ecology and the environment	**K1**
CO2	Comprehend the natural resources and environmental organizations	**K2**
CO3	Apply the acquired knowledge to sensitize individuals and public about the environmental crisis	**K3**

Relationship Matrix											
Semester	**Course Code**	**Title of the Course**								**Hours**	**Credits**
2	**23UHE24AE01**	**Ability Enhancement Compulsory Course - 2:** Environmental Studies								**2**	**1**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO 4**	**PSO 5**	
CO1	3	2	1	2	2	3	2	2	2	2	**2.1**
CO2	3	2	1	2	2	3	2	2	2	2	**2.1**
CO3	3	2	2	2	2	2	3	2	1	2	**2.1**
Mean Overall Score											**2.1 (Medium)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	23UTA31GL03	General Tamil - 3	4	3

கற்றலின் நோக்கங்கள்
தனிப்பாடல்களின் பாடற்பொருளை அறிதல்
சிற்றிலக்கியங்களின் வகைகளையும் வகைமைகளையும் அறிதல்
இடைக்காலப் புலவர்களின் பங்களிப்பை உணர்தல்
சிற்றிலக்கியங்களின் பாடுபொருள், தனித்தன்மை, மரபு ஆகியவற்றை அறிதல்
சிற்றிலக்கியங்கள்வழி தமிழின் வளர்ச்சி நிலையை அறிதல்

அலகு – 1 **(12 மணி நேரம்)**

ஔவையார்
காவிரியே தார்வேந்தன் (16) **கற்றது கைமண்ணளவு** (39) **மதியாதார் முற்றம்** (42)
இனியது கேட்கின் (55) **தாயொடு அறுசுவை** (64)
காளமேகப் புலவர் -
நஞ்சிருக்குத் தோலுரிக்கு நாதர்முடி(4) **ஓடுஞ் சுழிசுத்த முண்டமாகும்** (16)
அடிநந்தி சேர்தலால் ஆகம் (22) **செருப்புக்கு வீரரைச் சென்றுழக்கும்** (52)
துதிவாணி வீரம் (80)
இராமச்சந்திர கவிராயர் – **வஞ்சகர்பா னடந்தலைந்த** - 19
பொற்களந்தைப் படிக்காசுத் தம்பிரான் – **குட்டுதற்கோபிள்ளைப் பாண்டிய** - 21
தமிழ்விடுதூது,- கண்ணிகள் 19 **முதல்** 62 **வரை**
கலிங்கத்துப்பரணி -**தேவியைப் பரவியது, பாடல்** 121 **முதல்** 134 **வரை**

அலகு - 2 **(12 மணி நேரம்)**

முக்கூடற்பள்ளு –நாட்டுப்படலம் பாடல்கள் 19 –முதல் 27 வரை
முத்துகுமாரசாமி பிள்ளைத்தமிழ் – அம்புலிப்பருவம் முதல் 5 பாடல்கள்
அறிஞர் அண்ணா – வேலைக்காரி நாடகம்

அலகு - 3 **(12 மணி நேரம்)**

திருக்குற்றாலக்குறவஞ்சி – மலைவளம் (6 பாடல்கள்)
இலக்கியவரலாறு – சிற்றிலக்கியங்கள்
நற்றமிழ்க்கோவை கட்டுரைகள் 7, 8, 9

அலகு - 4 **(12 மணி நேரம்)**

தாயுமானவர் திருப்பாடல்கள் – பராபரக்கண்ணி 7 முதல் 30 வரை உள்ள கண்ணிகள்
இலக்கணம் – அணிகள்
குணங்குடி மஸ்தான் சாகிபு – குறை இரங்கி உரைத்தல் – 7 பாடல்கள்

அலகு – 5 **(12 மணி நேரம்)**

திருவருட்பா – திருக்கதவம் திறத்தல்
இலக்கிய வரலாறு – இடைக்காலப் புலவர்கள், நாடகத்தமிழ்
நற்றமிழ்க்கோவை -கட்டுரைகள் – 10, 11, 12

கற்பித்தல் முறை	**விரிவுரை** (Lecture), **காணொளிக் காட்சி** (Videos), **விளக்கக் காட்சி** (PPT presentation)

பாட நூல்கள்

1. தமிழாய்வுத்துறை (2023), பொதுத்தமிழ்-3, தூய வளனார் கல்லூரி
2. தமிழாய்வுத்துறை (2021), நற்றமிழ்க்கோவை, தூய வளனார் கல்லூரி

பார்வை நூல்கள்

1. செயராமன் ந.வீ. (1967),சிற்றிலக்கியச் செல்வம், மணிவாசகர் பதிப்பகம்
2. பொன்னுசாமி (2023), சிற்றிலக்கிய வரலாறு, இரண்டு தொகுதிகள்,பாரிநிலையம்
3. சண்முகம் பிள்ளை மு. (2022), சிற்றிலக்கிய வகைகள், மணிவாசகர் பதிப்பகம்

Websites and eLearning Sources

1. https://ta.wikipedia.org/wiki/
2. https://www.britannica.com/science/Siddha-medicine
3. https://nischennai.org/main/siddha-medicine/

4. https://tamil.hindustantimes.com/
5. https://www.tamiluniversity.ac.in/english/library2-/digital-library/
6. https://www.tamilelibrary.org/
7. www.projectmadurai.or
8. http://www.tamilvu.org/ta/library-libcontnt-273141
9. https://www.tamildigitallibrary.in/
10. https://noolaham.org/

Course Outcomes		
CO No.	**CO-Statements** ***இப்பாடத்தின் நிறைவில் மாணவர்கள்***	**Cognitive Levels (K - Level)**
CO1	***இடைக்காலப் புலவர்களின் பாட்டுதிதிறனை அறிந்து கொள்வர்***	**K1**
CO2	***சிற்றிலக்கிய வகைகளையும் வகைமைகளையும் அறிந்து கொள்வர்***	**K2**
CO3	***பள்ளு, பரணி, பிள்ளைத்தமிழ், குறவஞ்சி போன்ற இலக்கியங்கள் வழி வீரம், பக்தி, காதல் உணர்வை அறிந்து கொள்வர்***	**K3**
CO4	***சிற்றிலக்கியங்களின்அமைப்பு பாட்டு வடிவங்களை அறிந்து கொள்வர்***	**K4**
CO5	***இடைக்காலத் தமிழ் வளர்ச்சி நிலையை அறிந்து கொள்வர்***	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**	**Credits**	
3	**23UTA31GL03**			General Tamil - 3					**4**	**3**	
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	2	3	2	3	2	3	3	2	**2.5**
CO2	2	2	2	3	3	2	2	3	3	2	**2.4**
CO3	3	3	2	3	3	2	2	3	3	3	**2.7**
CO4	3	2	2	3	2	3	2	3	2	3	**2.5**
CO5	2	3	2	3	2	3	2	3	2	3	**2.5**
										Mean Overall Score	**2.52 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	23UFR31GL03	French - 3	4	3

Course Objectives
To analyse the French clothing with respect to its culture
To apply prepositions and understand its usages
To analyse a contemporary text in present tense
To evaluate the French festivals and compare with their own cultural context
To apply the past tense using simple conversation

UNIT I **(12 Hours)**

- TITRE: Vivre la ville
- GRAMMAIRE : la comparaison, les prépositions avec les noms géographiques, les pronoms personnels COI, le pronom y (le lieu)
- LEXIQUE : se repérer sur un plan de ville, la ville, les lieux de la ville
- PRODUCTION ORALE : demander et indiquer une direction dans un dialogue
- PRODUCTION ECRITE : décrire votre ville natale, créez les affiches en appréciant votre ville

UNIT II **(12 Hours)**

- TITRE: Visiter une ville
- GRAMMAIRE : la position des pronoms compléments, les verbes du premier groupe en – ger et – cer, les verbes ouvrir et accueillir
- LEXIQUE : dire les informations sur une ville de votre choix, les transports, les points cardinaux, les prépositions de lieu
- PRODUCTION ORALE : Indiquer le chemin
- PRODUCTION ECRITE : Demander des renseignements touristiques

UNIT III **(12 Hours)**

- TITRE: On vend ou on garde
- GRAMMAIRE : la formation du pluriel, les adjectifs de couleurs, l'adjectif beau, nouveau, vieux
- LEXIQUE : savoir comment s'habiller des grandes occasions, les couleurs, les formes, les matériaux
- PRODUCTION ORALE : comprendre une présentation de catalogues vestimentaires en France
- PRODUCTION ECRITE : adresser des souhaits à quelqu'un

UNIT IV **(12 Hours)**

- TITRE: Ventes d'autrefois, ventes d'aujourd'hui
- GRAMMAIRE : les pronoms relatifs qui et que, l'imparfait, les verbes connaître, écrire, mettre et vendre, la question avec inversion
- LEXIQUE : comprendre la description de personnes dans un extrait de roman, les mesures, l'informatique
- PRODUCTION ORALE : imaginez un dialogue avec un personnage célèbre. Utilisez l'inversion.
- PRODUCTION ECRITE : écrire une biographie en utilisant les pronoms relatifs

UNIT V **(12 Hours)**

- TITRE: Félicitations! / On voyage!

- GRAMMAIRE : les pronoms démonstratifs, les articles : particularités, les pronoms interrogatifs variables : lequel, les adverbes de manières, les verbes recevoir et conduire
- LEXIQUE : les moyens de transports, les voyages, les fêtes, l'aéroport et l'avion, la gare et le train, l'hôtel
- PRODUCTION ORALE : Présenter ses vœux–
- PRODUCTION ECRITE : Faire une réservation

Teaching Methodology	PPT Presentation, Seminar, Video Assignments

Book for Study

1. Dauda, P., Giachino, L., & Baracco, C. (2016). *Generation A1*. Didier.

Books for Reference

1. Girardet, J., & Pecheur, J. (2017). *Echo A1*. (2nd Ed.). CLE International.
2. Mérieux, R., & Loiseau, Y. (2012). *Latitudes A1*. Didier.
3. Fournier, I. (2011). *Talk French.* Goyal Publishers.

Websites and eLearning Sources

1. https://francais.lingolia.com/en/grammar/prepositions
2. https://www.lawlessfrench.com/grammar/present-tense/
3. https://www.thoughtco.com/textures-french-adjectives-and-expressions-1368980
4. https://study.com/academy/lesson/past-tense-in-french.html
5. https://absolutely-french.eu/french-celebrations/?lang=en

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	Relate colours, materials and shapes to the french clothing.	**K1**
CO2	Select appropriate prepositions in giving directions.	**K2**
CO3	construct a text in present tense using different verbs.	**K3**
CO4	examine the travel manners and celebrations of the French.	**K4**
CO5	justify the usage of past tense in a biography.	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**						**Hours**		**Credits**
3	**23UFR31GL03**		French - 3						**4**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	1	2	2	3	2	3	1	2	3	**2.1**
CO2	3	2	3	3	1	2	1	2	2	3	**2.2**
CO3	2	1	3	2	2	3	1	3	2	2	**2.1**
CO4	3	1	3	2	3	3	3	1	2	3	**2.4**
CO5	3	2	3	2	2	3	3	2	2	1	**2.3**
										Mean Overall Score	**2.22 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	23UHI31GL03	Hindi - 3	4	3

Course Objectives
To appreciate the features of Modern Hindi Prose
To understand the Hindi literature in association with the contemporary requirements
To enable the students to develop their effective communicative skills in Hindi
To strengthen the language competence among the students
To empower the students with globally employable soft skills

UNIT I **(12 Hours)**

- Tera Sneh Na Khooon
- Samband Bodak
- Reethikal - Namakarn
- Tense

UNIT II **(12 Hours)**

- Himadri Thung Sring Se
- Paribakshik Shabdavali
- Smuchaya Bodak
- Reethikal - Samajik Paristhithiyam

UNIT III **(12 Hours)**

- Insan Our Kuthae
- Vismayadi Bodak
- Reethikal - Sahithyik Paristhithiyam
- Reethikal - Salient Features

UNIT IV **(12 Hours)**

- Shokgeeth
- Avikary Shabdh
- Reethikal - Main Divisions
- Social Media and Modern World

UNIT V **(12 Hours)**

- Reethikal - Visheshathayem
- Anuvad
- Bahoo Ki Vidha (One Act Play)

Teaching Methodology	Videos, PPT, Quiz, Group Discussion, Case Based Problem Solving

Books for Study

1. Jain, S.K. (2019). *Anuwad: Siddhant Evam Vyavhar*. Kailash Pustak Sadan.
2. Gupth, K. M. (2020). *Hindi Vyakaran*, Anand Prakashan.
3. Bosalae, S. (2020). *kavya sarang*. Rajkamal Prakashan.

Books for Reference

1. Ramdev. (2016). *Vyakaran Pradeep*. Hindi Bhavan.

2. Singh, L.P. (2017). *Kavya Ke Sopan*. Bharathy Bhavan Prakashan.
3. Shukla, A.R. (2021). *Hindi Sahitya Ka Itihas*, Prabhat Prakashan.
4. Gosamy, K. (2016). *Anuvad vigyan ki Bhumika*. Rajkamal Prakashan.

Websites and eLearning Sources

1. https://www.hindwi.org/poets/jaishankar-prasad/all
2. https://youtu.be/e9wK-pYfVPc
3. https://www.amarujala.com/kavya/sahitya/sumitranandan-pant-best-hindi-poems
4. https://mycoaching.in/samuchchay-bodhak-kya-hai
5. https://www.subhshiv.in/2021/06/avikari-shabd.html

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, the students will able to	**Cognitive Levels (K - Level)**
CO1	find out the dialects of Hindi language.	**K1**
CO2	compare the poems of Sumithra Nandanpanth, Prasad & Bachan in Context with their experience of life.	**K2**
CO3	illustrate the importance given to family ethics by the youth in the modern period according to “Bahoo Ki vidha” One Act play.	**K3**
CO4	categorize the poetics in some selective poems.	**K4**
CO5	justify the social & political conditions of Devotional period in Hindi Literature.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**				**Hours**		**Credits**	
3	**23UHI31GL03**			Hindi - 3				**4**		**3**	
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	3	3	2	3	2	1	3	2	**2.4**
CO2	3	2	3	2	2	3	2	3	2	3	**2.5**
CO3	3	2	2	3	1	3	2	3	2	3	**2.4**
CO4	2	3	3	2	3	2	3	3	2	1	**2.4**
CO5	3	2	2	3	3	2	1	3	2	3	**2.4**
									Mean Overall Score		**2.42 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	23USA31GL03	Sanskrit - 3	4	3

Course Objectives
To introduce simple poetry in Sanskrit
To give an exposure to the Vedas and Vedangas
To acquaint students with epics and puranas
To train students in conjugation of verbs in future tense
To introduce Upasarga-s and their role in verb formations

UNIT I **(12 Hours)**

Ramodantam , Balakandam (1-15 verses)

UNIT II **(12 Hours)**

Ramodantam, Balakandam (15-30 verses)

UNIT III **(12 Hours)**

Vedas - Vedangas vivaranam

UNIT IV **(12 Hours)**

Asta dasha Purana and Dashopanishads

UNIT V **(12 Hours)**

Upasargas and Bhavishyat Kaalah Vakya Prayoga

Teaching Methodology	Videos, PPT, Blackboard, Demonstration, Exercises

Books for Study

1. Vedic literature
2. Ramodantam

Books for Reference

1. Parameshwara. (2018). *Ramodantam*. LIFCO Chennai.
2. Vadhyar, R. S., & Sons. (2019). *History of Sanskrit Literature*, Book - sellers and publishers , Kalpathu ,Palghat, Kerala , south India.
3. Kulapathy, K.M Saral *Sanskrit Balabodh, Bharathita vidya bhavan*, Munshimarg.

Websites and eLearning Sources

1. https://www.scribd.com/doc/210917188/Sri-Ramodantam-Sanskrit-Text-With-English-Translation
2. http://www.sushmajee.com/ms-ppp/text/ved-notes.pdf
3. https://occr.org.in/publication/Vedanga.pdf
4. https://www.forgottenbooks.com/en/download/TheThirteenPrincipalUpanishadsTranslatedFromtheSanskrit_10017247.pdf
5. https://www.learnsanskrit.org/guide/uninflected-words/the-upasarga/

Course Outcomes		
CO No.	CO-Statements On successful completion of this course, students will be able to	Cognitive Levels (K - Level)
CO1	remember Characters and events of Ramayana	K1
CO2	understand social ethics and moral duties.	K2
CO3	apply the values learnt, in day to day life	K3
CO4	appreciate the Vedic Philosophy	K4
CO5	evaluate and create new words with upasargas	K5

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**						**Hours**		**Credits**
3	**23USA31GL03**		Sanskrit - 3						**4**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	1	2	2	3	3	3	3	3	2	1	2.3
CO2	3	3	2	3	3	2	2	3	3	3	2.7
CO3	3	3	1	3	3	1	1	3	3	3	2.4
CO4	2	2	1	2	3	2	2	3	2	1	2.0
CO5	3	3	2	3	2	2	3	3	3	2	2.6
										Mean Overall Score	**2.4 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	23UEN32GE03	General English - 3	5	3

Course Objectives
To develop strategies to enhance reading skills through teacher-led practices, promoting comprehension, critical analysis, and creative engagement with various genres.
To strengthen informal and formal letter writing skills.
To analyze and appreciate different literary forms, including anecdotes, biographies, poems, and prose, fostering critical thinking and creative expression.
To practice applying grammatical structures, including the simple future and future continuous tenses, in writing tasks.
To engage in critical discussions through reading and writing about societal issues.

UNIT I: Suggestions to Develop Your Reading Habit **(13 Hours)**

1.0 Introduction
1.1 Objectives
1.2 Listening and Reading Skills through Teacher-led Reading Practice
1.3 Glossary
1.3.1 Words
1.3.2 Phrases
1.4 Reading Comprehension
1.5 Critical Analysis
1.6 Creative Task
1.7 General Writing Skill: Letter Writing: Informal
1.8 Grammar: Simple Present Tense

UNIT II: The Secret of Success: An Anecdote **(13 Hours)**

1.9 Introduction
2.0 Objectives
2.1 Listening and Reading Skills through Teacher-led Reading Practice
2.2 Glossary
2.3.1 Words
2.3.2 Phrases
2.4 Reading Comprehension
2.5 Critical Analysis
2.6 Creative Task
2.7 General Writing Skills: Letter Writing: Formal
2.8 Grammar: Present Continuous Tense

UNIT III: The Impact of Liquor Consumption on the Society **(13 Hours)**

2.9 Introduction
3.0 Objectives
3.1 Listening and Reading Skills through Teacher-led Reading Practice
3.2 Glossary
3.3.1 Words
3.3.2 Phrases
3.4 Reading Comprehension
3.5 Critical Analysis
3.6 Creative Task
3.7 General Writing Skills: Letter to Newspaper
3.8 Grammar: Simple Past Tense

UNIT IV: Dr. A.P.J. Abdul Kalam: A Short Biography **(12 Hours)**

3.9 Introduction
4.0 Objectives
4.1 Listening and Reading Skills through Teacher-led Reading Practice
4.2 Glossary
4.3.1 Words
4.3.2 Phrases
4.4 Reading Comprehension
4.5 Critical Analysis
4.6 Creative Task
4.7 General Writing Skill: Write a letter applying for a job
4.8 Grammar: Past Continuous Tense

UNIT V: Golden Rule: A Poem **(12 Hours)**

4.9 Introduction
5.0 Objectives
5.1 Listening and Reading Skills through Teacher-led Reading Practice
5.2 Glossary
5.3.1 Words
5.3.2 Phrases
5.4 Reading Comprehension
5.5 Critical Analysis
5.6 Creative Task
5.7 Grammar: Simple Future Tense
5.8 General Writing Skill: Circular-Writing

UNIT VI: Hygiene **(12 Hours)**

5.9 Introduction
6.0 Objectives
6.1 Listening and Reading Skills through Teacher-led Reading Practice
6.2 Glossary
6.3.1 Words
6.3.2 Phrases
6.4 Reading Comprehension
6.5 Critical Analysis
6.6 Creative Task
6.7 General Writing Skill: Writing an Agenda for a Meeting
6.8 Grammar: Future Continuous Tense

Teaching Methodology	Lecture Method, Use of ICT Tools and Interactive method

Book for Study

1. Jayraj., & Arul, S.J. et al. (2016). *Trend-Setter*: *An Interactive General English Textbook for Undergraduate Students*. Trinity.

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	recall and explain the fundamental components of English language and grammar.	**K1**
CO2	demonstrate their understanding of various texts by summarizing, paraphrasing, and interpreting the contents.	**K2**
CO3	apply their language and comprehension skills to create written communication.	**K3**
CO4	critically analyze the texts presented in the course.	**K4**
CO5	synthesize the language and grammar knowledge to compose creative tasks	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
3	**23UEN32GE03**			General English - 3						**5**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	3	2	2	3	2	3	2	3	2	**2.4**
CO2	2	2	3	2	3	3	2	3	2	2	**2.3**
CO3	2	3	2	3	2	2	3	2	3	2	**2.4**
CO4	2	2	3	2	3	3	2	3	2	3	**2.5**
CO5	2	2	2	3	2	2	2	3	2	2	**2.2**
										Mean Overall Score	**2.36 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	23UBO33CC04	**Core Course - 4:** Taxonomy of Angiosperms	5	4

Course Objectives
To understand the variations in angiosperms
To understand the basic principles and guiding the plant classifications
To gain knowledge on morphology and nomenclature
To describe and identify plants in technical terms and describing the salient features of different families
To understand the economic and medicinal importance of the various families

UNIT I **(15 Hours)**

History of plant taxonomy. Plant collection, Identification (herbaria and botanical gardens), documentation (keys and flora). Taxonomic hierarchy; Botanical nomenclature: ICN principles, scientific names, ranks, authorship, nomenclatural types, valid publication, rejection of names, priority of publication.

UNIT II **(15 Hours)**

Classification: artificial (Carolus Linnaeus), natural (Bentham & Hooker) and phylogenetic (Engler & Prantle's) and Angiosperm Phylogeny Group (APG). Brief account of cytotaxonomy, chemotaxonomy, molecular taxonomy and numerical taxonomy.

UNIT III **(15 Hours)**

Detailed study and economic importance of the following families (classification based on APG IV, 2016): Basal angiosperms: Nymphaeales - Nymphaeaceae; Magnoliids: Piperales - Magnoliales - Annonaceae; Monocots: Alismatales - Araceae - Asparagales - Orchidaceae, Commelinales - Pontederiaceae, Poales - Poaceae.

UNIT IV **(15 Hours)**

Eudicots: Rosids: Fabales - Fabaceae, Rosales - Rosaceae, Cucurbitales - Cucurbitaceae; Malpighiales - Euphorbiaceae, Myrtales - Lythraceae, Myrtaceae, Sapindales - Anacardiaceae, Rutaceae, Meliaceae.

UNIT V **(15 Hours)**

Eudicots cont.: Superasterids: Santalales - Loranthaceae, Caryophyllales - Amaranthaceae, Asterids: Ericales - Gentianales - Rubiaceae, Apocynaceae, Solanales - Solanaceae, Lamiales - Lamiaceae, Asterales - Asteraceae.

Teaching Methodology	Chart, PPT, Chalk and talk.

Books for Study

1. Michael, G. S. (2019). *Plant Systematics*, (3rd Ed.). Academic Press.
2. Sharma, OP. (2009). *Plant Taxonomy*. Tata McGraw-Hill Education Pvt. Ltd.

Books for Reference

1. Sampamurty, AVSS. (2015). *Taxonomy of Angiosperms*, (2nd Ed.). I.K. International Pvt. Ltd.
2. Jeffrey, C. (1982). *An Introduction to Plant Taxonomy*, (2nd Ed.). Cambridge University Press.

Website and eLearning Sources

1. https://www.bionity.com/en/encyclopedia/History_of_plant_systematics.html
2. https://thegma.org.uk/learning/resources/plant-classification?dt=2019-05-02&sig=wxf3hiQ2qkPhBWa1o4boUHbHvbTDaGxQcxAcegzXMfU%3D
3. https://www.gbif.org/dataset/fa8ab13c-52ed-4754-b838-aeff74c79718

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, the students will be able to	**Cognitive Levels (K-Level)**
CO1	recognize fundamental plant taxonomy principles and key terms.	**K1**
CO2	explain plant taxa evolutionary relationships with depth in taxonomy principles and methods.	**K2**
CO3	apply plant taxonomy knowledge to analyze literature critically and draw conclusions effectively.	**K3**
CO4	demonstrate proficiency in practical plant taxonomy skills, including fieldwork and specimen curation.	**K4**
CO5	execute independent plant taxonomy research, showcasing advanced problem-solving abilities	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**						**Hours**		**Credits**
3	**23UBO33CC04**		**Core Course - 4:** Taxonomy of Angiosperms						**5**		**4**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	2	2	2	3	2	3	2	2	**2.3**
CO2	3	3	3	2	2	3	2	2	2	3	**2.5**
CO3	3	3	3	2	2	3	3	3	2	2	**2.6**
CO4	2	3	3	2	3	2	3	3	3	3	**2.7**
CO5	3	3	3	2	3	3	3	3	3	3	**2.9**
										Mean Overall Score	**2.6 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	23UBO33CC05	**Core Course - 5:** Plant Breeding and Evolution	5	4

Course Objectives
To acquire knowledge on objectives and various methods of plant breeding.
To outline the process of evolution and various theories pertaining to biological evolution.
To judge which plant breeding methods are appropriate for specific objectives.
To analyse, evaluate and synthesize information relevant to plant breeding.
To formulate a plan for the application of plant breeding methods to achieve a specific objective.

UNIT I **(15 Hours)**

Plant Breeding: History and objectives; genetic basis and important achievements in plant breeding; modes of reproduction in crop plants (asexual, sexual, apomictic)- advantages and limitations, Floral biology in relation to selfing and crossing techniques; Plant Introduction - types and procedures; Centres of origin and domestication of crop plants.

UNIT II **(15 Hours)**

Selection methods: Mass selection, pure line and clonal selection- meritsand demerits; Hybridization: objectives, choice of parents and causes of failure; Incompatibility and male sterility - methods to overcome; Methods of handling segregation material for isolationof superior strains - bulk method and pedigree method of selection;Role of distant hybridization- in crop improvement.

UNIT III **(15 Hours)**

Inbreeding depression and heterosis: genetic basis and its applications; Steps in the production of single cross, double cross, three-waycross; Polyploidy: induced polyploidy, role of auto and allopolyploids; Mutation and crop improvement.

UNIT IV **(15 Hours)**

Back crossing: theory and procedure for transferring various types of character; Breeding for disease resistance and drought tolerance; Preservation and utilization of germplasm; Breeding techniques for rice, sugarcane, groundnut and maize; Limitations of conventional breeding; Aspects of molecular breeding.

UNIT V **(15 Hours)**

Evolution: origin of life, theories of evolution of life forms: Lamarckism and Darwinism. Variations - definition causes and types, mutation (principles of Hugo De'Vries). Role of mutation in speciation. Evolution through ages: human evolution. Evidences for evolution.

Teaching Methodology	Chart, PPT, Videos, Chalk and talk.

Books for Study

1. Chaudhari, H. K. (1995). *Elementary Principles of Plant Breeding*, (Revised Ed.). Oxford & IBH.
2. Chittaranjan, K. (2006-07). *Genome Mapping and Molecular Breeding in Plants*. Vols. I-VII. Springer.

Books for Reference

1. Chopra, V. L. (1994). *Plant breeding- Theory and Practice*. Oxford & IBH.
2. Acquaah, G. (2020). *Principles of Plant Genetics and Breeding*, (3rd Ed.).
3. Singh, B. D. (2022). *Plant Breeding Principles and Methods*, (12th Ed.).

Website and eLearning Sources

1. https://link.springer.com/chapter/10.1007/978-981-19-5434-4_1
2. https://www.seedworld.com/the-evolution-of-plant-breeding/
3. https://evolution.berkeley.edu/evolution-101/an-introduction-to-evolution/

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, the students will be able to	**Cognitive Levels (K-Level)**
CO1	acquire knowledge on floral biology and select proper breeding method	**K1**
CO2	critically analyze information about life and its origins	**K2**
CO3	cultivate skills in emasculation and pollination of various crop plants	**K3**
CO4	gain expertise on hybrid seed production techniques	**K4**
CO5	use the descriptors in various crops for selection of superior genotypes	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
3	**23UBO33CC05**			**Core Course - 5:** Plant Breeding and Evolution					**5**		**4**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	2	2	2	3	2	2	3	2	2	**2.2**
CO2	3	2	2	1	2	1	3	3	2	3	**2.2**
CO3	1	2	3	2	3	2	3	2	3	2	**2.3**
CO4	2	2	1	3	1	2	3	2	3	3	**2.2**
CO5	1	2	2	2	3	1	3	2	2	3	**2.1**
										Mean Overall Score	**2.2 (High)**

Semester	Course Code	Title of the Course	Hours/week	Credits
3	23UBO33CP03	**Core Practical - 3:** Taxonomy of Angiosperms, Plant Breeding and Evolution	3	2

Detailed Study:

- Description of plant in technical terms.
- A detailed study of the range of vegetative and floral characters of plants belonging to the families mentioned in the theory part except Orchidaceae.
- Field trip to any place within or outside the state to study the plants in their natural habitats.
- Spot identification (Binomial, Family) of plants included in the theory.
- Field note-book and 5 herbarium sheets of common angiosperms are to be prepared and submitted at the time of Practical Examination.
- Breeding techniques: Emasculation, Layering and Grafting.

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	23UBO33AO01A	**Allied Optional - 1:** Chemistry for Biologists - 1	4	3

Course Objectives
To learn the various molecule and compounds involved in Biological processes.
To learn the various concepts of chemistry in Applied Biology
To understand chemical principles involved in Biological processes.
To apply the various concepts of chemistry in Applied Biology

UNIT I: Periodicity and Chemical Bonding **(12 Hours)**

Periodicity: classification of elements, division of periodic table in to blocks(*s, p, d, f*) atomic radius, ionic radius, ionization energy, electro negativity, electron affinity-trends with in a group and periods. General electronic configurations and oxidation states of *s, p* and *d*-block element, inert pair effect.

Ionic Bond - definition, examples, condition for the formation of ionic bond, properties of ionic molecules.

Covalent bond - definition, examples, properties of covalent molecules, hybridization, types of hybridization, VSEPR theory: structuresof $BeCl_2$, BF_3, $NH_3$and H_2O.

UNIT II: Organic Chemistry **(12 Hours)**

Classification of organic compounds: (i) Hydrocarbons: aliphatic saturated / unsaturated,cyclic acyclic and aromatic compounds (ii) alkyl and aryl halides (iii) alcohols and ethers (iv)aldehydes, ketones and carboxylic acid and their derivative(v) amines and nitro compounds;nomenclatureand examples upto five carbonatoms.

UNIT III: Quantitative Analysis **(12 Hours)**

Error Analysis: accuracy, precision, errors, determinate and indeterminate errors, eliminating and minimizing error, relative error, absolute error.

Concentration units: mole, molarity, molality, formality, normality, ppm, molefraction, Primary standard and secondary standard solutions, principle of volumetric analysis, acid base titration, redoxtitration, complexometric titration, precipitation titration and indicators.

UNIT IV: Agricultural Chemistry **(12 Hours)**

Soil types-red soil, black soil, alluvial soil, desert soil, red soil; role of humus: Manures and their importance, Chemical fertilizers: Natural and synthetic fertilizers: NPK fertilizers-manufacture of NPK fertilizers, mixed fertilizers; role of macronutrients and micronutrients: Pesticides: classification insecticides, herbicides and fungicides; Structure of important pesticides: DDT, BHC, 2, 4-D, 2, 4, 5-T; biomass and sits utilization; triple revolution India (Green, Blue and White).

UNIT V: Coordination and Bioinorganic Chemistry **(12 Hours)**

Coordinate bond-ligands, classification of ligands, nomenclature of complexes DMG, EDTA ligands. Structure of $[Ag(NH_3)_2]^+$ linear; $[Cu(NH_3)_4]^{2+}$squareplanar;$[Ni(Cl)_4]^{2-}$Tetrahedral; $[Pt(CN)_4]^{2-}$square planar. Chemistry of haemproteins, nature of hemoglobin and myoglobin, chemistry of chlorophyll, phorphyrin unit and photosynthesis.

Teaching Methodology	Chalk and Talk, PPT, Videos

Books for Study

1. Puri, B.R., Sharma, L.R., & Kalia, K.K. (2020). *Principles of Inorganic Chemistry,* (33rd Ed.). Vishal Publishing Co.
   - **Unit-I:** *Chapter 2 and 5*
   - **Unit-V:** *Chapter 26 and 37*
   - **Unit-III:** *Chapter 40*
2. Bahl, A., & Bahl, B.S. (2014). *Advanced Organic Chemistry,* (22nd Ed.). S.Chand.

Unit-II: *Chapter 4*

3. Sharma, B.K. (2011). *Industrial Chemistry*. Goel Publishing Company.
   Unit-IV: *Chapter 5*

Books for Reference

1. Puri, B.R., Sharma, L.R., & Pathania, M.S. (1993). *Principles of Physical Chemistry,* (23rd Ed.). Shoban Lal Nagin S, Chand.
2. Tewari, K.S., & Vishnoi, N.K. (2000). *A Text Book* of *Organic Chemistry,* (3rd Ed.). S.Chand and Company Pvt. Ltd.
3. Gopalan, R. (1999*). Elements of Analytical Chemistry*. S.Chand.

Websites and eLearning Sources

1. https://bansal.ac.in/acc_sample_ioc.pdf
2. https://www.niser.ac.in/sps/sites/default/files/basic_page/Error%20Analysis_2015.pdf

Basics of Inorganic Chemistry

Error Analysis

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - level)**
CO1	observe the chemistry of different types of soils and the irutility.	**K1**
CO2	understand the principles involved in periodicity and chemical bonding.	**K2**
CO3	develop the knowledge about various reactions of organic chemistry	**K3**
CO4	relate bioinorganic complex molecules with human life	**K4**
CO5	apply the various analytical concepts in quantitative analysis.	**K5**

Relationship Matrix											
Semester	**Course Code**	**Title of the Course**						**Hours**		**Credits**	
3	**23UBO33AO01A**	**Allied Optional - 1:** Chemistry for Biologists - 1						**4**		**3**	
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	1	2	3	2	3	1	2	3	2	**2.1**
CO2	3	1	2	2	3	3	2	1	3	2	**2.2**
CO3	2	2	1	3	2	2	1	2	3	2	**2.0**
CO4	3	3	2	1	2	2	2	3	2	1	**2.1**
CO5	3	2	2	3	3	2	3	2	2	3	**2.5**
									Mean Overall Score		**2.2 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	23UBO33AO1B	**Allied Optional - 1:** Biometrics and Computer Applications - 1	4	3

Course Objectives
Learn the basic concepts of Statistics in biological sciences.
Learn to solve systems of linear equations and application problems requiring them.
Impart the knowledge of mathematical modeling.
Explains the important concepts of statistical data.
Know the various statistical measures

UNIT I **(12 Hours)**

Types of measurements - Interval, ratio, rank order and categorical - Logarithm, Permutation and Combination

UNIT II **(12 Hours)**

Solving Equations: Solving a simple linear equation involving one variable and two variables. Matrices - Operation on matrices - Determinants - Inverse - Solving a system of equations of order 3x3 using Cramer's rule and inverse method.

UNIT III **(12 Hours)**

Mathematical modeling: Principle of least squares (concepts only) -Curvilinear regression, $y = ax^2 + bx$ +c, $y = ab^x$ and $y = ae^{bx}$.

UNIT IV **(12 Hours)**

Statistics - Introduction - Uses and limitations of Statistics - Collection and classification of data - Frequency table - Frequency graphs - Diagrammatic representation of data -Sampling-Census and sample method - Methods of sampling.

UNIT V **(12 Hours)**

Measures of location: Mean, Median and Mode. **Measures of Dispersion**: Range, Mean deviation, Standard deviation and Coefficient of variation. Skewness and Kurtosis.

Teaching Methods	YouTube videos, PPT, Black Board teaching and Handouts.

Book s for Study

1. Gupta S.P, (2014). *Statistical Methods*, (43rd Ed.). Sultan Chand & Sons.
2. Navanitham, P.A. (2015). Business Mathematics and Statistics, Jai publishers.
3. Gupta S.P., & Kapoor V.K., (2020). *Fundamentals of Mathematical Statistics*, (12th Ed.). Sultan Chand & Sons.

Books for Reference

1. Rao, N. G. (2018). *Statistics for Agricultural Science*, (3rd Ed.). BS Publications.
2. Olive Jean Dunn & Virginia A Clark (2009). *Basic Statistics: A primer for the Biomedical Sciences*, (4th Ed.). A John Wiley & Sons, Inc., Publication.

Website and eLearning Resources

1. https://youtu.be/W7sMRIOL7LM
2. https://youtu.be/CcFXaFBl1kA
3. https://youtu.be/AAuuh-72HxY
4. https://youtu.be/NOUs-JTDnH8

Course Outcomes		
CO No.	**CO-statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	acquire the knowledge of Statistics in biological context.	**K1**
CO2	describe the concept of measurement, solving equations, mathematical modeling, Statistics measures.	**K2**
CO3	compute the statistical constants.	**K3**
CO4	apply the statistical concepts in real life problems.	**K4**
CO5	analyse the univariate and bivariate data.	**K5**

Relationship Matrix											
Semester	**Course Code**	**Title of the Paper**							**Hours/Week**		**Credits**
3	**23UBO33AO1B**	**Allied Optional - 1:** Biometrics and Computer Applications - 1							**4**		**3**
Course Outcomes	**Programme Outcomes (PO)**					**Programme Specific Outcomes (PSO)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	2	3	3	2	2	3	1	3	**2.4**
CO2	1	2	3	2	3	2	1	2	3	3	**2.2**
CO3	3	2	2	3	2	1	3	3	2	2	**2.3**
CO4	2	3	2	2	1	3	1	2	3	3	**2.2**
CO5	3	3	3	2	3	2	2	1	3	3	**2.5**
										Mean Overall Score	**2.32 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	@	**Allied Optional Practical:** Biometrics and Computer Applications	2	-

Course Objectives
Impart the knowledge of matrix.
Learn the basic concepts of straight line, regression and second degree.
Understand univariate and bivariate data.
Understand the basic concepts of graphical representation.
Learn the concepts of diagrammatic representation.
Impart the knowledge of matrix.

Using the Excel packages the students are asked to solve the following exercises

1. Solving a system of equations - Inverse Matrix, Cramer's rule.

2. Curve fitting - Straight line, Regression line and second degree.

3. Construction of frequency table - Univariate, Bivariate and Cross tabs.

4. Drawing frequency graphs.

5. Pictorial presentation - Bar diagrams, Pie diagrams etc.

Course Outcomes		
CO No.	**CO-statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	know the solutions of the system of equations.	**K1**
CO2	predict the future value by fitting the appropriate curve.	**K2**
CO3	display the frequency table, frequency curve for the given data.	**K3**
CO4	draw and explain the diagrams for the data under study.	**K4**
CO5	give the interpretation about various statistical measures using Excel functions.	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Paper**						**Hours**		**Credits**
3	**@**		**Allied Optional Practical:** Biometrics and Computer Applications						**2**		**-**
Course Outcomes	**Programme Outcomes (PO)**					**Programme Specific Outcomes (PSO)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	2	3	2	2	2	3	2	3	2.4
CO2	1	2	3	2	3	2	1	2	3	3	2.2
CO3	3	2	2	3	2	1	3	3	2	2	2.3
CO4	2	3	2	2	1	3	1	2	3	3	2.2
CO5	3	2	3	2	3	2	2	1	3	3	2.4
										Mean Overall Score	**2.24(High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	23UHE34VE03A	**Value Education - 3:** Social Ethics - 1	2	1

Course Objectives
To gain a comprehensive understanding of the principles advocated in social ethics.
To examine the different types of political systems in a thorough manner.
To comprehend the role and obligations of the educated youth.
To evaluate the conduct of the elected representatives in a detailed manner.
To thoughtfully analyze the various forms of cyber crime.

UNIT I: Introduction to Social Ethics **(6 Hours)**

Social ethics, social ethics and social responsibility, social ethics play an important role on the areas, religion influences social changes and vice versa, secularism. Social ethics and corporate dynamics, forms of social ethics.

UNIT II: The Economic and Political System of Today **(6 Hours)**

Planned economy and communism - market economy and capitalism- socialism - mixed economy -the emerging market economy - political system- totalitarian system- oligarchic system.

UNIT III: Integrity in Public Life National Integration **(6 Hours)**

What is Integrity, Public Life, Integrity and Public Life, Integrity in a Democratic State, India as Democratic State, Behavior of a elected representative of India, Noticeable degradation acts of elected Representatives, Suggestions to stem this rot, Types of integrity, Transparency can be a guarantee for integrity.

UNIT IV: Cyber Crime **(6 Hours)**

Business Ethics, Business ethics permeates the whole organization, Measuring business ethics , The Vital factors highlighting the importance of business ethics , Cyber crime, Strategies in committing Cyber Crimes, Factors aiding Cyber Crime, computer Hacking, Cyber Bullying, Telecommunications piracy, Counter Measures to Cyber Crime, Ethical Hacking.

UNIT V: Social Integration **(6 Hours)**

Global challenges, The future is with the Educational Youth, Cost of the Sacrifice, Crusaders against corruption, Responsibility of the Educated Youth, Positive Global Scenario, Right to Education, Eradicating gender inequality, Sustainable Human Development , Social Integration, Elimination Crime, Integration with Global Market

Book for Study

1. Department of Human Excellence. (2021). *Formation of Youth*, St Joseph's College (Autonomous), Tiruchirappalli.

Books for Reference

1. Arora, R.K. (2014). *Ethics, Integrity and Values*. Public Service Paperback.
2. Cunningham, D. (2004). *There's something happening here: The new left, the Klan, and FBI counterintelligence*. Berkeley: University of California Press.
3. Mali, P. (2017). *Cyber law & Cyber Crimes simplified*. Cyber Info media Paperback.
4. Richardson, M. (2019). *Cyber Crime: Law and Practice Hardcover - Import*.

Websites and eLearning Sources

1. https://cybercrime.gov.in/

2. https://open.lib.umn.edu/sociology/chapter/14-2-types-of-political-systems/
3. https://www.esv.org/resources/esv-global-study-bible/social-ethics/
4. https://en.wikipedia.org/wiki/Political_system

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	know the responsibility of the educated youth.	**K1**
CO2	understand the values prescribed under social ethics.	**K2**
CO3	apply their minds critically to the various types of cyber crime.	**K3**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**						**Hours**		**Credits**
3	**23UHE34VE03A**		**Value Education - 3:** Social Ethics - 1						**2**		**1**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	3	3	2	3	2	2	3	3	**2.7**
CO2	3	2	2	2	3	2	2	3	2	2	**2.3**
CO3	2	3	3	3	2	3	3	3	3	3	**2.8**
										Mean Overall Score	**2.6 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	23UHE34VE03B	**Value Education - 3:** Religious Doctrine - 1	2	1

Course Objectives
To impart knowledge to students about Salvation History
To familiarize students with the life and mission of Jesus Christ
To help Students understand the Holy Spirit
To empower students on Gospel Values
To equip the students about Mother Mary

UNIT I: God of salvation **(6 Hours)**

UNIT II: Life & Mission of Jesus Christ **(6 Hours)**

UNIT III: The Holy Spirit **(6 Hours)**

UNIT IV: Gospel Values **(6 Hours)**

UNIT V: Mary, the Mother of God **(6 Hours)**

Teaching Methodology	Chalk and Talk, Power point, Assignment and Group discussion

Books for Study

1. Department of Human Excellence. (2022). *Fullness of Life.* St. Joseph's College, Tiruchirappalli.

Books for Reference

1. (1994). *Compendium: Catechism of the Catholic Church.* Bengaluru: Theological Publications in India.
2. Holy Bible (NRSV).

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	understand the Salvation History	**K1**
CO2	grasp to the life and purpose of Jesus Christ	**K2**
CO3	live out the teachings of the Gospel	**K3**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
3	**23UHE34VE03B**			**Value Education - 3:** Religious Doctrine - 1						**2**	**1**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	3	3	2	3	2	2	3	3	**2.7**
CO2	3	2	2	2	3	3	3	3	2	2	**2.5**
CO3	2	2	3	3	2	2	3	3	3	3	**2.6**
										Mean Overall Score	**2.6 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	23UTA41GL04B	General Tamil - 4: அறிவியல் தமிழ் (Scientific Tamil)	4	3

கற்றலின் நோக்கங்கள்
அன்றாட வாழ்வில் அறிவியலின் செல்வாக்கை அறிந்துகொள்ளுதல்
பண்டைத்தமிழர் வாழ்வில் இடம்பெற்ற அறிவியல்கூறுகளைக் கண்டறிதல்
அறிவியலின் வளர்நிலைகளையும் வகைப்பாடுகளையும் கண்டுணர்தல்
பண்டைத்தமிழரின் பல்துறைச் சிந்தனைகள்வழி தமிழர் தம் பண்பாட்டு மேன்மையை உணர்தல்
படைப்பாற்றல் திறனைக் கண்டறிந்து வளர்த்தெடுத்தல்

அலகு 1 **(12 மணி நேரம்)**

தொல்காப்பியம்: நிலம் தீ நீர் வளி விசும்போடு (தொல். பொருள் 635)

ஒன்றறிவதுவே (தொல். பொருள் 571)

புறநானூறு

மண் திணித்த நிலனும் (புறம் 2 1- 6) செஞ்ஞா யிற்றுச் செலவும் (புறம் 30 1- 7)

அகநானூறு

அம்ம வாழி, தோழி (அகம் 141: 1-11) செஞ்ஞா யிற்றுச் செலவும் (புறம் 30 1-7)

பதிற்றுப்பத்து

நிலம் நீர் வளி விசும்பு என்ற நான்கின் (பதிற்று 14:1-4)

நெடுவயின் ஒளிறு மின்னுப் பரந்தாங்கு (பதிற்று 24:1-26)

உரைநடைக்கட்டுரை: வியக்க வைக்கும் தமிழரின் அறிவியல்

அலகு 2 **(12 மணி நேரம்)**

சித்தர் பாடல்கள்

பதார்த்த சிந்தாமணி

குளத்து சலந்தானே கொடிதான (27) ஏரிசலம் வாதமிகு மதுவே (31)

அருவிநீர் மேக மகற்றுங் (39) மேவிய சீவன் வடிவது சொல்லிடில் (திருமூலர்)

அணுவில் அணுவினை ஆதிபிரானை (திருமூலர்)

நட்டகல்லைத் தெய்வமென்று (சிவவாக்கியர்)

உரைநடைக்கட்டுரை: தமிழர்களின் மருத்துவ அறிவியல்

அலகு 3 **(12 மணி நேரம்)**

திருக்குறள் (2 அதிகாரங்கள்)

வான் சிறப்பு, மருந்து வலைப்பூக்கள் உருவாக்கல், பராமரித்தல் புதிய அறிவியல் கலைச்சொல்லாக்கங்களை உருவாக்குதல்

உரைநடைக்கட்டுரை: தமிழ் இலக்கியங்களில் வெளிப்படும் நீர் மேலாண்மையியல்

அலகு 4 **(12 மணி நேரம்)**

புதினம்: சொர்க்கத்தீவு - சுஜாதா நூல் - திறனாய்வு அறிவியல் புனைவு

ஆவணப்படம், திரைப்படம் - திறனாய்வு

உரைநடைக்கட்டுரை: தமிழில் அறிவியல் புனைவுகள்

அலகு 5 **(12 மணி நேரம்)**

அறிவியல்; கலைச்சொற்கள் அன்றாட வாழ்வில் அறிவியல் பழமொழிகளைத் தொகுத்தல் மூலிகைகள், கீரைகள் ஆகியவற்றின் முக்கியத்துவத்தைக் காட்சிப்படுத்துதல். தமிழர் அறிவியல் கண்காட்சி நடத்துதல்

உரைநடைக்கட்டுரை: அறிவியல் தமிழின் வளர்ச்சி நிலைகள்;

கற்பித்தல் முறை	**விரிவுரை (Lecture), காணொளிக் காட்சி (Videos), விளக்கக் காட்சி (PPT presentation)**

பாட நூல்கள்

1. தமிழாய்வுத்துறை (2021), அறிவியல் தமிழ் , தூய வளனார் தன்னாட்சிக் கல்லூரி

2. சுஜாதா (2009), *சொர்க்கத்தீவு, லிசா பப்ளிகேஷன்ஸ்,*
3. மூர்த்தி அ.கி.(2001) , *அறிவியல் கலைச்சொல் அகராதி, மணிவாசகர் பதிப்பகம்.*

பார்வை நூல்கள்

1. நெடுஞ்செழியன்(2017), *இன்னும் மீதமிருக்கிறது நம்பிக்கை, பூவுலகின் நண்பர்கள் வெளியீடு*
2. குழந்தைசாமி.வா.செ., (2001), *அறிவியல்தமிழ், பாரதி பதிப்பகம்*

Websites and eLearning Sources

1. www.tamilvu.org
2. www.tamildigitallibrary.in
3. https://www.tamiluniversity.ac.in/english/library2-/digital-library/
4. https://www.tamilelibrary.org/

Course Outcomes		
CO No.	**CO-Statements** ***இப்பாடத்தின் நிறைவில் மாணவர்கள்***	**Cognitive Levels (K - Level)**
CO1	*பண்டைய தமிழர்களின்; அறிவியல் அறிவை அறிந்து கொள்வர்.*	**K1**
CO2	*பண்டைய தமிழ் இலக்கியங்களுள் காணாலும் அறிவியல் சிந்தனைகளைப் புரிந்துகொள்வர்.*	**K2**
CO3	*தமிழரின் அறிவியல் மருத்துவத்தையும், நீர் மேலாண்;மை அறிவையும் அறிந்து கொள்வர்.*	**K3**
CO4	*இக்கால இலக்கியங்களுள் அறிவியல்துறை பெற்றுள்ள இடத்தை அறிந்து கொள்வர்.*	**K4**
CO5	*அறிவியல் கலைச்சொற்களைத் தமிழில் கற்றுக் கொண்டு அறிவியல்தமிழ் வளரத் துணைபுரிவர்.*	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
4	**23UTA41GL04B**			**General Tamil - 4 *அறிவியல் தமிழ்* (Scientific Tamil)**					**4**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	1	2	3	2	2	3	3	2	2	2	**2.2**
CO2	2	2	3	2	2	2	3	2	3	2	**2.3**
CO3	1	2	2	3	2	2	2	3	3	3	**2.3**
CO4	2	2	3	2	2	3	2	3	3	2	**2.4**
CO5	3	1	2	2	2	2	3	2	3	3	**2.3**
										Mean Overall Score	**2.3 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	23UFR41GL04	French - 4	4	3

Course Objectives
To analyse the French clothing with respect to its culture
To apply prepositions and understand its usages
To analyse a contemporary text in present tense
To evaluate the French festivals and compare with their own cultural context
To apply the past tense using simple conversation

UNIT I **(12 Hours)**

- TITRE: On fait le mélange!
- GRAMMAIRE : le présent progressif, les pronoms possessifs, la phrase négative
- LEXIQUE : décrire les étapes d'une action, la maison, les taches ménagères
- PRODUCTION ORALE : comprendre le récit d'un voyage
- PRODUCTION ECRITE : raconter ses actions quotidiennes

UNIT II **(12 Hours)**

- TITRE: à propos de logement
- GRAMMAIRE : quelques adjectifs et pronoms indéfinis, les verbes lire, rompre et se plaindre
- LEXIQUE : la localisation et le logement, les pièces, meubles et équipement
- PRODUCTION ORALE : jeu de rôle –votre ami et vous s'installe dans un nouveau meuble
- PRODUCTION ECRITE : décrire votre maison/appartement

UNIT III **(12 Hours)**

- TITRE: Tous en forme!
- GRAMMAIRE : le passé composé et l'imparfait, le passé récent, l'expression de la durée
- LEXIQUE : un souvenir et les événements du passées, le corps humain : extérieur, le corps humain : intérieur
- PRODUCTION ORALE : échanger sur ses projets de vacances
- PRODUCTION ECRITE : raconter un souvenir

UNIT IV **(12 Hours)**

- TITRE: Accidents et catastrophes
- GRAMMAIRE : les adjectifs et les pronoms indéfinis : rien/ personne/aucun, les verbes dire, courir et mourir
- LEXIQUE : savoir les mots et les expressions des catastrophes naturelles, les maladies et les remédies, les accidents, les catastrophes naturelles
- PRODUCTION ORALE : comprendre des personnes qui expriment leur accord ou leur désaccord selon un thème donné
- PRODUCTION ECRITE : écrivez sur une catastrophe naturelle en articulant la cause et la conséquence

UNIT V **(12 Hours)**

- TITRE: Faire ses études a l'étranger/ bon voyage/ la météo
- GRAMMAIRE : les pronoms démonstratifs neutres, le futur simple, situer dans le temps, moi

aussi/non-plus – moi non/si, les verbes impersonnels, les verbes croire, suivre et pleuvoir

- LEXIQUE : savoir vivre en France, le système scolaire, les formalités pour partir à l'étranger, la météo
- PRODUCTION ORALE : exprimer son opinion sur la météo/parler de l'avenir
- PRODUCTION ECRITE: comparer le système scolaire français et indien

Teaching Methodology	Workshop, group activity, Sharing contemporary french cultural videos

Book for Study

1. Dauda, P., Giachino, L., & Baracco, C. (2016). *Generation A1*. Didier.

Books for Reference

1. Girardet, J., & Pecheur, J. (2017). *Echo A1*. (2nd Ed.). CLE International.
2. Mérieux, R., & Loiseau, Y. (2012). *Latitudes A1*. Didier.
3. Fournier, I. (2011). *Talk French.* Goyal Publishers.

Websites and eLearning Sources

1. https://www.frenchcourses-paris.com/french-travel-journal/
2. http://www.saberfrances.com.ar/vocabulary/house.html
3. https://www.thoughtco.com/different-past-tenses-in-french-1368902
4. https://www.youtube.com/watch?v=JZdwJM7sEY8
5. https://www.scholaro.com/pro/Countries/France/Education-System

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K - Level)**
	On successful completion of this course, students will be able to	
CO1	recall the vocabulary pertaining to dwelling place.	**K1**
CO2	outline crisis management in France.	**K2**
CO3	develop a travel diary of your own.	**K3**
CO4	simplify the French education system.	**K4**
CO5	interpret past tenses in a text.	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**						**Hours**		**Credits**
4	**23UFR41GL04**		French - 4						**4**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	1	3	2	2	3	2	1	2	2	**2.1**
CO2	3	1	2	3	3	3	2	1	3	1	**2.2**
CO3	3	2	3	2	2	3	2	1	3	2	**2.3**
CO4	3	1	2	2	3	3	3	1	3	3	**2.4**
CO5	2	2	3	3	1	3	1	2	3	2	**2.2**
										Mean Overall Score	**2.24 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	23UHI41GL04	Hindi - 4	4	3

Course Objectives
To strengthen the language competence among the students
To equip students with cinematic perspective by comparative studies of Hindi literature
To enable the students to develop their effective communicative skills in Hindi
To strengthen the language competence among the students
To incept research-oriented aspirations among students

UNIT I **(12 Hours)**

- Computer Ka Yug
- Prathyay
- Adhunik Kal – Namakarn
- Namakaran

UNIT II **(12 Hours)**

- Vigyan Hani/Labh
- Paryayvachy Shabdh
- Adhunik Kal - Samajik Paristhithiyam
- Samanarthy Shabdh

UNIT III **(12 Hours)**

- Nari Shiksha
- Upasarg
- Adhunik Kal – Sahithyik Paristhithiyam
- Adhunik Kal – Salient Features

UNIT IV **(12 Hours)**

- Review- Book/Film
- Paryavaran Pradookshan
- Adhunik Kal - Main Divisions
- Adhunik Kal - Visheshathayem

UNIT V **(12 Hours)**

- Sapnom Kee Home Delivery (Novel)
- Anuvad

Teaching Methodology	Debate Participation, Videos, PPT, Quiz, Project Work

Books for Study

1. Bosalae, S. (2020). *kavya sarang*. Rajkamal Prakashan.
2. Gupth, M. K. (2020). *Hindi Vyakaran*. Anand Prakashan.
3. Jain, S.K. (2019). *Anuwad: Siddhant Evam Vyavhar*. Kailash Pustak Sadan.

Books for Reference

1. Chaturvedi, R.P. (2015). *Hindi vyakarana*. Upakar Prakashan.
2. Ramdev. (2016). *Vyakaran Pradeep*. Hindi Bhavan.
3. Gosamy, K. (2016). *Anuvad vigyan ki Bhumika*. Rajkamal Prakashan.

4. Shukla, A. R (2021). *Hindi Sahitya Ka Itihas*, Prabhat Prakashan.

Websites and eLearning Sources

1. https://youtu.be/xmr-DaQ3LhA
2. https://mycoaching.in/adhunik-kaal
3. https://m.sahityakunj.net/entries/view/bhartiya-sahitya-mein-anuvad-kee-bhoomika
4. https://mycoaching.in/upsarg-in-hindi
5. https://kalingaliteraryfestival.com/speakers/mamta-kalia/

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, the students will able to	**Cognitive Levels (K - Level)**
CO1	list out the social conditions prevailed in Modern Period which are depicted in Hindi Literature.	**K1**
CO2	discuss the dialects of Hindi language.	**K2**
CO3	illustrate the works of some eminent Hindi Writers related to society.	**K3**
CO4	analyze the human values expressed in life and literature of Hindi Novelist “Mamatha Kaliyah”.	**K4**
CO5	evaluate the film & Literary works in Hindi.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**				**Hours**		**Credits**	
4	**23UHI41GL04**			Hindi - 4				**4**		**3**	
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	3	2	3	3	2	3	2	3	1	2.4
CO2	3	2	3	3	2	3	2	3	1	2	2.4
CO3	3	2	2	3	2	2	1	3	2	3	2.3
CO4	3	2	3	1	3	3	2	3	3	2	2.5
CO5	3	2	2	3	3	2	3	2	3	3	2.6
									Mean Overall Score		**2.44 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	23USA41GL04	Sanskrit - 4	4	3

Course Objectives
To give an exposure to Sanskrit drama in general
To showcase the structure of pre-kalidasan plays in Sanskrit
To coach students in Sanskrit morphology
To acquaint students with the structures of Sanskrit syntax
To impart communicative skills in Sanskrit by training in the functional aspects of the language

UNIT I **(12 Hours)**

Samskrita Vyavahara sahasri vakiya Prayogaha

UNIT II **(12 Hours)**

Lot Lakaarah, Prayaogh Kartari Vaakyaani

UNIT III **(12 Hours)**

Naatakasya Itihaasah Vivaranam, Thuva and Tum Suffixs

UNIT IV **(12 Hours)**

Karnabhaaram , Naatakasya Visistyam

UNIT V **(12 Hours)**

Samskrita Racanani Vubhavoga

Teaching Methodology	Videos, PPt, Blackboard, Demonstration, Exercises

Books for Study

1. *Karnabhavam & Literature Language*
2. *Dhaatu Manjari*
3. Samskrita Vyavahara Sahasri (*A Collection of One Thousand Sentances*), Samskrita Bharati, Delhi.

Books for Reference

1. Vadhyar, R.S. & Sons. (2019). *History of Sanskrit Literature.* Book - sellers and publishers , Kalpathu ,Palghat, Kerala, south India,
2. Kulapathy, Saral, K.M. (2018). *Sanskrit Balabodh , Bharathita vidya bhavan* , Munshimarg.
3. Bharathi. (2019). *Vadatu sanskritam - Samaskara Binduhu.* S. Aksharam 8th cross, 2nd phase Giri nagar Bangalore.

Websites and eLearning Sources

1. https://sanskritdocuments.org/doc_z_misc_major_works/daily.pdf
2. https://www.learnsanskrit.org/guide/verbs-1/karmani-and-bhave-prayoga/
3. https://ia902903.us.archive.org/7/items/in.ernet.dli.2015.102820/2015.102820.The-Sanskrit-Drama-In-Its-Origin-Development-Theory-And-Practice.pdf
4. https://archive.org/details/oafI_karna-bharam-karnas-burden-of-bhasa-with-dr.-sudhakar-malaviya-gokuldas-sanskrit
5. https://sanskritwisdom.com/composition/essays/sanskrit-language/

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	understand human behaviors by studying dramas	**K1**
CO2	remember and identifying Mahabharata characters and events	**K2**
CO3	apply the morals learnt in day to day life	**K3**
CO4	appreciate ancient Sanskrit dramas	**K4**
CO5	create new conversational sentences and to Improve self-character (Personality Development)	**K5**

Relationship Matrix											
Semester	**Course Code**				**Title of the Course**					**Hours**	**Credits**
4	**23USA41GL04**				Sanskrit - 4					**4**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	2	2	2	3	3	3	3	3	2	**2.4**
CO2	2	2	3	3	2	3	2	3	3	2	**2.5**
CO3	3	3	2	3	2	1	1	3	3	3	**2.4**
CO4	2	2	3	2	3	3	3	3	2	3	**2.6**
CO5	2	3	3	3	2	1	3	3	3	2	**2.5**
										Mean Overall Score	**2.48 (High)**

Semester	Course Code	Title of the Course	Hours/week	Credits
4	23UEN42GE04	General English - 4	5	3

Course Objectives
To develop and enhance language proficiency in listening, reading, and writing skills through teacher-led reading practice, and comprehension exercises.
To encourage creative thinking through creative tasks and essay writing.
To foster effective communication skills by engaging in tasks that require note-taking, note-making, précis writing, paragraph writing, and the synthesis of information from different sources.
To strengthen grammatical skills by focusing on the application of different tenses and to emphasise grammatical accuracy in various writing tasks.
To encourage students to critically engage with media content and evaluate information.

UNIT I: Women Through the Eyes of Media **(13 Hours)**

1.0 Introduction
1.1 Objectives
1.2 Listening and Reading Skills through Teacher-led Reading Practice
1.3 Glossary
1.3.1 Words
1.3.2 Phrases
1.4 Reading Comprehension
1.5 Critical Analysis
1.6 Creative Task
1.7 General Writing Skill: Writing Minutes of a Meeting
1.8 Grammar: Present Perfect Tense

UNIT II: Effects of Tobacco Smoking **(13 Hours)**

1.9 Introduction
2.0 Objectives
2.1 Listening and Reading Skills through Teacher-led Reading Practice
2.2 Glossary
2.3.1 Words
2.3.2 Phrases
2.4 Reading Comprehension
2.5 Critical Analysis
2.6 Creative Task
2.7 General Writing Skill: Note-Taking
2.8 Grammar: Present Perfect Continuous Tense

UNIT III: Short Message Service (SMS) **(13 Hours)**

2.9 Introduction
3.0 Objectives
3.1 Listening and Reading Skills through Teacher-led Reading Practice
3.2 Glossary
3.3.1 Words
3.3.2 Phrases
3.4 Reading Comprehension
3.5 Critical Analysis
3.6 Creative Task
3.7 General Writing Skill: Note-Making
3.8 Grammar: Past Perfect Tense

UNIT IV: An Engineer Kills Self as Crow Sat on his Head: A Newspaper Report (12 Hours)

3.9 Introduction
4.0 Objectives
4.1 Listening and Reading Skills through Teacher-led Reading Practice
4.2 Glossary
4.3.1 Words
4.3.2 Phrases
4.4 Reading Comprehension
4.5. Critical Analysis
4.6. Creative Task
4.7 General Writing Skill: Précis Writing
4.8 Grammar: Past Perfect Continuous Tense

UNIT V: Traffic Rules (12 Hours)

4.9 Introduction
5.0 Objectives
5.1 Listening and Reading Skills through Teacher-led Reading Practice
5.2 Glossary
5.3.1 Words
5.3.2 Phrases
5.4 Reading Comprehension
5.5 Critical Analysis
5.6 Creative Task
5.7 General Writing Skill: Paragraph Writing
5.8 Grammar: Future Perfect Tense

UNIT VI: A Handful of Answers: A Zen Tale (12 Hours)

5.9 Introduction
6.0 Objectives
6.1 Listening and Reading Skills through Teacher-led Reading Practice
6.2 Glossary
6.3.1 Words
6.3.2 Phrases
6.4 Reading Comprehension
6.5 Critical Analysis
6.6 Creative Task
6.7 General Writing Skill: Writing Short Essays on Current Issues/General Topics
6.8 Grammar: Future Perfect Continuous Tense

Teaching Methodology	Lecture Method, Use of ICT Tools and Interactive method

Book for Study

1. Jayraj., & Arul, S.J. et al. (2016). *Trend-Setter: An Interactive General English Textbook for Under Graduate Students*. Trinity.

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	identify and explain key concepts and topics discussed in the course.	**K1**
CO2	understand the content by summarising, paraphrasing, and interpreting the materials presented.	**K2**
CO3	apply their knowledge to create various forms of written communication, such as meeting minutes, notes, précis, paragraphs, and essays.	**K3**
CO4	analyse the application of different tenses in various texts.	**K4**
CO5	synthesise their knowledge by creating creative tasks, including short essays on current issues and general topics	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
4	**23UEN42GE04**			**General English - 4**					**5**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	3	2	2	3	2	3	2	3	2	**2.4**
CO2	2	2	3	2	3	3	2	3	2	2	**2.3**
CO3	2	3	2	3	2	2	3	2	3	2	**2.4**
CO4	2	2	3	2	3	3	2	3	2	3	**2.5**
CO5	2	2	2	3	2	2	2	3	2	2	**2.2**
										Mean Overall Score	**2.36 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	23UBO43CC06	**Core Course - 6:** Cell Biology and Genetics	5	4

Course Objectives
To understand the organization of cells.
To acquire knowledge on the structure and organization of various cell organelles
To learn cell cycle and methods of cell division
To solve problems with relevance to the principles and applications of genetics.
To acquire basic knowledge on genomics and proteomics.

UNIT I **(15 Hours)**

Cell as a unit of structure and function; prokaryotic and eukaryotic; Endosymbiotic theory. Structure, organization and functions of nucleus, mitochondria, chloroplasts, ER, ribosomes, Golgi complex, lysosome and vacuole. Organisation of cytoskeleton.

UNIT II **(15 Hours)**

Cytoplasmic membrane structure and functions. Cellular mechanisms in development and differentiation. Cell division (mitosis and meiosis), Cell cycle. Mutation - types, causes and detection. Mutant types - lethal, conditional, biochemical; germinal vs somatic mutants, insertional mutagenesis. Special types of chromosome - polytene and lampbrush.

UNIT III **(15 Hours)**

Mendel's laws of heredity, Modified Mendelian ratios. Multiple alleles. Linkage and crossing over. Sex linked inheritance. Sex determination mechanism. Extra chromosomal inheritance.

UNIT IV **(15 Hours)**

DNA is the genetic material: Griffith's, Avery et al., and Hershy and Chase. RNA as genetic material. Basic knowledge and applications of genomics and proteomics. Genomics: structural and functional genomics. Plant genome (*Arabidopsis* and *Oryza*), animal (*Homo sapiens*). Human Genome Project - objectives and controversies.

UNIT V **(15 Hours)**

Population genetics: gene frequency, genepool, Hardy-Weinberg equilibrium. Genetic drift, Gene frequencies - conservation and changes. Selection - natural, artificial, ecological.

Teaching Methodology	Chart, PPT, Chalk and talk.

Books for Study

1. Verma, P. S., & Agarwal, V.K. (2003). *Genetics*. S. Chand &Co. Ltd.
2. Gupta, P. K. (2018). *Genetics*, (5th Ed.). Rastogi Publications.

Books for Reference

1. Sinnott, E.W., Dunn, L.L., & Dobzhansky, T. (1997). *Principles of Genetics*. Tata MaGraw Hill.
2. Freifelder, D. (1993). *Essentials of Molecular Biology*. Jones & Bartlett, Boston.
3. Gardner, E.J., Simmons, M.J. & Snustad, D. (1991). *Principles of Genetics*, (8th Ed.). John Wiley & Sons.

Websites and eLearning Sources

1. https://www.sciencelearn.org.nz/resources/1989-cell-biology-and-genetics
2. https://www.wiley.com/en-us/etextbooks-and-courseware/biology/cell-biology-and-genetics

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, the students will be able to	**Cognitive Levels (K-Level)**
CO1	Recall the evolution, diversity and replication of cells.	**K1**
CO2	Understand the role of compartmentalization and signaling in cellular biology	**K2**
CO3	Interpret and explain key experiments in the history of cell biology.	**K3**
CO4	Apply knowledge of modern techniques in cellular biology.	**K4**
CO5	Describe genes structure, chromosomes and proteins.	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**						**Hours**		**Credits**
4	**23UBO43CC06**		**Core Course - 6:** Cell Biology and Genetics						**5**		**4**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	3	2	2	3	2	2	2	2	**2.3**
CO2	2	3	2	3	3	2	3	2	2	2	**2.4**
CO3	2	2	3	2	3	3	3	2	3	3	**2.7**
CO4	3	3	2	1	2	3	2	3	1	2	**2.3**
CO5	2	3	2	2	3	2	3	2	2	3	**2.6**
Mean Overall Score											**2.5 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	23UBO43CC07	**Core Course - 7:** Ecology and Climate Change	5	4

Course Objectives
To understand the fundamentals of ecology
To acquire know on various ecosystems and their components
To understand techniques of community studies
To apply their skill to manage climate change
To analyse the biogeochemical cycles and their significance

UNIT I **(15 Hours)**

Introduction to ecology and ecosystem. Ecological factors - physical, edaphic, topographic. Biogeochemical cycles - C, N & P. Plant succession: definition, primary and secondary succession, autogenic and allogenic succession, pioneers and climax communities. Mechanism of plant succession - xerosere.

UNIT II **(15 Hours)**

Autecology and Synecology - definition. Population ecology -definition, size, density, age structure, dispersal and growth. Population interactions - negative and positive. Basic idea of biodiversity - species, genetic, ecosystem and habitat diversity.

UNIT III **(15 Hours)**

Sampling techniques in plant community studies - quadrat and transect methods; species area curve - density, frequency, abundance, dominance of populations; importance value index - construction of phytographs. Phytogeographical zones of India.

UNIT IV **(15 Hours)**

Centres of origin and distribution of species. Patterns of plant distribution - continuous and discontinuous. Continental drift - evidences and impact. Endemic distribution, theories on endemism, age and area hypothesis. Ecotone and edge effect.

UNIT V **(15 Hours)**

Carbon emissions, global warming, climate change, carbon credit, carbon sequestration, blue carbon, alternative energy sources and green energy. Climate change conferences and the role of IPCC and UNFCCC. Anthropause effects on Environment during Covid - 19.

Teaching Methodology	Chart, PPT, Chalk and talk.

Book for Study

1. Kormondy, E. J. (2017). *Concepts of Ecology*, (4th Ed.). Prentice Hall.

Books for Reference

2. Sharma, P. D. (2010). *Ecology and Environment*, (8th Ed.). Rastogi Publications.
3. Odum, E. (2017). *Fundamentals of Ecology*, (5th Ed.). Cengage.
4. Letcher, T. (2015). *Climate Change*, (2nd Ed.). Elsevier Publishing.
5. Smerdon, J. (2018). *Climate Change: The Science of Global Warming and Our Energy Future*. Columbia University Press.

Websites and eLearning Sources

1. https://bio.libretexts.org/Bookshelves/Ecology/Environmental_Science_(Ha_and_Schleiger)/02%3A_Ecology/2.04%3A_Ecosystems/2.4.03%3A_Biogeochemical_Cycles
2. https://www.agritech.tnau.ac.in/agriculture/agri_min_nutri_plantsampling.html
3. https://www.ipcc.ch/
4. https://unfccc.int/

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, the students will be able to	**Cognitive Levels (K-Level)**
CO1	develop an appreciation of the natural world through direct experience with local ecosystems	**K1**
CO2	become familiar with the variety of ways that organisms interact with both the physical and the biological environment.	**K2**
CO3	develop an understanding of the differences in the structure and function of different types of ecosystems.	**K3**
CO4	learn techniques of data analysis as well as methods of presenting scientific information in figures and tables.	**K4**
CO5	understand climate and climate change processes at local to global scales.	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**							**Hours**	**Credits**
4	**23UBO43CC07**		**Core Course - 7:** Ecology and Climate Change							**5**	**4**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	2	1	2	3	2	3	2	3	2	**2.2**
CO2	2	3	2	2	1	3	2	2	2	2	**2.1**
CO3	2	3	1	3	3	3	2	3	2	2	**2.4**
CO4	2	2	2	2	3	3	2	3	2	2	**2.3**
CO5	2	2	2	2	3	3	2	2	2	2	**2.2**
										Mean Overall Score	**2.3 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	23UBO43CP04	**Core Practical - 4:** Cell Biology, Genetics, Ecology and Climate Change	3	2

Cell Biology and Genetics:

1. Ultra structure of cell organelles.
2. Study of mitosis in root tips
3. Study of meiosis in anthers
4. Inheritance Patterns - Mendelian and modified Mendelian ratios
5. Linkage Mapping.
6. Estimation of allele frequency in natural (random matting) populations.
7. Isolation and display of polytene chromosomes.
8. Extraction of human genomic DNA from saliva.
9. Estimation of DNA (Colorimetric).

Ecology and Climate Change

1. Chemical analysis of water and Soil -Total hardness, Carbonates and Bicarbonates and Dissolved oxygen.
2. Vegetation Analysis: Quadrat, Line transects, Species Density, abundance and richness. Basal area and relative dominance
3. Green auditing
4. Field trip

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	23UBO43AO02A	**Allied Optional - 2:** Chemistry for Biologists - 2	4	3

Course Objectives
To learn the safety in the lab
To understand the principles of titrimetric analysis
To understand the principles of organic qualitative analysis

UNIT I: Physical Chemistry **(12 Hours)**

Chemical Kinetics: rate, order, molecularity of reactions. Zero order and first order reaction, rate constant derivation, examples, Importance of kinetic study, activation energy, activated complex, Arrhenius equation, factors affecting rate of the reactions.

Thermodynamics: terms ΔE, ΔH, ΔS, ΔG, endothermic, exothermic reactions, conditions for spontaneity of reactions. Laws of thermodynamics (I, II, III definition only).

UNIT II: Pharmaceutical Chemistry **(12 Hours)**

Classification of drugs: Definitions of: drug, pharmacophore, pharmacognory, pharmacy, harmaco kinetics, pharmaco dynamics, pharmacopoeia (IP, BP, USP). Antibiotics: Pencillin, chloramphenicol, (only the structural properties and SAR): Anaesthetics-general and local anaesthetics: Inhalation anaesthetics (N_2O, $CHCl_3$, haloethane, ethylchloride). Intravenous anaesthetics (thiopental sodium); Cardiovascular Drugs: classification and examples: cardiacglycosides, antihypertensive and anti-hypotensive drugs and sulphonamides-isolation of bioactive molecules from plants by soxhlet method.

UNIT III: Chemistry of Natural Products **(12 Hours)**

Vitamins-type, sources and deficiency disorders of Vitamins A1retinol, Vitamin B complex (thiamine-B1, riboflavin-B2, cyclocobalamine-B12), Vitamin C, Vitamin D and Vitamin E Alkaloids: occurrence, classification, physical properties and biological functions, Uses of coniine, piperine, nicotine, morphine and quinine alkaloids -Terpenoids: classification, isolation, structure, properties and uses of camphor, Citraland α-pinene.

UNIT IV: Catalysis **(12 Hours)**

Types of catalyst positive catalyst, negative catalyst and catalyst poison. Types of catalysis-homogeneous catalysis, heterogeneous catalysis and autocatalysis - general characteristics of catalytic reactions, autocatalysis**.** Biocatalysis- enzyme catalyst, kinetics of enzyme catalysis, Michaelis-Menton constant, active sites, turn over number, factors affecting enzyme catalysis; concentration of substrate, temperature, pH and inhibitors.

UNIT V: Separation and Purification Techniques **(12 Hours)**

Types of Chromatographic Techniques- TLC - Column - HPLC: Principles, instrumentation, sampling and applications of paper, thin layer, column chromatography and electrophoresis-distillation- steam and vacuum distillation- recrystallization.

Books for Study

1. Puri, B.R., Sharma, L.R., & Pathania, M.S. (1993). *Principles of Physical Chemistry,* (23rd Ed.). Shoban Lal Nagin Chand and Co.
   Unit- I *Chapter 23 and 27*
   Unit-IV *Chapter 31*
2. Ghosh, J. (2012). *A Text Book of Pharmaceutical Chemistry,* (3rd Ed.). S. Chand and Company Pvt. Ltd.
   Unit- II *Chapter 11*
3. Subramanian, P. S., Gopalan, R., & Rangarajan, K. (2003). *Elements of Analytical Chemistry*. S. Chand.
   Unit - V *Chapter 9*

Books for Reference

1. Tewari, K. S., & Vishnoi, N. K. (2000). *A Text Book* of *Organic Chemistry*, (3rd Ed.). S. Chand and Company Pvt. Ltd.
2. Bahl, A., & Bahl, B. S. (2014). *Advanced Organic Chemistry*, (22nd Ed.). S. Chand.

Websites and eLearning Sources

1. https://www.youtube.com/watch?v=bYwq5oNZmq4
2. https://www.slideshare.net/Kamyaparashar/chemical-kinetics-presentation

Electrophoresis

Chemical Kinetics

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
4	**23UBO43AO02A**			**Allied Optional - 2:** Chemistry for Biologists - 2					**4**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	2	3	3	2	3	2	2	3	**2.5**
CO2	2	2	1	3	2	2	1	2	3	2	**2.0**
CO3	3	1	2	2	3	3	2	1	3	2	**2.2**
CO4	3	3	2	1	2	2	2	3	2	1	**2.1**
CO5	2	1	2	3	2	3	1	2	3	2	**2.1**
									Mean Overall Score		**2.2 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	23UBO43AO02B	**Allied Optional - 2:** Biometrics and Computer Applications- 2	4	3

Course Objectives
Impart the knowledge of normal distributions.
Understand the statistical hypothesis.
Learn the basic concepts of correlation and regression.
Learn the concepts of theory of attributes.
Understand the non-parametric test.
Impart the knowledge of normal distributions.

UNIT I **(12 Hours)**

Probability: Normal distribution - Definition - Properties - Areas under normal curve - Interpreting areas as probabilities - Importance of normal distributions. Confidence interval: Confidence interval for means - between two means, variance and proportion.

UNIT II **(12 Hours)**

Testing of hypothesis: Null hypothesis - Two kinds of errors - Testing of hypothesis based on simple mean - difference between mean - Population proportion - Difference between the population proportion -Chi-square test - Goodness of fit - Test for independence - F- test: Equality of variances.

UNIT III **(12 Hours)**

Correlation and regression: Correlation: Types of correlation - Scatter diagram - Pearson's coefficient of correlation - Rank correlation. Simple regression: Meaning of regression lines -Regression equations y on x and x on y only - Regression coefficient - Simple problems.

UNIT IV **(12 Hours)**

Theory of attributes: Introduction - Notations - Dichotomy - Classes and class frequencies - Consistency of data - Criteria of independence - Yule's coefficient of association - Coefficient of colligation.

UNIT V **(12 Hours)**

Non -Parametric tests: Introduction -Advantages - Sign test- Mann Whitney U test - One sample runs test -Kruskal - Wallis test and Run test for randomness.

Teaching Methods	YouTube videos, PPT, Black Board teaching and Handouts.

Books for Study

1. Gupta S.P, (2014). *Statistical Methods*, (43rd Ed.).Sultan Chand & Sons.

Books for Reference

1. Rao, N. G (2018). Statistics for Agricultural Science, BS Publications, Third Edition.
2. Dunn, O.J., & Clark, V.A. (2009). *Basic Statistics: A primer for the Biomedical Sciences*, (4th Ed.). A John Wiley & Sons, Inc., Publications.

Website and eLearning Resources

1. https://youtu.be/TvkdX6Dw994
2. https://youtu.be/MHrDKdk9hw0
3. https://youtu.be/NOUs-JTDnH8

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K -Levels)**
CO1	knowledge about formulating and testing a hypothesis and determining probability of making errors in hypothesis tests.	**K1**
CO2	understand the concept of test of significance.	**K2**
CO3	explain the concept of normal distribution, statistical hypothesis, correlation, regression, association of attributes and non-parametric test.	**K3**
CO4	apply hypothesis testing techniques to real-world scenarios.	**K4**
CO5	give the statistical interpretation about parametric and non-parametric test.	**K5**

Relationship Matrix											
Semester	**Course Code**	**Title of the Course**								**Hours**	**Credits**
4	**23UBO43AO02B**	**Allied optional - 2:** Biometrics and Computer Applications- 2								**4**	**3**
Course Outcomes	**Programme Outcomes (PO)**					**Programme Specific Outcomes (PSO)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	3	2	2	3	3	1	2	3	2	**2.3**
CO2	3	2	2	3	3	3	2	1	2	3	**2.4**
CO3	2	3	2	2	2	3	2	2	2	3	**2.3**
CO4	3	3	2	2	3	2	1	3	3	2	**2.4**
CO5	3	2	3	1	2	3	3	2	2	3	**2.4**
										Mean Overall Score	**2.36 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	23UBO43OP01A	**Allied Optional Practical:** Chemistry for Biologists	2	2

UNIT I: Safety Rules in the Laboratory **(6 Hours)**

Introduction- personal protection- nature of chemicals- toxic-corrosive- explosive- inflammable, carcinogenic-other hazardous chemicals- philosophy of lab safety - first-aid techniques - general work culture inside the chemistry lab - handling of chemicals and apparatus in the laboratory: storage and handling of chemicals-disposal of chemical wastes- glassware - handling of glassware - handling of different types of laboratory equipment's like bunsen burner-centrifuge- Kipp's apparatus.

UNIT II: Volumetric Analysis **(6 Hours)**

Volumetric analysis - principle - standard solutions - normality and molarity - principles of titrations- primary standard and secondary standard solutions- acid-base titration- red oxtitration-complexometric titration- precipitation titration and example of each with indicators used.

UNIT III: Theory of Organic Qualitative Analysis **(6 Hours)**

Qualitative analysis of organic substances: solubility test in $NaHCO_3$-NaOH and HCl-test for saturation and unsaturation- aliphatic and aromatic- acidic- basic and neutral nature-elements test for N, S and halogens.

UNIT IV: Volumetric Analysis **(6 Hours)**

1. Estimation of HCl (Std.oxalicacidxNaOHxHCl).
2. Estimation of NaOH (Std.Na_2CO_3xHClxNaOH).
3. Estimation of oxalicacid (Std. FASxKMnO4xoxalicacid).
4. Estimation of FAS (Std. oxalic acidxKMnO4xFAS).
5. Estimation of $KMnO_4$ (Std. $K_2Cr_2O_7$xFASxKMnO4).
6. Estimation of $K_2Cr_2O_7$byThio solution.
7. Estimation of Na_2CO_3 by HCl using a standard Na_2CO_3solution.
8. Estimation of zinc (EDTA titration).
9. Estimation of magnesium (EDTA titration).
10. Estimation of hardness of water (EDTA titration).

UNIT V: Organic Analysis **(6 Hours)**

1. Identification of acidic, basic, phenolic and neutral organic substances.
2. Test for aliphatic and aromatic nature.
3. Test for saturation and unsaturation.
4. Preparation of sodium fusion extract.
5. Detection of N, S, and Cl.

Books for Study

1. Puri, B.R., Sharma, L. R., & Kalia, K. K. (1993). *Principles of Inorganic Chemistry,* (23rd Ed.). Shoban Lal, Nagin Chand and Co.
   Unit-II *Chapter 41*
2. Gnanapragasam, N.S., & Ramamurthy, G. (2007). *Organic Chemistry Lab Manual,* (2nd Ed.). S. Viswanathan Printers and Publishers (P) Ltd.
   Unit-III *Part A*
3. (2021). *Allied Practical Manual*. Department of Chemistry. St. Joseph's College. (Private circulation).

Books for Reference

1. Venkateswaran, V., Veeraswamy, R., & Kulandaivelu, A.R. (1997). *Basic Principles of Practical Chemistry,* (2nd Ed.). Sultan Chand and Sons.
2. Furniss, B.S. (1984). *Vogel's Textbook of Practical Organic Chemistry,* (7th Ed.). ELBS Longman.

Websites and eLearning Sources

1. https://www.youtube.com/watch?v=FUo428guKt0
2. https://www.youtube.com/watch?v=_G6_OEa1BjA

Detection of Elements

Acid-Base Titration

Note:

1. Mono-functional compounds are given for organic analysis.
2. Each student is expected to practice the analysis of at least10 different organic substances.
3. Apart from the TWOCIA tests, one MODELTEST comprising both volume tric and organic analysis is to be conducted to enable the students ready for semester examination.

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	know about the handling of chemicals and safety measures in the laboratory.	**K1**
CO2	estimate the principle of volume tricanalysis and various types of titration.	**K2**
CO3	illustrate the theoretical aspects of organic analysis.	**K3**
CO4	detect various lement spresent in the organic compounds.	**K4**
CO5	demonstrate various techniques of volume tricanalysis.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**				**Hours**			**Credits**
4	**23UBO43OP01A**			**Allied Optional Practical:** Chemistry for Biologists				**2**			**2**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	2	3	3	2	3	2	2	3	**2.5**
CO2	2	2	1	3	2	2	1	2	3	2	**2.0**
CO3	3	1	2	2	3	3	2	1	3	2	**2.2**
CO4	3	3	2	1	2	2	2	3	2	1	**2.1**
CO5	2	1	2	3	2	3	1	2	3	2	**2.1**
									Mean Overall Score		**2.2 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	23UBO43OP01B	**Allied Optional Practical:** Biometrics and Computer Applications	2	2

Course Objectives
Learn the basic concepts of statistical test.
Impart the knowledge small sample and large sample test.
Know the concept of correlation and regression.
Learn the various statistical hypothesis tests.
Know the difference about parametric and non - parametric test.

Using the SPSS software the students are asked to solve the following exercises:

1. Finding Descriptive statistics.
2. Finding correlation coefficient, Rank Correlation.
3. T- tests
4. F-test
5. Chi-square test
6. Non-parametric tests.

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	acquire the knowledge of basic statistical test.	**K1**
CO2	understand the concept of small and large sample test.	**K2**
CO3	compute various statistical measures in the real life problems.	**K3**
CO4	apply the hypothesis testing to parametric and non - parametric test.	**K4**
CO5	give the interpretations about statistical result.	**K5**

Relationship Matrix:

Semester	Course Code	Title of the Paper	Hours	Credits
4	23UBO43OP01B	**Allied Optional Practical:** Biometrics and Computer Applications	2	2

Course Outcomes	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	2	3	2	3	2	3	2	2	3	2	**2.4**
CO2	3	2	3	2	3	2	2	3	1	2	**2.3**
CO3	2	2	3	2	2	3	3	2	2	3	**2.4**
CO4	3	2	2	3	3	1	2	3	1	3	**2.3**
CO5	2	3	3	2	1	3	2	2	3	2	**2.3**
										Mean Overall Score	**2.34 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	23UHE44VE04A	**Value Education - 4:** Social Ethics - 2	2	1

Course Objectives
To understand the significance of natural resources and strive to coexist harmoniously with nature.
To implement strategies for disaster management within the community.
To evaluate the significance and distinctions between science and religion.
To recognize the importance of maintaining a healthy lifestyle.
To utilize counseling techniques to address and resolve individuals' issues.

UNIT I: Harmony with Nature **(6 Hours)**

What is environment, Why should we think of harmony, Longing for human well-being, Principles to conserve environmental resources, Causes of disharmony, The fruits of harmony with nature, Forest resources, Water resources, Mineral resources, Food resources, Fruits of disharmony, Economic values and growth, Environmental Ethics, Guidelines to live in harmony with nature, Towards life-centered system for better quality of life. Harmony with animal kingdom.

UNIT II: Issues Dealing with Science and Religion **(6 Hours)**

What is Science, Science and Religion, Social Relevance of Science and Technology, Science and technology for social justice, Difference caused by Science and Technology, Need for indigenous technology, Science, Technology and Innovation Policy of India.

UNIT III: Public Health **(6 Hours)**

Health related issues, Health Care in India vs Developed Countries, Health and Heredity, Public Health - The Indian Scenario, Objectives of public health in India, Public Health System in India, Failure on the public health front, Role of the central government, Hospitals Services in India, Health and Abortion, Health and Drug Addiction, Drug abuse.

UNIT IV: Disaster Management **(6 Hours)**

Disaster Management, Types of disaster, Plans of disaster management, Technology to manage natural disasters and catastrophes, Disaster Management, Rehabilitation and Reconstruction, Human-induced disaster, First Aid, The importance of First-aid, Disaster Declaration and Response.

UNIT V: Counselling for Adolescents **(6 Hours)**

High Risk Behaviours, Developmental Changes in Adolescents, Key Issues of the Adolescents, Need for Counselling, Nature of Counselling, Counselling Goals, Does helping help? The Good and the Bad news. Importance of Career Guidance Counselling.

Books for Study

1. Department of Human Excellence. (2021). *Formation of Youth*, St Joseph's College (Autonomous), Tiruchirappalli.

Books for Reference

1. Albert, D., & Steinberg, L. *Judgment and decision making in adolescence*: Journal of Research on Adolescence, page no: 211-224 (2011).
2. Larry, R. C. (2000). *Disaster Management and Preparedness,* Lewis Publications.
3. Hurlock, E.B. (2001). *Developmental Psychology: A: Life-Span Approach*. (5th Ed.). Tata McGraw-Hill.
4. Sangha., & Kamaljit. (2015). *Ways to Live in Harmony with Nature: Living Sustainably and Working with Passion.* Australia, Woodslane Pty Limited.

Websites and eLearning Sources

1. https://en.wikipedia.org/wiki/Disaster_management_in_India
2. https://ndma.gov.in/
3. https://talkitover.in/services/child-adolescent-counselling/
4. https://www.nipccd.nic.in/schemes/adolescent-guidance-centre-19#gsc.tab=0

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K - Level)**
	On successful completion of this course, students will be able to	
CO1	Know the value of natural recourses and to live in a harmony with nature.	**K1**
CO2	Apply the plans of disaster management in the society.	**K2**
CO3	Analyse the importance and differences of science and religion.	**K3**

Relationship Matrix											
Semester	**Course Code**	**Title of the Course**								**Hours**	**Credits**
4	**23UHE44VE04A**	**Value Education - 4:** Social Ethics - 2								**2**	**1**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	3	3	2	3	3	2	3	3	**2.8**
CO2	3	2	2	3	3	2	3	3	2	2	**2.5**
CO3	2	3	3	3	2	3	3	3	3	3	**2.8**
										Mean Overall Score	**2.7 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	23UHE44VE04B	**Value Education - 4:** Religious Doctrine - 2	2	1

Course Objectives
To explore the rich historical background of the Catholic Church
To explore and comprehend the Sacraments practiced by the Catholic Church
To incorporate Christian Prayer into daily routines
To reflect on personal growth through the lens of Sacraments and Christian Prayer
To promote unity by embracing universal values from various religions

UNIT I The Catholic Church **(6 Hours)**

UNIT II Sacraments of Initiation **(6 Hours)**

UNIT III Sacraments of Healing & at the Service of Community **(6 Hours)**

UNIT IV The Christian Prayer **(6 Hours)**

UNIT V Harmony of Religions **(6 Hours)**

Teaching Methodology	Chalk and Talk, Power point, assignment and Group discussion

Book for Study

1. Department of Human Excellence (2022). Fullness of Life, St Joseph's College (Autonomous), Tiruchirappalli.

Book for Reference

1. (1994). *Compendium: Catechism of the Catholic Church.* Bengaluru: Theological Publications in India.
2. Holy Bible (NRSV).

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	understand the history of the Catholic Church	**K1**
CO2	examine and grasp the Sacraments of the Catholic Church	**K2**
CO3	apply the Christian Prayer to their everyday life	**K3**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**						**Hours**	**Credits**	
4	**23UHE44VE04B**		**Value Education - 4:** Religious Doctrine - 2						**2**	**1**	
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	3	3	2	3	2	2	3	3	**2.7**
CO2	3	2	2	2	3	3	3	3	2	2	**2.5**
CO3	2	2	3	3	2	2	3	3	3	3	**2.6**
										Mean Overall Score	**2.6 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	23UBO53CC08	**Core Course - 8:** Biophysics and Biostatistics	5	4

Course Objectives
To understand the field of biophysics with reference to bioenergetics
To understand the principles of statistics and know the method of calculation
To learn to apply physical principles to biological systems
To apply the statistical principles to solve the biological problems
To analyse the measures of central value and standard deviation

UNIT I **(15 Hours)**

Biophysics: Photobiology - electromagnetic spectrum, visible rage of spectrum, solar energy and photosynthesis. Influence of light on Phytochrome and its effect on root growth. Phototropin, its significance in plant growth. Fluorescence. Bioluminescence. Phosphorescence.

UNIT II **(15 Hours)**

Bioenergetics - energy and work. Laws of thermodynamics - concept of entropy and enthalpy. Gibb's free energy - energy transduction in biological systems. High-energy compounds - ATP bioenergetics and energy coupled reactions. Radioactivity - structure of an atom, isotopes, types of radiations, application of radioactive isotopes in biological studies, detection of radiation, autoradiography.

UNIT III **(15 Hours)**

Biostatistics: Data - primary & secondary; variable - discrete & continuous. Population and sample, sampling techniques, classification of data, frequency distribution - discrete, continuous and cumulative; parts of a statistical table - advantages of classification of data. Presentation of data - histogram, frequency polygon, frequency curve, Ogive curve, bar charts
- simple, multiple, subdivided, pie diagram.

UNIT IV **(15 Hours)**

Measures of central values: mean, median, mode. Measures of dispersion: range, mean deviation, standard deviation, coefficient of variation - Skewness. Correlation - definition - types - methods of studying correlation: scatter diagram method and Karl Pearson's coefficient of correlation for simple and linear data. Regression: definition - regression lines.

UNIT V **(15 Hours)**

Probability - definition, binomial, poison and normal distributions. Tests of significance. General procedure - large sample testing & small sample testing: t-Test, Chi-squire test and F test.

Teaching Methodology	Chart, PPT, Chalk and talk.

Book for Study

1. Fabrizio, C. (2016). *The physics of living systems*. Springer International Publishing.

Books for Reference

1. Mishra, S. R. (2010). *Textbook of Photobiology*. Discovery Publishing Pvt. Ltd.
2. Gupta, S. P. (2008). *Elementary Statistical Methods*. Sultan Chand & Sons.

Websites and eLearning Sources

1. https://opentextbc.ca/biology/chapter/5-1-overview-of-photosynthesis/
2. http://www.biosciencenotes.com/bioenergetics/
3. https://www.osmosis.org/notes/Introductory_Biostatistics

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, the students will be able to	**Cognitive Levels (K-Level)**
CO1	recognize the structure and dynamics of macromolecules, cells and tissues	**K1**
CO2	realize energy transformation and transfer; thermodynamics	**K2**
CO3	understand and use statistical theory underlying the application of biostatistical methods	**K3**
CO4	analyze the different type of data using appropriate statistical software.	**K4**
CO5	demonstrate a good understanding of descriptive statistics and graphical tools.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
5	**23UBO53CC08**			**Core Course - 8:** Biophysics and Biostatistics						**5**	**4**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	2	2	2	3	2	2	1	2	**2.2**
CO2	2	3	1	2	3	3	2	2	2	2	**2.2**
CO3	2	3	1	2	2	2	2	2	1	2	**1.9**
CO4	2	2	2	2	1	2	2	2	1	2	**1.8**
CO5	2	2	1	3	3	2	3	2	2	2	**2.3**
Mean Overall Score											**2.1 (Medium)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	23UBO53CC09	**Core Course - 9:** Microbiology and Immunology	5	4

Course Objectives
To provide students with basic understanding of Structure and organization of bacteria
To understand the application of microbes in food and dairy microbiology
To provide comparative analysis of major groups of microbes.
To be aware about the immune systems of human being
To know about the antibody production and their immunological role

UNIT I **(15 Hours)**

Microbiology: History, Development and Classification (Outline). Whittaker's five kingdom concept, Bergey's Manual of Systematic Bacteriology (outline). Morphology, cell structure, cell wall chemistry, growth, nutrition and reproduction of bacteria. Viruses: structure, classification and reproduction - lytic and lysogenic cycle. A brief account on Rickettsias, Chlamydia, Mycoplasmas, Viroids and Prions.

UNIT II **(15 Hours)**

Culture of microorganisms: Pure cultures, batch and continuous cultures. Methods of Preservation of microorganisms. Microorganisms and Human diseases: Food borne (Botulism), water borne (Cholera), air borne (Tuberculosis), vector borne (malaria) and contact diseases (AIDS) and SARS. Control of microorganisms - physical, chemical and biological methods.

UNIT III **(15 Hours)**

Soil Microbes and Their Roles, Improvements in Soil Fertility, Nitrogen Fixing Bacteria and Their Role in Nitrogen Cycle, Phosphate Solubilization. Mycorrhizae. Plant-Microbes Interactions: Ectomycorrhizae and Endomycorrhizae. Food microbiology: Types of food spoilage and methods of food preservation. Dairy microbiology: Fermented dairy products. Industrial microbiology: Fermentation and Industrial production of alcohol and antibiotics.

UNIT IV **(15 Hours)**

Immunology: Immune system - adaptive, innate, humoral and cellular immunity. Origin, structure and immunological role of primary lymphoid organs (bone marrow and thymus) and Secondary lymphoid organs (Spleen, lymph nodes, Payer's patches, tonsils and appendix).

UNIT V **(15 Hours)**

Origin and role of immune cells (Leucocytes and lymphocytes). Lymph: composition and functions. Antibody types, study of IgG, its structure and immunological role. Virus encounter human system and vaccinationjj.

Teaching Methodology	Chart, PPT, Chalk and talk.

Books for Study

1. Pelczar, J. C., ECS & Krieg, R. (1999). *Microbiology*. Tata McGraw Hill.
2. Sullia, S.B., & Shantharam, S. (2005). *General microbiology*. Oxford & IBH

Books for Reference

1. Dubey, R.C., & Maheshwari, D.K. (2004). *A text book of microbiology*. S.Chand.
2. Casida, L.E., (2005). *Industrial Microbiology*. New Age International.

Websites and eLearning Sources

1. https://www.wileyindia.com/a-textbook-of-plant-pathology.html
2. https://www.britannica.com/science/plant-disease.
3. https://www.planetatural.com/pest-problem-solver/plant-disease/
4. https://www.imgt.org/IMGTeducation/Tutorials/ImmuneSystem/UK/the_immune_system.pdf2
5. https://www.roswellpark.org/sites/default/files/repasky_9-1-16_cells_and_tissues_lecture_part_1.pdf

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, the students will be able to	**Cognitive Levels (K-Level)**
CO1	understand the various types of microbes in an environment and their importance.	**K1**
CO2	comprehend the structure and function of immune system in humans.	**K2**
CO3	demonstrate the role of microorganisms in food processing and spoilage, soil fertility and sewage disposal	**K3**
CO4	identify the defense mechanism against infection in humans.	**K4**
CO5	assess role of microorganisms in industrial processing of microbial products	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
5	**23UBO53CC09**			**Core Course - 9:** Microbiology and Immunology						**5**	**4**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	3	2	2	3	2	2	2	2	**2.3**
CO2	2	3	2	2	1	2	3	2	2	2	**2.1**
CO3	2	2	3	2	2	3	3	2	3	1	**2.3**
CO4	3	3	2	1	1	3	2	2	1	2	**2.1**
CO5	2	3	2	2	3	1	3	2	1	3	**2.4**
Mean Overall Score											**2.2 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	23UBO53CP05	**Core Practical - 5:** Biophysics, Biostatistics, Microbiology & Immunology	4	2

Biophysics

1. Separation of cell and tissue components by centrifugation
2. Separation of pigments by Paper chromatography
3. Absorption spectrum of macromolecules and pigments - UV, FTIR

Biostatistics

1. Sampling by Random Number Table
2. Data Collection
3. Classification of Data: Discrete, continuous and cumulative.
4. Statistical diagrams: Histogram, Frequency curve, Bar chart and Ogive curve
5. Measures of Central Values: Mean, Median and Mode
6. Measures of Dispersion: Range, Mean Deviation and Standard Deviation.

Microbiology

1. Preparation of common media (Nutrient agar & Potato dextrose agar).
2. Staining of Bacteria (Simple & Grams staining).
3. Isolation and enumeration of microbes in soil and water (serial dilution).
4. Study of motility by Hanging Drop.
5. Pure cultures of bacteria - Streak plate, Pour plate and Spread plate.
6. Microbiology of milk (Phosphatase and MBRT)
7. Antibiosis - Kirby Baur method

Immunology

1. Blood grouping
2. WIDAL- test for typhoid
3. RPR- test for syphilis
4. RF- test for rheumatoid arthritis
5. Immunoelectrophoresis - Demo
6. ELISA - Demo

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	23UBO53ES01A	**Discipline Specific Elective - 1:** Molecular Biology	5	3

Course Objectives
To understand the structure, organization and function of prokaryotic and eukaryotic genome.
To acquire knowledge on mechanism and influences on genetic code and its perpetuation.
To comprehend the basic cellular and molecular events.
To apply the knowledge acquired to study the molecular mechanisms.
To analyse the principles of gene regulation.

UNIT I **(15 Hours)**

Organisation of genome - prokaryotic and eukaryotic. Linear and circular DNA molecules. Mutations - types, causes and detection. Mutant types - lethal, conditional, biochemical, germinal vs somatic mutants, insertional mutagenesis. Basic idea about mobile genetic elements - IS elements and transposons.

UNIT II **(15 Hours)**

DNA replication: General features, enzymology, detailed mechanism (initiation, elongation and termination). DNA damage: damages caused by alkylation, UV, gamma and X-rays. DNA repair: excision, double-strand break, mismatch and SOS mechanisms.

UNIT III **(15 Hours)**

Transcription: The Central Dogma, Genetic code, RNA polymerase, promoters, enhancers, silencers, general transcription factors and the mechanism of transcription(initiation, elongation and termination) in prokaryotes and eukaryotes. Post-transcriptional events (splicing, capping and polyadenylation).

UNIT IV **(15 Hours)**

Translation: Organization of mRNA, genetic code and its characterization, ribosome and rRNA, amino acyl synthetase, tRNA and amino acid activation. Mechanism of initiation elongation and termination. Translation factors, post-translation processing.

UNIT V **(15 Hours)**

Gene regulation: Basic principles of transcriptional regulation- positive and negative; inducible and repressible; activators and repressors. The lac operon (positive and negative control), the trp operon (repression-derepression and attenuation), riboswitches, mRNA stability, RNA interference, microRNAs.

Teaching Methodology	Chart, PPT, Videos, Chalk and talk.

Books for Study

1. Freifelder, D. (1993). *Essentials of Molecular Biology*. Jones & Bartlett.
2. Gupta, P.K. (2005). *Molecular Biology and Genetic Engineering*. Rastogi Publications.
3. Wilson, K., & Walker, J. (2010). *Principles and Techniques of Biochemistry and Molecular Biology*.

Books for Reference

1. De Robertis & De Robertis. (1990). *Cell and Molecular Biology*. Saunders College, Philadelphia.
2. Elliott, W.H., & Elliott, D.C. (2005). *Biochemistry and Molecular Biology*, (3rd Ed.). Oxford University.

Websites and eLearning Sources

1. https://www.nature.com/scitable/definition/transcription-dna-transcription-87/
2. https://www.ncbi.nlm.nih.gov/books/NBK26887/
3. https://courses.lumenlearning.com/wm-biology1/chapter/reading-steps-of-genetic-transcription/

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, the students will be able to	**Cognitive Levels (K-Level)**
CO1	demonstrate the impact of structure modification on a biological system and relationship between systems	**K1**
CO2	demonstrate the principal molecular events of transcription and translation in prokaryotes and eukaryotes	**K1**
CO3	have knowledge on molecular events of DNA replication	**K2**
CO4	emphasize the concepts of split genes, splicing mechanisms	**K3**
CO5	develop comprehensive understanding about Ribo-switches and RNA interference	**K4**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**						**Hours**		**Credits**
5	**23UBO53ES01A**		**Discipline Specific Elective - 1:** Molecular Biology						**5**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	3	2	2	3	2	2	3	2	2.4
CO2	2	3	2	1	2	3	1	2	3	3	2.2
CO3	2	2	2	3	1	2	2	3	2	2	2.1
CO4	3	2	2	1	3	3	1	3	2	3	2.4
CO5	2	3	2	3	1	3	2	3	2	1	2.2
Mean Overall Score											**2.3 (Medium)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	23UBO53ES01B	**Discipline Specific Elective - 1:** Bioinformatics and Bionanotechnology	5	3

Course Objectives
To study the basic elements of interface, concepts between biology and nanotechnology.
To outline the basics of sequence alignment and analysis.
To classify different types of biological databases.
To explain the synthesis approaches for nanomaterial and its characterization.
To construct various types of nanomaterial for application and evaluate the impact on environment.

UNIT I **(15 Hours)**

Bioinformatics: Introduction, Aim, Scope and Research areas of Bioinformatics. Branches of Bioinformatics. Biological Databases, Classification format of Biological Databases, Biological Database Retrieval System - NCBI, PUBMED, EBI, EMBL, gene bank etc.

UNIT II **(15 Hours)**

Database searches for homology using BLAST and FASTA and interpretation of the results to derive biological significance of the queried DNA/protein sequences. Alignment of protein and DNA sequences using algorithm software to deduce homology and interpretation of data.

UNIT III **(15 Hours)**

Nanotechnology: Origin, scope and importance. Nanoparticles - definition. Principles: quantization effects - inverse relationship between size and reactive surface area. Properties: surface effects, the effects of size, shape, surface and bulk composition, and solubility and persistence.

UNIT IV **(15 Hours)**

Essentials of nanostructure generation: top-down vs. bottom-up. Chemical and physical self assembly. Physical, chemical and biogenic synthesis of nanomaterials - biomimetics, green plants, and microorganisms. Role of biomolecules - reducing and/or capping agents: proteins, viruses and carbohydrates, Preparation and characterization of nanoparticles (UV, FTIR, SEM, DLS and zeta potential, X-ray diffraction).

UNIT V **(15 Hours)**

Targeted nanoparticles: active and passive targeting. Application: medicine, manufacturing & materials, delivery vehicles, cancer therapy, tissue engineering, fluorescent biological labels, biological assays, nano-imaging, biosensors, micromanipulation techniques, metabolic engineering and gene therapy, environmental management; nanotechnology in agriculture; Interactions of nanoparticles, uptake, transport and toxicity.

Teaching Methodology	Chart, PPT, Chalk and talk.

Books for Study

1. Sharon, M., & Sharon, M. (2012). *Bio-Nanotechnology - Concepts and Applications*. CRC Press.
2. Rastogi, S.C., Mediratta, N., & Rastogi, P. (2004). *Bioinformatics, methods and applications, genomics, proteomics and drug discovery*. Prentice Hall of India, pvt. Ltd.

Books for Reference

1. Attwood, T. K., & Parry-Smith, D. J. (2001). *Introduction to Bioinformatics Delhi*. Pearson Education Ptd. Ltd.
2. Jain, K. K. (2006). *Nanobiotechnology molecular diagnostics: Current techniques and application (Horizon Bioscience)*, (1st Ed.). Taylor & Francis.
3. Mailander, V., & Landfester, K. (2009). *Interaction of nanoparticles with cells*. *Biomacromolecules*.

Websites and eLearning Sources

1. http://ieet.org/index.php/IEET/more/bionanotechnology20141007Institute of Ethics & Emerging Technologies
2. https://phys.org/news/2014-10-endless-possibilities-bio-nanotechnology.html

3. http://www.particle-works.com/applications/controlled-drug-release/Applications
4. https://jnanobiotechnology.biomedcentral.com/articles/10.1186/1477-3155-2-3DOI: 10.1186/1477-3155-2-3
5. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3865110/
6. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC419715/

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, the students will be able to	**Cognitive Levels (K-Level)**
CO1	have knowledge and awareness of basic concepts of biology, computer science and mathematics	**K1**
CO2	develop problem-solving skills including the ability to develop new algorithms and analysis methods	**K2**
CO3	implement phylogenetic tree construction	**K3**
CO4	understand the strengths, limitations and potential uses of nanomaterials.	**K4**
CO5	develop skill in Functional principles of Bionanotechnology therapies	**K5**

Relationship Matrix											
Semester	**Course Code**	**Title of the Course**							**Hours**		**Credits**
5	**23UBO53ES01B**	**Discipline Specific Elective - 1:** Bioinformatics and Bionanotechnology							**5**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	2	1	2	2	3	2	1	2	**2.1**
CO2	2	3	2	2	2	2	3	2	2	3	**2.3**
CO3	2	2	3	2	1	2	2	3	2	2	**2.1**
CO4	1	2	2	3	2	2	3	2	3	2	**2.2**
CO5	1	2	2	3	2	2	3	2	1	3	**2.1**
										Mean Overall Score	**2.2 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	23UBO53ES02A	**Discipline Specific Elective - 2:** Research Methodology	5	3

Course Objectives
To obtain knowledge on basic concepts in research.
To understand the objective of research.
To evaluate the significance of databases and citation index.
To plan basic research and the research process.
To acquire skill in writing research articles and formatting the papers.

UNIT I **(15 Hours)**

Research: Meaning, Definition and Objectives. Hypothesis: definition and types. Understanding the language of research - Concept, Construct, Variable. Research Process.

UNIT II **(15 Hours)**

Research Design: Concept, classification and Importance in Research. Features of a good research design. Experimental Design: Concept of Independent and group research.

UNIT III **(15 Hours)**

Bibliometrics: definition and relevance; Bibliometrics databases, h-index, SNIP, Page Rank, Impact Factor and evaluation. The use of bibliometrics in research: Citation Research, Science Citation Index. Patent: definition, types and Indian Patent Act.

UNIT IV **(15 Hours)**

Interpretation of Data and Paper Writing. Types of manuscript in journals. Layout of a Research paper and proof correction. Journals in Life Science, Impact factor of Journals, Software for paper formatting like LaTeX/MS Office, BEAMER for presentation.

UNIT V **(15 Hours)**

Structure of thesis. Literature collection: Books, Research articles and e- resources. Structure and components of research proposal, National and International funding sources. Ethical issues related to publishing. Plagiarism andSoftware for detection of Plagiarism.

Teaching Methodology	Chart, PPT, Chalk and talk.

Books for Study

1. Kothari, C. R. (2014). *Research Methodology-Methods & Techniques*. WishwaPrakashan
2. Misra, R. P. (2000). *Research Methodology - A Handbook*. Concept Pub. Company.
3. Pillai., & Bagavathi. (2008). *Statistics*. S. Chand& Company Ltd.

Books for Reference

1. Gupta, S.P. (1990). *Statistical Methods.* Sultan Chand & Sons.
2. Rao, N. G. (1983). *Statistics for Agricultural Science.* Oxford & IBH.
3. Gupta, S.C. (2013). *Fundamentals of statistics*. Himalaya Publishers.

Websites and eLearning Sources

1. https://www.trueeditors.com/blog/components-of-a-thesis/
2. https://www.aresearchguide.com/4format.html

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, the students will be able to	**Cognitive Levels (K-Level)**
CO1	understand and comprehend the basics in research methodology and applying them in research/ project work.	**K1**
CO2	demonstrate the ability to choose methods appropriate to research objectives.	**K2**
CO3	develop advanced critical thinking skills and Demonstrate enhanced writing skills	**K3**
CO4	help them to select an appropriate research design	**K4**
CO5	enable them to collect the data, edit it properly and analyse it accordingly. Thus, it will facilitate students' prosperity in higher education.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
5	**23UBO53ES02A**			**Discipline Specific Elective - 2:** Research Methodology						**5**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	3	2	2	3	2	2	3	2	**2.4**
CO2	2	3	2	3	2	2	3	2	2	1	**2.2**
CO3	2	2	3	2	1	3	3	2	3	1	**2.2**
CO4	3	3	2	3	1	3	3	2	3	1	**2.4**
CO5	2	2	2	2	1	2	2	2	2	1	**1.8**
Mean Overall Score											**2.2 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	23UBO53ES02B	**Discipline Specific Elective - 2:** Biopesticides	5	3

Course Objectives
To study the importance of appropriate control measures for managing insect pests in crops.
To acquire knowledge on present use of biopesticides as part of integrated pest management.
To illustrate the mass production techniques of microbial biopesticides.
To analyze how to use the variable biopesticide methods for managing different kinds of pests.
To design various types of biopesticide formulations.

UNIT I **(15 Hours)**

Biological control of insect pests: scope and principles, factors affecting biological control. Biopesticides: introduction, importance and classification- living creatures to control pests - weeds for controlling pest.Pest Control in Organic Farming. Application methods of biopesticides.

UNIT II **(15 Hours)**

Botanical pesticides: present status and future prospects; opportunities for botanical pesticides in crop rotation; multiple cropping for controlling pests, Trap Crops. Plants as a source of natural pesticides: Neem, Chrysanthemum, Pongamia, Garlic, Turmeric, Tobacco and Citronella.

UNIT III **(15 Hours)**

Biocontrol agents: Isolation, identification, mode of action and mass production of Pseudomonas fluorescence (bacterial agent), Trichodermaviride (fungal agent).

UNIT IV **(15 Hours)**

Biological pesticides: isolation, identification. Bacterium as biopesticide (Bacillus thuringiensis) - production and field applications. Fungus as biopesticide (Entomophagous - Beauveriabassiana). Insect as biopesticide (Reduviid predators -Rhynocoriskumarii, R. fussipus R. marginatus).Trichogramma. Virus as biopesticide (Baculovirus - NPV). Virulence, pathogenicity and symptoms of entomopathogenic nematodes.

UNIT V **(15 Hours)**

Production methods of biopesticides: liquid culture fermentation and solidstate fermentation - Types of biopesticide formulations: dry inoculum, granules, pellets, capsules, wettable powder and liquid formulations. Impediments and limitation in production and use of biopesticide.

Teaching Methodology	Chart, PPT, Videos, Chalk and talk.

Books for Study

1. Ghosh, G. K. (2000). *Biopesticide and Integrated pest Management*. A P H Publishing Corporation.
2. Bhattacharyya, P., & Purohit, S.S. (2008). *Organic Farming: Biocontrol and Biopesticide Technology*.
3. Saleem, F., & Shakoori, A. R. (2012). *Development of Bioinsecticide*. Lap Lambert Academic Publishing.

Books for Reference

1. Chandra, K., Greep., & Srivathsa. (2005). *Bio Control Agents & Biopesticides*.
2. Dent, D. (2000). *Insect Pest Management,* (2nd Ed.). ABI Publishers.

Websites and eLearning Sources

1. https://www.sciencedirect.com/science/article/abs/pii/B978012823355900010
2. https://agritech.tnau.ac.in/farm_enterprises/Farm%20enterprises_%20bio%20pesticides.html

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, the students will be able to	**Cognitive Levels (K-Level)**
CO1	describe about the importance of biopesticides in agriculture.	**K1**
CO2	produce biopesticides on large scale	**K2**
CO3	quality control of different biopesticdes	**K3**
CO4	make students to think about the prones and cones of new technologies since they are living in a world where there is an outburst of newer technologies everyday	**K4**
CO5	strengthen and exploring entrepreneurship opportunities	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
5	**23UBO53ES02B**			**Discipline Specific Elective - 2:** Biopesticides						**5**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	2	3	2	2	2	2	2	3	2	**2.2**
CO2	2	3	2	1	2	2	3	2	2	3	**2.2**
CO3	2	2	3	2	1	2	3	2	2	2	**2.1**
CO4	1	2	2	2	2	2	3	2	3	2	**2.1**
CO5	1	2	2	3	2	2	3	2	1	3	**2.1**
Mean Overall Score											**2.14 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	23UBO53SP01	**Self-paced Learning:** Economic Botany	-	2

Course Objectives
To learn the origin and history of various crop plants.
To understand the cultivation of various economically important crops.
To acquire knowledge on the binomial nomenclature and morphology of economic crops.
To acquire the skill for preparation plant-based products.
To produce beverages and narcotics from specific plants.

UNIT I: Cereals and Legumes

Origin and History, Botanical description, Cultivation, Harvesting and uses of Cereals and Legumes: Wheat, Rice, Maize, Black gram, Redgram, Chick pea and Pigeon pea.

UNIT II: Vegetables and Fruits

Origin and History, Botanical description and economic importance of Vegetables and Fruits: Apple, Banana, Mango, Brinjal, Tomato and Potato.

UNIT III: Spices and Condiments

Origin and History, Botanical description, Cultivation and uses of Spices and Condiments: Pepper, Cardamom, Clove, Chilly, Coriander and Turmeric.

UNIT IV: Beverages Plants, Fibres and Timber

Origin and History, Botanical description, Cultivation, Processing and uses of Beverages plants: Tea, Coffee and Cocoa. Fibers and Timber: Cottonand Jute, Teak, Rosewood, and Mahogany.

UNIT V: Oil Yielding Plants

Origin and History, Botanical description, Harvesting, Extraction and uses of Fatty oils and Vegetable Fats: Sun flower, Soya bean, Coconut and Gingelly. Medicinal Plants: Rauvolfia, Chinchona and Digitalis.

Teaching Methodology	Chart, PPT, Chalk and talk.

Books for Study

1. Kochhar, S. L. (2012). *Economic Botany in Tropics*. MacMillan & Co.
2. Panday, B. P. (2000). *Economic Botany*. S Chand Publishing Company.

Books for Reference

1. Wickens, G. E. (2001). *Economic Botany: Principles & Practices*. Kluwer Academic Publishers.
2. Chrispeels, M. J., & Sadava, D. E. (2003). *Plants, Genes and Agriculture*. Jones & Bartlett Publish

Websites and eLearning Sources

1. https://cereal-scientech.blogspot.com/2011/12/economic-importance-of-cereal-grains.html
2. https://dpd.gov.in/iv)%20Economic%20Importance%20&%20Value%20Added%20Products%20of%20%20Pulses.pdf

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, the students will be able to	**Cognitive Levels (K-Level)**
CO1	understand Economic Botany and types of fibers.	**K1**
CO2	current trends in Fiber industries, Spices and condiments, Commercial market of spices	**K2**
CO3	preparation of plant based products	**K3**
CO4	preparation of various beverages in industries	**K4**
CO5	formulation of active ingredients and its commercialization	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
5	**23UBO53SP01**			**Self-paced Learning:** Economic Botany						**-**	**2**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	3	2	2	3	2	2	3	2	**2.4**
CO2	2	3	2	1	2	3	1	2	3	3	**2.2**
CO3	2	2	2	3	1	2	2	3	2	2	**2.1**
CO4	3	2	2	1	3	3	1	3	2	3	**2.4**
CO5	2	3	2	3	1	3	2	3	2	1	**2.2**
Mean Overall Score											**2.3 (Medium)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	23USS54SE01	**Skill Enhancement Course - 2:** Soft Skills	2	1

Course Objectives
To help students understand, practice, and improve their communication skills
To enable students with effective presentation skills
To help students attend interviews confidently and participate effectively in group discussions
To make students realise their potential and excel on personal as well as professional grounds
To develop the thinking skills of students for better performance in competitive exams, interviews and group discussions

UNIT I: Communication Skills

Basics of Communication: Importance of Good Communication Skills, Types of Communication Skills, Verbal Communication, Non-verbal Communication, Tips for Improving Nonverbal Communication, Communication Styles, Barriers to Communication, Ways To Improve Communication Skills, Practicum

Professional Grooming: How to Create the Impact for that First Impression, Presentation Skills, Developing Handouts, Developing Notes, Adding Visual and Audio Effects, Practicum

UNIT II: Resume Writing & Interview Skills

*Resume Writing***:** The Purpose of a Resume, Finding a Job & Making a Career, Length of Resume, Order of Resume, Tailoring the Resume, What your Resume should include, Some Tips for Listing a Bachelor's degree on Your Resume, What NOT to put on your Resume, Formatting Resume, Difference between Resume, Biodata and Curriculum Vitae, Preparation of a Resume

*Interview Skills***:** Meaning of Interview, Types of Interviews, How to get ready for the big day?, Appropriate Attire, Etiquette, Mastering the Art of Meet and Greet, Resume – Points to Remember, Practicum

Group Discussion: Why is GD Essential?, Factors that influence GD, Outcome of GD, Tips for participation in a GD, Useful phrases for GD, Success Tips in GD, Practicum

UNIT III: Personal Effectiveness

Self-Discovery: Characteristics of Personality, Kinds of Self, Who am I?, Personality Inventory Table

Goal Setting: Why do Goal Setting?, Goal Setting Process, Smart Goals

UNIT IV: Numerical Ability

Average, Simple Interest, Compound Interest, Profit and Loss, Area, Volume and Surface Area

UNIT V: **Test of Reasoning**

*Verbal Reasoning***:** Series Completion, Analogy. *Non-Verbal Reasoning*

Book for Study

1. Balaiah, J., & Joy, J. L. (2024). *Straight from the Traits: Securing Soft Skills*, (Revised 3rd Ed.). St. Joseph's College, Tiruchirappalli.

Books for Reference

1. Aggarwal, R.S. (2010). *A Modern Approach to Verbal and Non-Verbal Reasoning*, S. Chand.
2. Balaiah, J. & Joy, J. L. (2018). *Winners in the Making: A primer on soft skills*. St. Joseph's College, Tiruchirappalli.
3. Covey S. R. (2004). *The 7 Habits of Highly Effective People: Restoring the Character Ethic* (Rev. ed.). Free Press.
4. Egan, G. (1994). *The Skilled Helper* (5th Ed.). Pacific Grove, Brooks/Cole.

5. Khera, S. (2014). *You Can Win*. Macmillan Books.
6. Martin, Y. (2005). *Hiring the Best: A Manager's Guide to Effective Interviewing and Recruiting*, (5th Ed.). Adams Media.
7. Sankaran, K., & Kumar, M. (2010). *Group Discussion and Public Speaking*, (5th Ed.). M.I. Publishers.
8. Trishna. (2012). *How to do well in GDs & Interviews*, (3rd Ed.). Pearson Education.

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	analyse problems directed at testing their cognitive abilities	**K3**
CO2	present the best of themselves as job seekers and communicate effectively in all contexts	**K4**
CO3	assess themselves, set goals, and manage conflicts that are expected of a good leader	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**						**Hours**		**Credits**
5	**23USS54SE01**		**Skill Enhancement Course - 2:** Soft Skills						**2**		**1**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO 3**	**PO 4**	**PO 5**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	
CO1	3	3	3	2	2	2	2	3	2	3	**2.5**
CO2	2	3	3	2	3	3	2	3	2	2	**2.5**
CO3	2	2	3	3	2	3	3	3	2	2	**2.5**
										Mean Overall Score	**2.5 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	23UBO63CC10	**Core Course - 10:** Plant Physiology	4	3

Course Objectives
To learn the underlying principles of various physiological process of plants in relation to water
To study and understand nutrition in plants and nitrogen metabolism
To understand the various mechanism of photosynthesis in plants.
To understand the various mechanism of respiration process in plants
To learn the various action of plant regulator and its physiological function in relations to various morphogenetic activities.

UNIT I **(12 Hours)**

Water, Mineral and Solute: Uptake and Transport. Molecular Structure and properties of water. Diffusion and osmosis - osmotic pressure, turgor pressure and significance of osmosis. Plasmolysis and its importance. Mechanism of absorption of water - passive and active absorption. Ascent of sap - theories on absorption. Absorption, mechanism and transport of mineral salts. Transpiration - types, mechanism, significance and factors affecting transpiration.

UNIT II **(12 Hours)**

Mineral nutrition: plant nutrients - essential and non-essential elements - micro and macro nutrients. Source, physiological role and deficiency symptoms of minerals. Hydroponics and aeroponics. Nitrogen metabolism: importance of nitrogen to plants. Sources of nitrogen, nitrogen cycle, nitrogen, ammonium assimilation and transamination.

UNIT III **(12 Hours)**

Photosynthesis: Photosynthetic apparatus and pigment system, Emerson Enhancement Effect and two pigment systems, Antenna complexes and reaction centers, Photosynthetic electron transport system and its mechanism, photophosphorylation and types - cyclic, non-cyclic and psuedacyclic pathway of carbon, CO2 fixation - C3, C4 and CAM plants.

UNIT IV **(12 Hours)**

Respiration: Definition, types of respiration: Glycolysis (EMP pathway), Krebs cycle, Terminal oxidation, Electron transport chain (modern view) and oxidative phosphorylation. ATP synthesis, Photorespiratory carbon, Oxidative cycle, Pentose Phosphate pathway: its significance, Respiratory Quotient.

UNIT V **(12 Hours)**

Plant Growth: Plant growth substance: discovery and physiological effects of Auxin, Gibberellins and cytokinins. Growth inhibitor hormone: Ethylene and Absiscic acid. Physiology of flowering: Photoperiodism and Phytochrome, Vernalisation: techniques and mechanism. Seed dormancy and germination: physiological and biochemical changes.

Teaching Methodology	Chart, PPT, Chalk and talk.

Books for Study

1. Verma, V. (2007). *Text book of Plant Physiology*. Ane Books India.
2. Jain, V. K. (2006). *Fundamentals of Plant Physiology*, (18th Ed.). Chand & Co.
3. Pandey, S. N., & Sinha, B.K. (2006). *Plant Physiology*, (4th Ed.). Vikas Publishing House Ltd.

Books for Reference

1. Noggle., & Fritz. (1976). *Introductory Plant Physiology*. Prentice Hall.
2. Baijal, B. D., & Ravisharma. (1981). *A Textbook of Plant Physiology*. Shiva LalAgarwal
3. Salisbury, F.B., & Ross, C.N. (1995). *Plant Physiology*. CBS Publishers.

Websites and eLearning Sources

1. https://unacademy.com/content/neet-ug/study-material/biology/plant-water-relation.
2. https://www.agry.purdue.edu/ext/pubs/agry.
3. https://www.toppr.com/guides/biology/mineral-nutrition/metabolism-of-nitrogen.

4. https://www.youtube.com/watch?v=XSMjfvpDtTY.
5. https://unacademy.com/content/wp-content//Respiration-in-Plants.
6. https://bio.libretexts.org/Bookshelves/Botany/.

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, the students will be able to	**Cognitive Levels (K-Level)**
CO1	recall and describe fundamental principles of plant physiology, such as water relations, nutrient uptake, photosynthesis, and respiration, demonstrating basic knowledge retention.	**K1**
CO2	explain the intricate molecular and cellular mechanisms underlying key physiological processes in plants, showcasing a deeper understanding of plant physiology concepts.	**K2**
CO3	applying advanced knowledge of plant physiology to design and conduct various experiments, demonstrating the ability to integrate theoretical concepts into practical research.	**K3**
CO4	analyse and interpret complex data sets related to plant physiological experiments, showcasing proficiency in data analysis and critical thinking skills.	**K4**
CO5	communicate scientific findings effectively through well-structured written reports and articulate presentations, demonstrating advanced communication skills tailored to diverse audiences.	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**							**Hours**	**Credits**
6	**23UBO63CC10**		**Core Course - 10:** Plant Physiology							**4**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	2	2	1	2	3	1	2	3	**2.1**
CO2	2	2	3	1	2	3	2	2	3	2	**2.2**
CO3	1	3	2	2	3	1	2	3	2	3	**2.2**
CO4	2	3	2	3	1	2	3	1	2	3	**2.3**
CO5	1	3	3	2	2	2	3	2	1	3	**2.2**
									Mean Overall Score		**2.2 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	23UBO63CP06	**Core Practical - 6:** Plant Physiology	3	2

Detailed Study

1. Effect of temperature on membrane permeability.
2. Osmosis - Thistle funnel, potato osmoscope.
3. Determination of water potential and solute potential.
4. Determination of root pressure and sap exudation.
5. Effect of environmental factors on the rate of transpiration.
6. Extraction and separation of leaf pigments.
7. Effect of light and CO2 on photosynthesis.
8. Aerobic respiration - Ganong'srespiroscope.
9. Ascent of sap - Balsam plant experiment.
10. Measurement of lipase activity.
11. Demonstration experiments:
    i. Phototropism,
    ii. Geotropism,
    iii. Arc Auxanometer
    iv. Dialatometer
    v. Hydroponics

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	23UBO63CC11	**Core Course - 11:** Genetic Engineering and Biotechnology	4	3

Course Objectives
To define the principles and application of intellectual property rights.
To understand the principles of genetic engineering.
To learn the types and application of cloning vectors.
To study and analyze different types of gene transfer methods.
To design protocol for plant tissue culture.

UNIT I **(12 Hours)**

Basic principle and important steps in recombinant DNA Technology. *Agrobacterium*- mediated gene transfer and Crown gall disease. Steps in Methods to generate desired foreign genes: isolation of prokaryotic gene by restriction enzymes and of eukaryotic gene by cDNA synthesis. Joining DNA molecules: ligases, linkers and homopolymers.

UNIT II **(12 Hours)**

Cloning vectors: natural vectors - E. coli plasmids; *in vitro* vectors - pBR; cosmids; single- stranded DNA vectors - M13; and shuttle vectors - *E. coli*; Yeast shuttle vector.Selectable markers. Gene cloning strategies: cDNA library and genomic library.

UNIT III **(12 Hours)**

Methods of gene transfer to bacteria, plants and animals: Ca-transfection, microinjection, electroporation, shotgun, lipofection, somatic cell nuclear transfer, and embryonic stem cells.

UNIT IV **(12 Hours)**

Various methods of Plant Tissue Culture and Applications. Protoplast fusion technology. Applications of plant tissue culture in agriculture and forestry. Transgenic plants against herbicide, insects, drought and salinity. Genetic Use Restriction Technology. Anti-sense RNA technology and the FlavrSavr tomato.

UNIT V **(12 Hours)**

Production technology of plantibodies and monoclonal antibodies by hybridoma technology. Gene therapy. Cloning animals (therapeutic and reproductive). Xenografting. Release of GMOs: *Bt*brinjal in India. Concerns of genetic engineering. IPRs - meaning, types (IP, Copyrights & Patents). Arguments for and against patenting genes and life forms.

Teaching Methodology	Chart, PPT, Chalk and Talk.

Books for Study

1. Glick, B. R., & Pasternak, J. J. (2001). *Molecular biotechnology - principles and applications of recombinant DNA*, (2nd Ed.). ASM Press, Washington, D.C.
2. Old, R.W., & Primrose, S.B. (2001). *Principles of Gene Manipulation-an introduction to genetic engineering*. Black Well Science Ltd.

Books for Reference

1. Gamborg, O.L., & Philllips, G.C. (1995). *Plant cell, Tissue and Organ culture.* Narosa publishing House.
2. George, E.F., & Sherrington, P.D. (1984). *Plant propagation by Tissue culture*. Exegetics Limited.
3. Watson, J.D., & Gilman, M., Witkowski, J., & Zoller, M. (1992). *Recombinant DNA*, (2nd Ed.). WH Freeman Co.

Websites and eLearning Sources

1. https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/agrobacterium
2. https://www.frontiersin.org/articles/10.3389/fmicb.2021.766364/full
3. https://www.genome.gov/about-genomics/policy-issues/Synthetic-Biology

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, the students will be able to	**Cognitive Levels (K-Level)**
CO1	understand the basics of gene cloning, role of enzymes and vectors for genetic engineering	**K1**
CO2	understand the basics of Gene transfer methods	**K2**
CO3	learn the techniques and safety measures of genetic engineering, genome mapping and gene therapy	**K3**
CO4	understand Totipotency and cytodifferentiation	**K4**
CO5	learn the concepts of callus culture, cell suspension culture, micropropagation, organogenesis, somatic embryogenesis and protoplast culture	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
6	**23UBO63CC11**			**Core Course - 11:** Genetic Engineering and Biotechnology						**4**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	3	2	2	3	3	2	3	2	**2.5**
CO2	2	3	2	3	2	2	3	2	2	3	**2.4**
CO3	2	2	3	2	3	3	3	2	3	1	**2.4**
CO4	3	3	3	3	1	3	3	3	3	1	**2.6**
CO5	1	2	2	2	3	1	2	2	2	3	**2.0**
										Mean Overall Score	**2.38 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	**23UBO63CP07**	**Core Practical - 7:** Genetic Engineering and Biotechnology	**3**	**2**

Detailed Study:

Genetic Engineering, Biotechnology

1. Culture media and sterilization techniques
2. Generation of In vitro plants
3. Embryo culture
4. Callus induction and differentiation
5. Somatic embryogenesis.
6. Micropropagation and Synthetic seeds

Biochemistry

7. Qualitative estimation of sugars.
8. Estimation of total lipids (gravimetric).
9. Estimation of amino acids.
10. Determination of strength of amino acids.
11. Quantitative estimation of total protein.
12. Effect of pH/temperature on enzyme activity
13. Estimation of total phenolics

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	23UBO63ES03A	**Discipline Specific Elective - 3:** Biochemistry	5	3

Course Objectives
To acquire knowledge about chemical and molecular foundations of life.
To compile the structure, properties and roles of carbohydrates, proteins and lipids.
To analyze the structure, function and acid base properties of amino acids.
To critique the role of vitamins and enzymes in biological systems.
To evaluate the importance of secondary metabolites to mankind.

UNIT I **(15 Hours)**

Carbohydrates: Classification of carbohydrates; Stereochemistry of simple sugars; α, β- glycosidic linkages, Structure and properties of monosaccharide (glucose, fructose, mannose), disaccharide (maltose, lactose, sucrose) and oligosaccharides; Polysaccharides: Chemical structure and functions of starch, glycogen, plant cell wall and bacterial cell wall.

UNIT II **(15 Hours)**

Lipids: Classification, structure, properties and synthesis of lipids; Saturated and Unsaturated fatty acids; Structure and function of phospholipids, glycolipids; cholesterol-biological importance; Membranes and fluid mosaic model.

UNIT III **(15 Hours)**

Amino acids: Structure & properties, Non-protein amino acids and their functions; Proteins: classification, peptide bond, structure- primary, secondary, tertiary (collagen), quaternary and the forces stabilizing protein structure.

UNIT IV **(15 Hours)**

Enzymes: biocatalysts - definition and characteristics, IUB classification; principles of catalysis, activation energy, transition state, active site and Michaelis-Menten equation; Mode of action - Lock & Key and Induced Fit models; Factors affecting enzyme action - pH, temperature, substrate & enzyme concentration; Enzyme regulation by inhibition: competitive, non-competitive & feedback.

UNIT V **(15 Hours)**

Secondary metabolites and their functions in plants: Terpenoids: N- containing metabolites (alkaloids), Phenolics: classification, properties and significance; Shikimic acid and mevolonic acid pathway; Synthesis of alkaloids from amino acids.

Teaching Methodology	Chart, PPT, Chalk and talk.

Books for Study

1. Lubert, S. (2005). *Biochemistry*. W.H. Freeman & Co.
2. Lehninger. (2008). *Principles of Biochemistry by Nelson*, (5th Ed.). D. L., Lehninger, A. L., & Cox, M. M. Publisher: W. H. Freeman and Company.
3. Judith, G. V. (2011). *Biochemistry by Donald Voet*, (4th Ed.). Publisher: John Wiley & Sons.

Books for Reference

1. Caret. *et al*. (1993). *Inorganic, Organic and Biological Chemistry*. WMC Brown.
2. Jeremy, M. B., John, L. T., & Lubert, S. (2010). *Biochemistry*, (17th Ed.). 74 Publisher: W. H. Freeman.

Websites and eLearning Sources

1. https://www.medicalnewstoday.com/articles/161547#chemistry
2. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2642958/
3. https://bio.libretexts.org/Bookshelves/Biochemistry/Fundamentals_of_Biochemistry_(Jakubowski_and_Flatt)/01%3A_Unit_I
4. _Structure_and_Catalysis/03%3A_Amino_Acids_Peptides_and_Proteins/3.01%3A_Amino_A

cids_and_Peptides

5. https://infinitabiotech.com/blog/principles-of-enzyme-catalysis/

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, the students will be able to	**Cognitive Levels (K - Level)**
CO1	able to understand physical and chemical properties of molecules as a linkage of biochemistry	**K1**
CO2	able to undertake investigations and perform analyses that provide information about biochemical questions and help to solve biochemical problems.	**K2**
CO3	students will equip themselves with the basic biochemistry techniques which can later applied for their laboratory research and also for many other industrial researches.	**K3**
CO4	understand factors affecting enzyme reactions	**K4**
CO5	recognize drugs containing tannis as active principles.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
6	**23UBO63ES03A**			**Discipline Specific Elective - 3:** Biochemistry						**5**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	2	2	3	1	3	3	2	2	2	**2.2**
CO2	3	2	2	1	2	2	3	1	2	3	**2.1**
CO3	1	2	3	2	3	2	3	2	3	2	**2.3**
CO4	1	2	2	3	1	2	3	2	2	3	**2.1**
CO5	2	2	1	2	3	2	3	2	2	3	**2.2**
										Mean Overall Score	**2.2 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	23UBO63ES03B	**Discipline Specific Elective - 3:** Agricultural Botany	5	3

Course Objectives
To understand the scope and importance of various branches of agriculture.
To gain knowledge in agricultural development at global level.
To acquire skills of various crops cultivation in India.
To classify various agricultural operational procedures of various crops.
To prioritize various harvesting procedures.

UNIT I: Introduction to Agriculture **(15 Hours)**

Agriculture - Definition - Importance and scope - Branches of agriculture- Agronomy - Definition - Meaning and scope. National and International Agricultural Research Institutes. Indian economy - National income.

UNIT II: History of Agriculture Development **(15 Hours)**

Evolution of human beings and agriculture - Era of civilization- Importance of Neolithic civilization - History of Agricultural development in world and India - Agriculture in ancient India -- Development of scientific Agriculture - Stages of agriculture development - Chronological agricultural technology development in India.

UNIT III: Crop Classification and Crop Production **(15 Hours)**

Crops and their classification-Major crops of India and TamilNadu-Economic importance. Major soil types of India and Tamil Nadu. Factors affecting crop production - climate - edaphic- biotic - physiographic and socioeconomic factors - Agricultural seasons of India and Tamil Nadu. Tillage - Definition - Types- Objectives - Modern concepts of tillage.

UNIT IV: Basic Agricultural Operations **(15 Hours)**

Seed treatment. Nursery. Sowing methods. Germination - Factors affecting germination. Plant population and geometry - effect on growth and yield. After cultivation - Thinning - Gap filling. Weeds - Definition - Beneficial and Harmful effects of weed. Irrigation and its role on plant growth. Manures and fertilizers - Time and methods of application.

UNIT V: Harvesting and Storage **(15 Hours)**

Maturity symptoms of field crops - methods of harvesting - Cleaning and drying -methods of storage. Current stream of developments.

Teaching Methodology	Chart, PPT, Chalk and talk.

Books for Study

1. Rao, S. G. B., Thiruppathi, M., Kumar, R., & Kumar, S. M. P. (2015). *Basic Agronomy*. Manibharathi Publications.
2. Chandrasekaran, B., Annadurai, K., & Somasundaram, E. (2010). *A Textbook of Agronomy*. New Age International Publishers.

Books for Reference

1. Balasubramaniyan, P. & SP. Palaniappan. (2010). *Principles and Practices of Agronomy*. Agrobios.
2. ICAR. (2011). *Handbook of Agriculture*. Indian Council of Agricultural Research.
3. Panda, S.C. (2010). *Agronomy*. Agro bios (India).
4. Reddy, Y. T. & Reddi, S. G. H. (2010). *Principles of Agronomy*. Kalyani Publishers.

Websites and eLearning Sources

1. http://www.dphu.org/uploads/attachements/books/books_2248_0.pdf
2. https://www.scribd.com/doc/119183030/principles-of-agronomy-andagrometerology
3. http://www.newagepublishers.com/samplechapter/001757.pdf
4. http:// www.sun.worldcat.org/title/principles of agronomy/oclc/689265

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, the students will be able to	**Cognitive Levels (K-Level)**
CO1	demonstrate the knowledge of, and need for sustainable development	**K1**
CO2	develop innovative processes, products, and technologies to meet the challenges in agriculture and farming practices.	**K2**
CO3	understand the impact of the professional agricultural solutions in societal and environmental contexts	**K3**
CO4	recognize and examine the relationships between inputs and outputs in their agricultural fields to make effective and profitable decisions.	**K4**
CO5	understand mechanics of agri-preneurship	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**							**Hours**	**Credits**
6	**23UBO63ES03B**		**Discipline Specific Elective - 3:** Agricultural Botany							**5**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	3	2	2	3	2	2	3	2	**2.4**
CO2	2	3	2	3	2	2	3	2	2	1	**2.2**
CO3	2	2	3	2	3	3	3	2	3	2	**2.4**
CO4	3	3	2	3	1	3	3	2	3	1	**2.4**
CO5	2	2	1	2	1	2	2	1	2	1	**1.6**
Mean Overall Score											**2.2 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	23UBO63ES04A	**Discipline Specific Elective - 4:** Medicinal Botany	5	3

Course Objectives
To acquire the knowledge about understanding of principle and efficacy of various Indian system of medicines.
To learn the identification, pharmacological importance and processing of medicinal plants based on their classification and characterization.
To analyze the suitable conservation method for medicinal plants using modern biotechnology tools to ensure the sustainable utilization.
To evaluate the medicinal plants based drug efficacy and its various applications for different ailments
To create new methods for identification and characterization of drug adulteration and formulations for the human welfare.

UNIT I **(15 Hours)**

Medicinal Plants: History, Scope and Importance. Traditional medicinal systems: Ayurvedha, Siddha, Naturopathy, Aromatherapy and Acupuncture. Definition of drug classification of natural drugs: Alphabetical, Morphological, Taxonomical, Chemical and pharmacological.

UNIT II **(15 Hours)**

Ethnobotany: definition, major tribes of South India and their ethno botanical heritage. Ethnobotany and conservation of plants with special reference to India. Mythology and conservation of ecosystems (sacred groves). Role of ethnic groups in conservation of medicinal plant genetic resources. Endangered taxa and forest management.

UNIT III **(15 Hours)**

Cultivation, collection and preparation of natural drugs macroscopic (physical and organoleptic characters), therapeutic and pharmaceutical characterization of the following medicinal plants: *Adathoda vasica, Aloe vera, Centella asiatica, Piper nigrum, Allium sativum, Curcuma longa, Ocimum sanctum and Catharanthes roseus.* Conservation of endangered and endemic medicinal plants using Plant Tissue Culture.

UNIT IV **(15 Hours)**

Drugs from leaves (Eucalyptus), flower (Eugenia), fruits and seeds (Coriander), roots (Withania), underground stem (Ginger), bark (Cinchona) and wood (Ephedra). Cultivation and utilization of selected medicinal plants *Bacop amonnieri, Cassia senna, Andrographis paniculata, Gloriosa superba, Phyllanthus amarus and Rauvolfia serpentina.*

UNIT V **(15 Hours)**

Drug adulteration and types. Drug evaluation: physical, chemical and biological. Quality control of herbal drugs. Role of NMPB, AYUSH and CDRI.

Teaching Methodology	Chart, PPT, Chalk and talk.

Book for Study

1. Gokhale, S. B., Kokate, C. K., & Purohit, A.P. (2003). *Pharmacognosy*. NiraliPrakashan.

Books for Reference

1. Bhattacharjee, S. K. (2004). *Hand Book of Medicinal plants*. Pointer Publishers.
2. Harbourne, J. B. (1998). *Phytochemical methods: A Guide to Modern Techniques of Plant Analysis,* (3rd Ed.). Chapman and Hill Co.
3. Joshi, S. G. (2001). *Medicinal plants*. Oxford & IBH Publishing Co. Pvt. Ltd.
4. Arber, A. (1999). *Herbal plants and Drugs*. Mangal Deep Publications.

Websites and eLearning Sources

1. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3358962/
2. https://faculty.washington.edu/stevehar/Ethnobotany.pdf

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, the students will be able to	**Cognitive Levels (K-Level)**
CO1	know about history and relevance of herbal drugs in Indian system of medicine	**K1**
CO2	Know about the major and minor ethnic groups or Tribals of India, and their life styles.	**K2**
CO3	get awareness on the conservation practices of medicinal plants	**K3**
CO4	understand the techniques for drug evaluation (Chemical, Physical and Biological), Phytochemical investigations, standardization and quality control of herbal drugs	**K4**
CO5	know the technique of medicinal gardening - Cultivation practices, marketing and utilization of selected medicinal plants	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**							**Hours**	**Credits**
6	**23UBO63ES04A**		**Discipline Specific Elective - 4:** Medicinal Botany							**5**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	3	1	3	3	3	1	2	2	**2.3**
CO2	2	2	3	2	2	1	3	3	2	3	**2.3**
CO3	3	3	3	2	3	1	3	3	2	3	**2.6**
CO4	3	1	3	2	3	2	3	1	2	2	**2.2**
CO5	2	3	2	2	3	1	1	2	3	3	**2.2**
Mean Overall Score											**2.32 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	23UBO63ES04B	**Discipline Specific Elective - 4:** Biological Techniques	5	3

Course Objectives
To learn the microtechnique preparation of slides
To understand the stain preparation and staining techniques
To study about the specimen preservation techniques
To understand about the organic farming development techniques
To know about the various clinical and immunological tests

UNIT I **(15 Hours)**

Microtechniques - selection of material, fixation, fixation images- acid and basic. Preparation of permanent slide-Dehydration process, Infiltration of wax, embedding, sectioning (microtome), mounting. Leaf clearing, smear and squash techniques.

UNIT II **(15 Hours)**

Stains: Classification- single, double, triple staining. Florescent image processing Nuclear, cytoplasmic, cell wall stains and their rationale. Herbarium - collection, drying, pasting of plant specimen, Protection of Herbarium- importance.

UNIT III **(15 Hours)**

Techniques of the preparation of vertebrate skeletons and transparency preparations (Alizarian red) cartilage staining, museum techniques: dry and wet preparation. Taxidermy Arthropod squash. Blood grouping ABO and Rh, blood smear preparation. Haemocytometer.

UNIT IV **(15 Hours)**

Earthworm and its types. Preparatory methods of vermiculture techniques. Vermin compost - panchakavia; fish extract, Economic and ecological importance of vermicompost. Biofertilizers- Cultivation of Spirulina and Scenedesmus. Animal rearing: albino rats, rabbits and fruit fly.

UNIT V **(15 Hours)**

PCR - principles, technique and applications- Types of PCR -Reverse Transcriptase (RT) Blotting techniques -Northern. DNA finger printing and barcoding. Immunological test - WIDAL, RPR, RF and ELISA.

Teaching Methodology	Chart, PPT, Chalk and talk & Instrumentation and Museum visit.

Books for Study

1. Yadav, P. R. (2006). *Biological Techniques*. Discovery Publishing House.
2. Swargiary, A. (2017). *Biological Tools & Techniques*. Kalyani Publishers.

Books for Reference

1. Ramakrishnan, S. (2012). *Manual of Medical Laboratory Techniques*. Jaypee Brothers Medical Publishers.

Websites and eLearning Sources

1. https://nios.ac.in/media/documents/dmlt/HC/Lesson-20.pdf
2. https://www.sciencedirect.com/science/article/pii/S2405580819303449
3. https://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture_notes/med_lab_tech_students/serology.pdf
4. https://www.ndvsu.org/images/StudyMaterials/Micro/Stains---staining.pdf
5. https://faculty.ksu.edu.sa/sites/default/files/plant_microtechniqe_part_1_a_0.pdf

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, the students will be able to	**Cognitive Levels (K-Level)**
CO1	understand the various micro techniques in biology.	**K1**
CO2	learn the principles and applications of microscopy.	**K2**
CO3	construct immunological techniques and applications.	**K3**
CO4	distinguish and identify techniques used to preserve organisms in museum.	**K4**
CO5	prepare biofertilizers and animal rearing.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
6	**23UBO63ES04B**			**Discipline Specific Elective - 4:** Biological Techniques						**5**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	2	1	2	2	3	2	1	2	**2.1**
CO2	2	3	2	2	3	2	3	2	2	1	**2.2**
CO3	2	2	3	2	1	2	2	3	2	2	**2.1**
CO4	1	2	2	3	2	1	3	2	3	2	**2.1**
CO5	1	2	2	3	2	2	3	2	2	3	**2.2**
										Mean Overall Score	**2.1 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	23UBO63CE01	Comprehensive Examination	-	2

Course Objectives
To assess the student's knowledge of the area of specialization
To evaluate the ability of a student to formulate an original research problem
To Comprehensiveness and relevance
To present the knowledge, skills and practical they undertake
To show their deep understanding of concepts related to their field of study

UNIT I

Classification, structure and reproduction of Algae, Fungi, Lichens, Bryophytes, Pteridophytes and Gymnosperms, Plant diseases and defense mechanism. Ecology and Evolutionary trends. Bionomial nomenclature, Numerical Taxonomy and Chemotaxonomy, Tissues, totipotency, properties of wood; Microsopogenesis, megasporogenesis, double fertilization and polyembryony.

UNIT II

Cell Biology - Cell as a unit structure and function, Cell division: Mitosis and Meiosis Chromosomal behaviour and their cytological significance; Mendelian Genetics- linkage and crossing over, Chromosome mapping, Human genome project; Protein synthesis and gene expression, DNA replication; Polyploidy and mutations in crop improvement. Heterosis and Inbreeding Depression; theories of evolution and variations in speciation

UNIT III

Photosynthesis: mechanism and importance, Nitrogen Metabolism. Physiology of seed dormancy and germination, Plant growth Regulator, Phytochrome and its role. Biopolymers- carbohydrates, proteins and lipids; Enzyme kinetics and Mode of enzyme action. Secondary metabolites- Alakaloids, phenolics and terpenoids. Bioenergetics, redox potential and coupled reaction, photobiology.

UNIT IV

Whittaker's five kingdom concept, food spoilage and preservation, Role of microbes in waste water treatment, Biofertilizer, protoplast culture, Somatic hybrid and Cybrids. Synthetic seeds and their application, Vectors in gene cloning - Plasmids, Cosmids, Bacteriophages, fermentation as a biochemical process, Microbial Single Cell Protein (SCP) production, humoral and cellular immunity, Antibody types and immunological role.

UNIT V

Sampling techniques, Central values (mean, mode, median), T-test, Chi square Test; Concept of Ecosystem, Method of studying plant communities, Vegetation types of India, Biotic interactions - Succession and its types, Biogeochemical cycles. Ethnobotany- scope and Tribes of Tamil Nadu, Conservation - in situ and ex situ conservation.

Teaching Methodology	Chart, PPT, Chalk and talk.

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, the students will be able to	**Cognitive Levels (K-Level)**
CO1	engage theory in light of a given topic, issue, or problem and vice-versa	**K1**
CO2	substantive knowledge of theories, concepts, and methodologies	**K2**
CO3	demonstrate the Intellectual maturity in study area	**K3**
CO4	maximize their time and performance	**K4**
CO5	think critically and the ability to articulate reflective and knowledgeable responses to challenging questions.	**K5**