

# Dr. N.G.P. ARTS AND SCIENCE COLLEGE

(An Autonomous Institution, Affiliated to Bharathiar University, Coimbatore)

Approved by Government of Tamil Nadu and Accredited by NAAC with 'A++' Grade (3rd Cycle-3.64 CGPA)

Dr. N.G.P. - Kalapatti Road, Coimbatore-641048, Tamil Nadu, India

Web: www.drngpasc.ac.in | Email: info@drngpasc.ac.in | Phone: +91-422-2369100

Regulations 2023-24 for Under Graduate Programme (Outcome Based Education model with Choice Based Credit System)

## **B.Sc. Biotechnology Degree**

(For the students admitted during the academic year 2023-24 and onwards)

Programme: Biotechnology

## Eligibility:

A candidate who has passed in Higher Secondary Examination with any Academic Stream or Vocational Stream as one of the subjects under Higher Secondary Board of Examination and as per the norms set by the Government of Tamil Nadu or an Examination accepted as equivalent thereto by the Academic Council, subject to such conditions as may be prescribed thereto are permitted to appear and qualify for the **Bachelor of Biotechnology Degree Examination** of this College after a programme of study of three academic years.

## **Programme Educational Objectives:**

The Curriculum is designed to attain the following learning goals which students shall accomplish by the time of their graduation:

- 1. To demonstrate a substantial understanding of concepts in key areas of Biotechnology and its applications.
- 2. To supplement the academic input of students by way of seminars, conferences, guest lectures and industrial visits.
- 3. To describe the common methods and applications of biotechnology with regards to microorganisms, plants, animals and Pharma industries.

# PROGRAMME OUTCOMES:

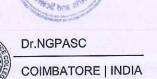
On the successful completion of the program, the following are the expected outcomes.

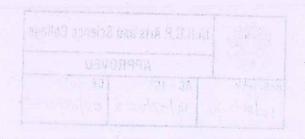
outcomes.	
PO Number	PO Statement
PO1	Students will be able to identify, analyze and understand problems related to biotechnology and finding valid conclusions with basic knowledge in biotechnology.
PO2	Graduates will be able to justify societal, health, safety and legal issues and understand his responsibilities in biotechnological practices.
PO3	Provide education that leads to comprehensive understanding of the principles and practices of biotechnology that will help to undertake any responsibility as an individual and as a team in a multidisciplinary environment.
PO4	Graduates will be able to demonstrate knowledge of project management when dealing with Biotechnology problems.
PO5	Students will possess hands-on technical skills necessary for supporting biotechnology research activity and empower students with the ability to think and solve problems in the field of biotechnology.

# Credit Distribution Pattern for UG Programme:

Part	Subjects	No.of Papers	Credit	Semester No.
I	Tamil / Hindi / French/Malayalam	4	$4 \times 3 = 12$	I to IV
II	English	4	$4 \times 3 = 12$	I to IV
	Core (Credits 2,3,4,5)	16-19	70	I to VI
Ш	Inter Departmental Course (IDC)	4	16	I to IV
	Discipline Specific Elective (DSE)	3	3 x 4 =12	V & VI
	Skill Enhancement Course (SEC)	4	8	III ,IV,V& VI
	Industrial Training	1	2	V
	Environmental Studies(AECC)	1	2	I
IV	Basic Tamil/ Advanced Tamil/ Human Rights & Womens' Rights (AECC)	1	2	II
	Generic Elective (GE) (AEEC)	1	2	V
	Innovation &IPR/ Innovation, IPR & Entrepreneurship (AECC)	1	2	VI
V	NSS/NCC/YRC/RRC/Yoga/ Sports/Clubs		2	I -II
	TOTAL		142	







## CURRICULUM

# B. Se BIOTECHNOLOGY

Course Code	Course	Course Name			••	Exam	N	Iax Ma	rks	
Course Code	Category	Course Name	L	Т	P	(h)	CIA	ESE	Total	Credits
First Semester			Ÿ							
Part-I										
231TL1A1TA/ 231TL1A1HA/ 231TL1A1MA/ 231TL1A1FA	Language-I	Tamil-I / Hindi- I/ Malayalam-I/ French-I	4	1	1.3	3	25	75	100	3
Part-II										
231EL1A1EA	Language-II	English – I	4	,	1	3	25	75	100	3
Part-III		w = -1			7		- 154	* 1		
233BT1A1CA	Core - I	Cell Biology	4	1		3	25	75	100	4
233BT1A1CB	Core - II	Biochemistry	4	1	-	3	25	75	100	3
233BT1A1CP	Core Practical - I	Cell Biology and Biochemistry	•	,	4	6	40	60	100	2
232CE1A1IB	IDC - I	Chemistry	4	,	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	3	25	75	100	4
Part-IV								- 45	gar.	
233MB1A1AA	AECC - I	Environmental studies	2	,	-		50	The second second	50	2
Part - V		188 <u>1</u> 2	,				,			
233BT1A1XA	Extension Activity	NSS/NCC/YRC/ RRC/Yoga/Sports			Section 19	5 <u>5</u>	50	-	50	1
	Total		22	3	5				700	22

BoS Chairman/HoD
Department of Biotechnology
Dr. N. G. P. Arts and Science College
Coimbatore — 641 048

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Dr.NGPASC

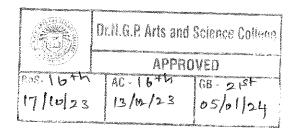
	Course		•	·		E	N	1ax Mar	ks	,
Course Code	Course	Course Name	L	Т	P	Exam (h)	CIA	ESE	Total	Credits
Second Semester										
Part-I										
231TL1A2TA/ 231TL1A2HA/ 231TL1A2MA/ 231TL1A2FA	Language - I	Tami-II/Hindi- II/Malayalam- II/French-II	4	1	1	3	25	75	100	· 3
Part-II				,						
231EL1A2EA	Language - II	English – II	4	1	1	3	25	75	100	3
Part-III										
233BT1A2CA	Core - III	Genetics	4	1	-	3	25	75	100	4
233BT1A2CB	Core - IV	Microbiology	4	1	1	3	25	75	100	3
233BT1A2CP	Core Practical - II	Genetics and Microbiology	-	-	4	6	40	60	100	2
234CS1A2IB	IDC - II	Python for Biologists	4	1		3	25	75	100	4
Part-IV										
231TL1A2AA/ 231TL1A2AB/ 235CR1A2AA	AECC - II	Basic Tamil/ Advance Tamil /Human Rights and Women's Rights	2	-		-	50	-	50	2
Part-V									· · · · · · · · · · · · · · · · · · ·	
233BT1A2XA	Extension Activity	NSS/NCC/YRC/ RRC/Yoga/Sports	-		-	_	50	-	50	1
Total			22	3	5				700	22

HoS Chairman/HoD

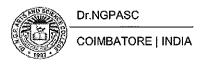
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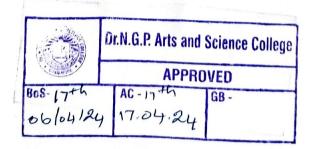




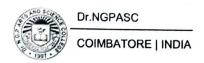


Course Code	Course	Course Name	L	Т	P	Exam	Max Marks			Credits
Course Cour	Category	Course Ivanie		_	_	(h)	CIA	ESE	Total	Credits
Third Semester										
Part-I										
231TL1A3TA/ 231TL1A3HA/ 231TL1A3MA/ 231TL1A3FA	Language - I	Tamil-III/ Hindi-III/ Malayalam-III/ French-III	3	1	-	3	25	75	100	3
Part-II										
231EL1A3EA	Language - II	English – III	3	1	-	3	25	<i>7</i> 5	100	3
Part-III										
233BT1A3CA	Core - V	Molecular Biology	4	-	-	3	25	75	100	4
233BT1A3CB	Core - VI	Biodiversity	4	-	-	3	25	75	100	4
233BT1A3CP	Core Practical - III	Molecular Biology and Biodiversity	-	-	4	6	40	60	100	2
232MT1A3IE	IDC - III	Basic Mathematics	4	-	•	3	25	75	100	4
233BT1A3EP	SEC Practical - I	Biotechniques	2	<u>-</u>	4	6	40	60	100	2
	Total		20	2	8			JA, I	700	22

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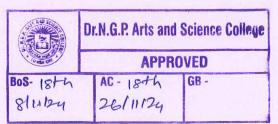




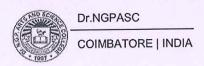
	Course				D	Exam	M	lax Mar	ks	Credits	
Course Code	Category	Course Name	L	T	P	(h)	CIA	ESE	Total	Cleuits	
Fourth Semester	, , , , , , , , , , , , , , , , , , ,				120					**	
Part-I											
231TL1A4TA/ 231TL1A4HA/ 231TL1A4MA/ 231TL1A4FA	Language - I	Tamil-IV/ Hindi-IV/ Malayalam-IV/ French-IV	3	1	-	3	25	75	100	3	
Part-II							1				
231EL1A4EA	Language - II	English – IV	3	1		3	25	75	100	3	
Part-III									7		
233BT1A4CA	Core - VII	Immunology	5	-	-	3	25	75	100	5	
233BT1A4CB	Core - VIII	Bioinformatics	4	-	-	3	25	75	.100	4	
233BT1A4CP	Core Practical - IV	Immunology and Bioinformatics	-	-	4	6	40	60	100	2	
232PY1.A4IA	IDC - IV	Biophysics	4	-	-	3	25	75	100	4	
233BT1A4EP	SEC Practical- II	Recombinant DNA Technology	2	-	3	6	40	60	100	2	
Total			21	2	7				700	23	

Bos Chairman/HoD

Department of Biotechnology Dr. N. G. P. Arts and Science College Coimbatore — 641 048







Course Code	Course	Course Name	L	Т	P	Exam	N	Iax Ma	rks	C 1"
Course Coue	Category	Course Name	L	1	(h)		CIA	ESE	Total	Credits
Fifth Semester										
Part-III										
233BT1A5CA	Core - IX	Plant and Animal Biotechnology	4	1		- 3	25	75	100	5
233BT1A5CB	Core - X	Environmental Biotechnology	4	1		- 3	25	75	100	5
233BT1A5CC	Core - XI	Entrepreneurial Biotechnology	4	1		- 3	25	75	100	5
233BT1A5CP	Core Practical - V	Plant, Animal and		-	6	6	40	60	100	3
233BT1A5SA	SEC - III	Bioprocess Technology	3	1		3	25	75	100	2
233BT1A5DA		Clinical Trials	100	İ	1		7 11	g = = 1/10 <sup>1</sup>	21 10.7	-
233BT1A5DB	DSE - I	Bioethics & Bio safety	4	-	- ,	- 3	25	75	100	4
233BT1A5DC	DSE-1	Molecular Signaling								
233BT1A5TA	IT	Industrial Training	-	-	-	3	40	60	100	2
art IV								71. 30		Allered
	GE		2	-	-	3	50	-	50	2
Total			21	3	6				750	28

	Course					Exam	M	Iax M	arks	Credits	
Course Code	Category	Course Name	L	T	P	(h)	CIA	ESE	Total	Creuro	
Sixth Semester											
Part-III											
233BT1A6CA	Core - XII	Genomics and Proteomics	4	1	-	3	25	75	100	5	
233BT1A6CB	Core - XIII	Bionanotechnology	4	1	-	3	25	75	100	5	
233BT1A6CP	Core Practical - VI	Genomics, Proteomics and Bionanotechnology		-	6	6	40	60	100	3	
233BT1A6SA	SEC - IV	Stem Cell Technology	4	1	1	3	25	75	100	2	
233BT1A6DA		Drug Design & Delivery				Till.					
233BT1A6DB	DSE - II	Biomaterials	4	-	-	3	25	75	100	4	
233BT1A6DC	BUL II	Synthetic Biology									
233BT1A6DD		Biomarker Technology									
233BT1A6DE	DSE - III	Molecular Diagnostics	4	-	-	3	25	75	100	4	
233BT1A6DF		Food Technology									
Part-IV								1			
235BI1A6AA	AECC -III	Innovation and IPR	2	-		3	50	-	50	2	
Total			22	2	6				650	25	
Grand Total									4200	142	

# DISCIPLINE SPECIFIC ELECTIVE

Students shall select the desired course of their choice in the listed elective course during Semesters V & VI

# Semester V (Elective I)

## **List of Elective Courses**

S. No.	Course Code	Name of the Course
1	233BT1A5DA	Clinical Trials
2	233BT1A5DB	Bioethics & Bio safety
3	233BT1A5DC	Molecular Signaling

## Semester VI (Elective II)

## **List of Elective Courses**

S. No.	Course Code	Name of the Course
1	233BT1A6DA	Drug Design & Delivery
2	233BT1A6DB	Biomaterials
3	233BT1A6DC	Synthetic Biology

# Semester VI (Elective III)

#### **List of Elective Courses**

S. No.	Course Code	Name of the Course
1	233BT1A6DD	Biomarker Technology
2	233BT1A6DE	Molecular Diagnostics
3	233BT1A6DF	Food Technology

## GENERIC ELECTIVE COURSES (GE)

# The following are the courses offered under Generic Elective Course

## Semester V (GE-I)

S. No.	Course Code	Course Name
1	233BT1A5GA	Mushroom Technology

## **EXTRACREDITCOURSES**

# The following are the courses offered under self study to earn extra credits:

### Semester III

S. No.	Course Code	Course Name
1	233BT1ASSA	Biofertilizer Technology
2	233BT1ASSB	Environmental Management

#### **CERTIFICATE COURSES**

S. No.	Course Code	Course Name
1	233BT5A1CA	Plant Tissue Culture
2	233BT5A2CA	Molecular Diagnosis

## **UG-REGULATION (R5)**

## (2023-24 and onwards)

# (OUTCOME BASED EDUCATION WITH CBCS)

### 1.NOMENCLATURE

- **1.1 Faculty**: Refers to a group of programmes concerned with a major division of knowledge Eg. Faculty of Computer Science consists of disciplines like Departments of Computer Science, Information Technology, Computer Technology, Computer Applications, Data Analytics, Cognitive Systems, Artificial Intelligence and Machine Learning and Cyber Security
- **1.2 Programme**: Refers to the Bachelor of Science / Commerce / Arts stream that a student has chosen for study.
- **1.3 Batch**: Refers to the starting and completion year of a programme of study. Eg. Batch of 2023–26 refers to students belonging to a 3 year Degree programme admitted in 2023 and completing in 2026.
- **1.4 Course**: Refers to component of a programme. A course may be designed to involve lectures / tutorials / laboratory work / seminar / project work/ practical training / report writing / Viva- voce, etc., or a combination of these, to meet effectively the teaching learning needs.
  - a) Core Course: A course, which should compulsorily be studied by a candidate as a core requirement
  - b) Inter Disciplinary Course (IDC): A course chosen generally from a related discipline/subject with an intention to seek exposure in the discipline relating to the core domain of the student
  - c) Discipline Specific Elective (DSE) Course: Elective courses offered under main discipline/ subject of study.
  - d) Skill Enhancement Courses (SEC): Value-based and/or skill-based courses which are aimed at providing hands-on-training, competencies, skills, etc.
  - e) Ability Enhancement Compulsory Courses (AECC): Mandatory courses that lead to Knowledge enhancement. Environmental Science, Human Rights and Women's Rights, Basic Tamil/ Advanced Tamil, Innovation and IPR, Innovation, IPR and Entrepreneurship.
  - f) Ability Enhancement Elective Course (AEEC)/Generic Elective (GE) An elective course chosen generally from an unrelated discipline/subject, with an intention to seek exposure is Generic Elective.

### 1.5 Project Work:

Course involving application of knowledge in problem solving / analyzing /exploring a real life situation / difficult problem. The Project work will be given in lieu of a Core paper.

## Internship/Industrial Training

Students must undertake industrial / institutional training for a minimum of 15 days during the IV semester summer vacation. The students will submit the report for evaluation during V semester.

#### 1.6 Extra Credits:

Extra credits shall be awarded for achievements in identified curricular/co-curricular/Extracurricular activities executed outside the regular class hours. Extra credits are not mandatory for completing the programme.

## 2. STRUCTURE OF PROGRAMME

#### 2.1 PART- I: LANGUAGE- I

Tamil or any one of the languages namely Malayalam, Hindi and French will be offered under Part – I in the first four semesters.

#### 2.2 PART- II: LANGUAGE- II

English will be offered during the first four semesters.

#### 2.3 PART-III:

- Core Course
- Inter Departmental Course (IDC)
- Discipline Specific Elective (DSE)
- Skill Enhancement Course (SEC)
- Industrial Training (IT)

#### 2.4 PART- IV:

# 2.4.1 Ability Enhancement Compulsory Course (AECC):

The Ability Enhancement Compulsory Courses such as i)Environmental Studies, ii) Human Rights and Womens' Rights, iii) Innovation and IPR/ Innovation, IPR and Entrepreneurship are offered during I,II and VI Semester.

#### **Basic Tamil**

a) Those who have not studied Tamil up to XII Std and taken a non-Tamil language under Part-I shall take oneBasic Tamil coursein the second semester.

(OR)

### Advanced Tamil

b) Those who have studied Tamil up to XII Std and taken a non-Tamil language under Part-I shall take one Advanced Tamil course in the second semester.

**Note:** Students who come under the above a+b categories are exempted from Human Rights and Women's Rights in the second semester.

Ability Enhancement Elective Course (AEEC)/Generic Elective (GE) An elective course chosen generally from an unrelated discipline/subject, with an intention to seek exposure is Generic Elective offered in V semester. (Theory/Practical/Non-Lab Practical)

# 2.5 PART- V: EXTENSION ACTIVITIES

The following extracurricular activities like NSS/YRC/NCC/RRC/Yoga/Sports/Clubs are offered under extension activities during semester I & II. Students will be evaluated based on their active participation in any one of the above activities. 75% Attendance is compulsory for extension activity.

## 3. CREDIT ALLOTTMENT

The following is the credit allotment:

Lecture Hours (Theory) : 1 credit per lecture hour per week

Laboratory Hours : 1 credit for 2 Practical hours per week

Project Work : 1 credit for 2 hours of project work per week

# 4. DURATION OF THE PROGRAMME

The B.A. /B.Com./B. Sc. Programme must be completed within 3 years (6 semesters) and a maximum of 6 years (12 semesters) from the date of acceptance to the programme. If not, the candidate must enroll in the course determined to be an equivalent by BoS in the most recent curriculum recommended for the Programme.

# 5.REQUIREMENTS FOR COMPLETION OF A SEMESTER

Every student shall ordinarily be allowed to keep terms for the given semester in a program of his/ her enrolment, only if he/ she fulfills at least seventy five percent (75%) of the attendance taken as an average of the total number of lectures, practicals, tutorials, etc. wherein short and/or long excursions/field visits/study tours organised by the college and supervised by the faculty as envisaged in the syllabus shall be credited to his/her attendance. Every student shall have a minimum of 75% as an overall attendance.

#### 6. EXAMINATIONS

The end semester examinations shall normally be conducted after completing 90 working days for each semester. The maximum marks for each theory and practical course shall be 100 with the following breakup:

## a) Mark distribution for Theory Courses

Continuous Internal Assessment (CIA) : 25 Marks

End Semester Exams (ESE) : 75 Marks

Total : 100 Marks

## i) Distribution of Internal Marks

S.No.	Particulars	Distribution of Marks	
1	CIA I (2.5 Units) (On completion of 45th working day)	5	
2	Model ( All 5 Units) (On completion of 85 <sup>th</sup> working day)	, 5	
3	Attendance	5	
4	Library Usage	5	
5	Skill Enhancement *	5	
	THE COLUMN TWO IS NOT	OF.	

Total 25

## **Breakup for Attendance Marks:**

S.No	Attendance Range	Marks Awarded
1	95% and Above	5
2	90% - 94%	4
3	85% - 89%	3
4	80% - 84%	2
5	75% - 79%	1

#### Note:

Special Cases such as NCC, NSS, Sports, Advanced Learner Course, Summer Fellowship and Medical Conditions etc. the attendance exemption may be given by principal and Mark may be awarded.

# Break up for Library Marks:

S.No	Attendance Range	Marks Awarded
1	10h and above	5
2	9h- less than 10h	4
3	8h - less than 9h	3
4	7h - less than 8h	2
5	6h – less than 7h	1

#### Note:

In exception, the utilization of e-resources of library will be considered.

# \*Components for "Skill Enhancement" may include the following:

Class Participation, Case Studies Presentation/term paper, Field Study, Field Survey, Group Discussion, Term Paper, Presentation of Papers in Conferences, Industry Visit, Book Review, Journal Review, e-content Creation, Model Preparation, Seminar and assignment.

# Components for Skill Enhancement

Any one of the following should be selected by the course coordinator

S.No.	Skill Enhancement	Description
1	Class Participation	<ul><li>Engagement in class</li><li>Listening Skills</li><li>Behaviour</li></ul>
2	Case Study Presentation/ Term Paper	<ul> <li>Identification of the problem</li> <li>Case Analysis</li> <li>Effective Solution using creativity/imagination</li> </ul>
3	Field Study	<ul> <li>Selection of Topic</li> <li>Demonstration of Topic</li> <li>Analysis &amp; Conclusion</li> </ul>
4	Field Survey	<ul> <li>Chosen Problem</li> <li>Design and quality of survey</li> <li>Analysis of survey</li> </ul>
5	Group Discussion	<ul> <li>Communication skills</li> <li>Subject knowledge</li> <li>Attitude and way of presentation</li> <li>Confidence</li> <li>Listening Skill</li> </ul>
6	Presentation of Papers in Conferences	<ul> <li>Sponsored</li> <li>International/National</li> <li>Presentation</li> <li>Report Submission</li> </ul>
7,	Industry Visit	<ul><li>Chosen Domain</li><li>Quality of the work</li></ul>

		<ul><li>Analysis of the Report</li><li>Presentation</li></ul>
8	Book Review	<ul> <li>Content</li> <li>Interpretation and Inferences of the text</li> <li>Supporting Details</li> <li>Presentation</li> </ul>
9	Journal Review	<ul> <li>Analytical Thinking</li> <li>Interpretation and Inferences</li> <li>Exploring the perception if chosen genre</li> <li>Presentation</li> </ul>
10	e-content Creation	<ul> <li>Logo/ Tagline</li> <li>Purpose</li> <li>Content (Writing, designing and posting in Social Media)</li> <li>Presentation</li> </ul>
11	Model Preparation	<ul><li>Theme/ Topic</li><li>Depth of background Knowledge</li><li>Creativity</li><li>Presentation</li></ul>
12	Seminar	<ul><li>Knowledge and Content</li><li>Organization</li><li>Understanding</li><li>Presentation</li></ul>
13	Assignment	<ul><li>Content and Style</li><li>Spelling and Grammar</li><li>References</li></ul>

ii) Distribution of External Marks (ESE)

Total Written Exam: 75

75

Marks Distribution for Practical course

100 Total 40 Internal: External:

# i) Distribution of Internals Marks

S.No.	Particulars	Distribution of Marks
1	Experiments/Exercises	2 State attor of Walks
2	Test 1	15
3	Test 2	10
4	Observation Notebook	10
- (a <mark>.*</mark>	Observation inotebook	05

Total 40

# ii) Distribution of Externals Marks

S.No.	Particulars		
1	•		<b>External Marks</b>
1	Practical		40
2	Record	29 (24.5)- 4-	10
3	Viva- voce		10
		Total	60

Practical examination shall be evaluated jointly by Internal and External Examiners

# Mark Distribution for Project/ Internship/ Industrial Training

Total 100 Internal 40 External: 60

# i) Distribution of Internal Marks

S.No.	Particulars	Internal Marks
1	Review I	15
2	Review II	20
3	Attendance	5

Total 40

# ii) Distribution of External Marks

S.No Particulars	External Marks
Project Work / Internship / Industrial training Presentation	40
2 Viva -voce	20

Lotal

Evaluation of Project Work/Internship/ Industrial training shall be shall be done jointly by Internal and External Examiners.

#### 7. Credit Transfer

**a.** Upon successful completion of **1 NPTEL** Course (**4 Credit Course**) recommended by the department, during Semester I to IV, a student shall be eligible to get exemption of one **4 credit course** during the V or VI semester. The proposed NPTEL course should cover content/syllabus of exempted core paper in V orVI semester.

S. No.	Course Code	Course Name	Proposed NPTEL Course	Credit
1			Option – 1 Paper title	4
			Option – 2 Paper title	
			Option - 3 Paper title	

b. Upon successful completion of 2 NPTEL Courses (2 Credit each) recommended by the department, during Semester I to IV, a student shall be eligible to get exemption of one 4 credit course during the V or VI semester. Out of 2 NPTEL proposed courses, atleast 1 course should cover content/syllabus of exempted core paper in V orVI semester.

### Mandatory

The exempted core paper in the V or VI semester should be submitted by the students for approval before the end of  $4^{th}$  semester

Credit transfer will be decided by equivalence committee

S. No.	Course Code	Course Name	Proposed NPTEL Course	Credit
1			Option – 1 Paper title	
			Option – 2 Paper title	2
			Option - 3 Paper title	
2			Option – 1 Paper title	2
			Option – 2 Paper title	
			Option – 3 Paper title	

S.No.	Student Name	Class	Prop	osed NPTEL Course	Proposed Course for Exemption
			Course II	Option 1- Paper Title Option 2- Paper Title Option 3- Paper Title Option 1- Paper Title Option 2- Paper Title Option 3- Paper Title	Any one Core Paper in V or VI semester
Cla	ss Advisor			HoD	Dean

#### 8. Innovations

Upon Successful outcome of Design Thinking / Copy right/Product/ Patent by the end of the V Semester, student shall be eligible to get exemption in AECC: Innovation, IPR & Entrepreneurship / Innovation & IPR offered during VI Semester.

## 9.Internship/Industrial Training

Students must undertake industrial / institutional training for a minimum of 15 days during the IV semester summer vacation. The students shall submit the report for evaluation during V semester.

### 10. Extra Credits: 10

Earning extra credit is not essential for programme completion. Student is entitled to earn extra credit for achievement in Curricular /Co-Curricular/ Extracurricular activities carried out other than the regular class hours.

A student is permitted to earn a maximum of Ten extra Credits during the programme period.

### A maximum of 1 credit under each category is permissible.

Category	Credit
Proficiency in foreign language	1 minute view
Proficiency in Hindi	1
Self study Course	1
Typewriting/Short hand	1
CA/ICSI/CMA (Foundations)	1
CA/ICSI/CMA(Inter)	1
Sports and Games	1
Publications / Conference Presentations (Oral/Poster)	1
Lab on Project	1
Innovation / Incubation / Patent / Sponsored Projects / Consultancy	1
Representation in State / National level celebrations	1
Awards/Recognitions/Fellowships	1

Credit shall be awarded for achievements of the student during the period of study only.

#### **GUIDELINES**

### Proficiency in foreign language

A pass in any foreign language in the examination conducted by an authorized agency.

### Proficiency in Hindi

A pass in the Hindi examination conducted by Dakshin Bharat Hindi Prachar Sabha.

Examination passed during the programme period only will be considered for extra credit.

### Self study Course

A pass in the self study courses offered by the department.

The candidate should register the self study course offered by the department only in the III semester.

## Typewriting/Short hand

A Pass in short hand /typewriting examination conducted by Tamil Nadu Department of Technical Education (TNDTE) and the credit will be awarded.

## CA/ICSI/CMA(Foundations)

Qualifying foundation in CA/ICSI/CMA / etc.

## CA/ICSI/CMA(Inter)

Qualifying Inter in CA/ICSI/CMA / etc.

## **Sports and Games**

Students can earn extra credit based on their achievements in sports in University/ State / National/ International levels.

# Publications / Conference Presentations (Oral/Poster)

Research Publications in Journals oral/poster presentation in Conference

## Lab on Project (LoP)

To promote the undergraduate research among all the students, the LoP is introduced beyond their regular class hours. LoP is introduced as group project consisting of not more than five members. It consist of four stages namely Literature collection, Identification of Research area, Execution of research and Reporting / Publication of research reports/ product developments. These four stages spread over from III to IV semester.

# (Evaluation will be done internally)

# Innovation / Incubation / Patent / Sponsored Projects / Consultancy

Development of model/ Products /Prototype /Process/App/Registration of Patents/ Copyrights/Trademarks/Sponsored Projects /Consultancy

# Representation in State/ National level celebrations

State / National level celebrations such as Independence day, Republic day Parade, National Integration camp.

# Awards/Recognitions/Fellowships

Regional/ State / National level awards/ Recognitions/Fellowships

#### **GUIDELINES**

#### 100 % CIA Courses:

- AECC
- AEEC

S.No	Type of Course
1	Environmental Studies (AECC)
2	Human Rights and Women's Rights, Basic Tamil / Advanced Tamil (AECC)
3	Innovation &IPR/ Innovation, IPR and Entrepreneurship(AECC)
4	Generic Elective (AEEC)

## **Modalities for Implementing Internal Assessment Marks:**

- Student pertaining to 2023 Batch (2023-26) UG programme for the above mentioned courses shall secure a minimum of 40% out of the maximum marks in the continuous internal assessment (CIA) i.e., 20 marks out of 50 marks.
- Students who have not acquired the minimum marks shall be allowed to reappear to improve their marks in the exam components only within the time duration of the programme, in the forthcoming semesters.

#### Distribution of Internal Marks for AECC & AEEC

Theory			Practical	W L ST TILL BELL
S. No.	Particulars	Distributionof Marks	Particulars	Distributionof Marks
1	CIAI(2.5Units) (On completionof45 <sup>th</sup> workingday)	15	CIA I (Exercise 1-5)	5
2	Model(5Units)(On completionof85 <sup>th</sup> workingday)	15	CIA II (Exercise 6 - 10)	5
3	Assignment	05	Class Participation	10
4	Attendance	05	Practical Record	10
5	LibraryUsage	05	Test -III & Viva-Voce (10+10)	20
6	SkillEnhancement*	05		

**Total 50** 50

# Question paper pattern AECC & AEEC

Test	MARKS	DESCRIPTION	TOTAL	Remarks
CIA Test I	$50 \times 1 = 50 \text{ Marks}$	MCQ	50	Marks secured
1 Hour			Marks	will be Converted
First 2.5 Units				to 15 marks
CIA test II/	50 x 1 = 50 Marks	MCQ	50 Marks	Marks secured will be
Model test  1 Hour			Marks	Converted
All five Units				to 15 marks

Question paper pattern	Total Marks -50
Basic Tamil	Advanced Tamil
Section -A	Section -A
Choose the correct answer 10x2=20 Section -B	Choose the correct answer 10 x1=10 Section -B
True or false 10x2=20 Section -C	Fill in the blanks 10x2=20 Section -C
Answer in one page 1x10=10	Write an essay in two pages 2x10=20

# Question paper pattern for all other courses falling under Part I to Part III

# CIA I : [1 1/2 Hours-2.5 Units] - 25 Marks

SECTION	MARKS	DESCRIPTION	TOTAL	Remarks
Section - A	8 x 0.5 = 04 Mark	MCQ	i jarania.	Marks secured
Section - B	3 x 3 = 09 Mark	Answer ALL Questions	25 Mark	will be
Section - C	2 x 6 = 12 Mark	Either or Type ALL Questions Carry Equal Marks		converted To 5 mark

# CIA II/Model: [3 Hours-5 Units] - 75 Mark

SECTION	MARKS	DESCRIPTION	TOTAL	Remarks
Section - A Section - B	$10 \times 1 = 10 \text{ Mark}$	MCQ		Marks secured
	5 x 5 = 25 Mark	Answer ALL Questions (Either or Type Questions)	75 Mark	will be
Section - C	5 x 8 = 40 Mark	Each Questions Carry Equal Mark		converted To 5 mark



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# End Semester Examination: [3 Hours-5 Units] - 75 Mark

SECTION	MARKS	DESCRIPTION	TOTAL
Section - A	10 x 1 = 10 Mark	MCQ	
Section - B	5 x 5 = 25 Mark	Answer ALL Questions (Either or Type Questions)	75 Mark
Section - C	5 x 8 = 40 Mark	Each Questions Carry Equal Mark	Terror I

Course Code	Course Name	Category	L	Т	P	Credit
231TL1A1TA	TAMIL - I	LANGUAGE- I	4	1	-	3

#### **PREAMBLE**

This course has been designed for students to learn and understand

- மொழிப்பாடங்களின் வாயிலாக தமிழரின் பண்பாடு நாகரீகம், பகுத்தறிவு ஆகியவற்றை அறியச் செய்தல்
- ் கலை மற்றும் மரபுகளை அறியச் செய்தல்
- மாணவர்களின் படைப்பாக்கத்திறன்களை ஊக்குவித்தல்

#### **COURSE OUTCOMES**

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	வாழ்க்கைத் திறன்கள் (Life Skills)- மாணவர்களின் செயலாக்கத் திறனை ஊக்குவித்தல்	К3
CO2	மதிப்புக்கல்வி (Attitude and Value education)	K4
CO3	பாட இணைச்செயல்பாடுகள் (Co-curricular activities)	K4
CO4	சூழலியல் ஆக்கம் (Ecology)	K4
CO5	மொழி அறிவு (Tamil knowledge)	K5

#### MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	1	1	1		✓
CO2	1			✓	
CO3	1	<b>✓</b> ,			· ✓
CO4	1		<b>✓</b>		
CO5	1	2-1		<b>√</b>	✓

#### **COURSE FOCUSES ON**

✓ Skill Development	<b>√</b>	Entrepreneurial Development
Employability	<b>√</b>	Innovations
✓ Intellectual Property Rights	✓	Gender Sensitization
Social Awareness/ Environment Dr.NGPASC	<b>✓</b>	Constitutional Rights/ Human Values/ Ethics

SEMESTER I TAMIL - I 231TL1A1TA

**Total Credits:** 

Total Instruction Hours: 60 h

## **Syllabus**

#### மறுமலர்ச்சிக் கவிதைகள் Unit I

13 h

- 1. இலக்கிய வரலாறு
- 2. பாரததேசம்
- 3. படி
- 4. தமிழரின் பெருமை
- 5. தமிழ்க் கொலை புரியாதீர்
- மறுமலர்ச்சிக் கவிஞர்களின் தமிழ்ப்பணிகள்
- பாரதியார்
- பாரதிதாசன்
- நாமக்கல் கவிஞர்
- புலவர் குழந்தை

- 6. திரைத்தமிழ்
  - அ) 'விஞ்ஞானத்த வளர்க்கப் போறண்டி' எனத் தொடங்கும் பாடல் உடுமலை நாராயண கவி
  - ஆ) 'சும்மா கிடந்த நிலத்தை' எனத் தொடங்கும் பாடல் பட்டுக்கோட்டை கல்யாண சுந்தரனார்
  - இ) 'சமரசம் உலாவும் இடமே' எனத் தொடங்கும் பாடல் மருதகாசி
  - ஈ) 'உன்னை அறிந்தால்' எனத் தொடங்கும் பாடல் கண்ணதாசன்

#### Unit II புதுக்கவிதைகள்

13 h

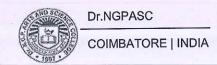
- 1. இலக்கிய வரலாறு
- 2. கடமையைச் செய்
- 3. மலையாளக் காற்று
- 4. ஒப்பிலாத சமுதாயம் 5. கன்னிமாடம்
- 6. கரிக்கிறது தாய்ப்பால்
- 7. ஐந்தாம் வகுப்பு 'அ' பிரிவு
- 8. ஹைகூ கவிதைகள்

- புதுக்கவிதையின் தோற்றமும் வளர்ச்சியும்
- மீரா
- சிற்பி
- அப்துல் ரகுமான்
- மு.மேத்தா
- ஆரூர் தமிழ்நாடன்
- நா. முத்துக்குமார்
- 10 கவிதைகள்

#### Unit III பெண்ணியம்

09 h

- 1. தொலைந்து போனேன்
- 2. நீரில் அலையும் முகம்
- 3. தற்காத்தல்
- 4. ஏனிந்த வித்தியாசங்கள் ?
- 5. புதையுண்ட வாழ்க்கை
- தாமரை
- அ. வெண்ணிலா
- பொன்மணி வைரமுத்து
- மல்லிகா
- சுகந்தி சுப்ரமணியன்



## Unit IV சிறுகதைகள்

15 h

1. இலக்கிய வரலாறு

- சிறுகதையின் தோற்றமும் வளர்ச்சியும்

2. கனகாம்பரம்

- கு.ப.ராஜகோபாலன்

3. ஆற்றங்கரைப் பிள்ளையார்

- புதுமைப்பித்தன்

4. பொம்மை

- ஜெயகாந்தன்

5. காய்ச்சமரம்

- கி. ராஜநாராயணன்

6. காட்டில் ஒருமான்

- அம்பை

7. வேட்கை

- சூர்யகாந்தன்

## Unit V பயிற்சிப் பகுதி

10 h

## அ. இலக்கணம்

1. வல்லின ஒற்று மிகும், மிகா இடங்கள் - ஒற்றுப்பிழை நீக்கி எழுதுதல்

2. ர,ற-ல,ழ,ள - ண,ந,ன வேறுபாடு - ஒலிப்பு நெறி, சொற்பொருள் வேறுபாடு அறிதல்)

## ஆ. படைப்பாக்கம்

1. கவிதை - எழுதுதல்

(15 வரிகள் முதல் 30 வரிகள் வரை)

2.சிறுகதை - எழுதுதல்

(குறைந்தது 3 பக்கங்கள்)

#### **Text Book**

தமிழ் மொழிப்பாடம் - 2022-2023, தொகுப்பு: தமிழ்த்துறை, டாக்டர் என்.ஜி.பி.

1 கலை அறிவியல் கல்லூரி, கோயம்புத்தூர் – 641048, வெளியீடு: நியூ செஞ்சுரி புக் ஹவுஸ், சென்னை – 600 098.

#### References

- 1 பேராசிரியர் புலவர் சோம. இளவரசு , எட்டாம் பதிப்பு 2014, தமிழ் இலக்கிய வரலாறு – மணிவாசகர் பதிப்பகம், சென்னை – 600 108.
- 2 பேராசிரியர் முனைவர் பாக்கியமேரி , முதற் பதிப்பு 2013 , இலக்கணம் -இலக்கிய வரலாறு - மொழித்திறன் - பூவேந்தன் பதிப்பகம், சென்னை-600 004.
- 3 இணையதள முகவரி: https://www.tamilvu.org

Course Code	. Course Name	Category	L	Т	P	Credit
231TL1A1HA	HINDI - I	LANGUAGE-1	4	1	1	3

#### **PREAMBLE**

This course has been designed for students to learn and understand

- the writing ability and develop reading skill
- the various concepts and techniques for criticizing literature
- The techniques for expansion of ideas and translation process

#### **COURSE OUTCOMES**

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Learn the fundamentals of novels and stories	K1
CO2	Understand the principles of translation work	K2
CO3	Expose the knowledge writing critical views on fiction	K2
CO4	Build creative ability	K3
CO5	Apply the power of creative reading	КЗ

## MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓			✓	✓
CO2	1	1			✓
CO3	1		1	✓	✓
CO4	<b>*</b>		<b>✓</b>	V	<b>✓</b>
CO5	<b>√</b>	1	✓		✓

#### **COURSE FOCUSES ON**

1	Skill Development	<b>✓</b>	Entrepreneurial Development
<b>✓</b>	Employability	✓	Innovations
✓	Intellectual Property Rights	· V	Gender Sensitization
✓	Social Awareness/ Environment	<b>✓</b>	Constitutional Rights/ Human Values/ Ethics



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231TL1A1HA HINDI - I SEMESTER I

**Total Credits: 3** 

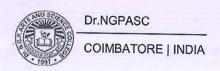
Total Instruction Hours: 60 h

## **Syllabus**

Unit I 13 h गद्य - नूतन गद्य संग्रह (जय प्रकाश)पाठ 1- रजियापाठ 2- मक्रीलपाठ 3- बहता पानी निर्मला पाठ 4- राष्ट्रपिता महात्मा गाँधी Unit II 13 h कहानी कुंज- डाँ वी.पी. 'अमिताभ' (पाठ 1-4) Unit III 12 h व्याकरण: शब्द विचार (संज्ञा, सर्वनाम,विशेषण) Unit IV 12 h अनुच्छेद लेखन Unit V 10 h अनुवाद अभ्यास-III (केवल अंग्रेजी से हिन्दी में) (पाठ 1 to 10)

## **Text Books**

- प्रकाशक: सुमित्र प्रकाशन 204 लीला अपार्ट्मेंट्स, 15 हेस्टिंग्स रोड'अशोक नगर इलाहाबाद-211001
- 2 प्रकाशक: गोविन्द प्रकाशनसदर बाजार, मथुरा उत्तरप्रदेश-281001
- 3 पुस्तक: व्याकरण प्रदिप रामदेवप्रकाशक: हिन्दी भवन 36 टेगोर नगर इलाहाबाद-211024
- 4 पुस्तक: व्याकरण प्रदिप रामदेवप्रकाशक: हिन्दी भवन 36 इलाहाबाद-211024
- 5 प्रकाशक: दक्षिण भारत प्रचार सभा चेनैई -17



Course Code	Course Name	Category	L	Т	P	Credit
231TL1A1MA	MALAYALAM- I	LANGUAGE - I	4	1	-	3

#### **PREAMBLE**

This course has been designed for students to learn and understand

- the writing ability and develop reading skill
- the various concepts and techniques for criticizing literature, to learn the techniques for expansion of ideas and translation process
- the competency in translating simple Malayalam sentences into English and vice versa

#### **COURSE OUTCOMES**

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Learn the fundamentals of novels and stories	. K1
CO2	Understand the principles of translation work	K2
CO3	Expose the knowledge writing critical views on fiction	K2
CO4	Apply creative ability	K3
CO5	Build the power of creative reading	КЗ

#### MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	1			1	1
CO2	1				· /
CO3	1	1	✓		1
CO4	1		<b>√</b>	1	✓
CO5	1	1	1		✓ .

#### **COURSE FOCUSES ON**

Employability Innovations	
✓ Intellectual Property Rights ✓ Gender Sensitization	
Social Awareness/ Environment  Constitutional Rights/ Hur Ethics	nan Values/

231TL1A1MA	MALAYALAM - I	SEMESTER I
		Total Credits: 3

Total Instruction Hours: 60 h

# **Syllabus**

Unit I	Novel	14 h
Pathumma	yude Adu	
Unit II	Novel	10 h
Pathumma	yude Adu	
Unit III	Short Story	14 h
Nalinakant	hi	
Unit IV	Short Story	10 h
Nalinakant	hi	
Unit V	Practical Application	12 h
Expansion	of ideas, General Essay and Translation	

### **Text Books**

- Vaikkam Muhammed Basheer, "Pathummayude Adu" (NOVEL), DC Books & Kottayam
- 2 T.Padmanabhan, "Nalinakanthi" (Short Story), DC Books & Kottayam.

## References

- 1 Malayala Novel Sahithyam.
- 2 Malayala Cherukatha Innale Innu.

Course Code	Course Name	Category	L	Т	P	Credit
231TL1A1FA	FRENCH - I	LANGUAGE - I	4	1	-	3

#### **PREAMBLE**

This course has been designed for students to learn and understand

- the competence in general communication skills with oral, written and comprehension & expression
- the culture, life style and the civilization aspects of the French people as well as of France
- the students to acquire competency in translating simple French sentences into English and vice versa

#### **COURSE OUTCOMES**

On the successful completion of the course, students will be able to

CO Number	(C) Statement	
CO1		
CO2	CO2 Apply the adjectives and the classroom environment in France	
CO3	CO3 Select the Plural, Articles and the Hobbies	
CO4	CO4 Measure the Cultural Activity in France	
CO5	Evaluate the sentiments, life style of the French people and the usage of the conditional tense	K3

#### MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5	
CO1	1			per 25 9500	1	
CO2	1				1	
СОЗ	<b>√</b>	inde proprieta		C. and nothing		
CO4	1		✓		1	
CO5	1		✓		1	

#### **COURSE FOCUSES ON**

1	Skill Development	<b>✓</b>	Entrepreneurial Development
✓	Employability	✓	Innovations
✓	Intellectual Property Rights	· ·	Gender Sensitization
Dr.NGPAS	Social Awareness/ Environment	<b>✓</b>	Constitutional Rights/ Human Values/ Ethics

231TL1A1FA FRENCH-I SEMESTER I

**Total Credits: 3** 

**Total Instruction Hours:** 60 h

# Syllabus

Unit I Salut I Page 10

12 h

Objectifs de Communication	Tâche	Activités de réception et de production orale
<ul> <li>Saluer</li> <li>Enter en contact</li> <li>avec quelqu'un.</li> <li>Se presenter.</li> <li>S'excuser</li> </ul>	En cours de cuisine, premiers contacts avec les members d'un groupe	<ul> <li>Comprendre des personnes qui se saluent.</li> <li>Ēchanger pour entrer en contact, se présenter, saluer, s'excuser.</li> <li>Communiquer avec tu ou vous.</li> <li>Comprendre les consignes de classe</li> <li>Ēpeler son nom et son prénom.</li> <li>Computer jusqu'à 10.</li> </ul>

# Unit II Enchanté I Page 20

12 h

Objectifs de Communication	Tâche	Activités de réception et de production orale
<ul> <li>Demander de se presenter.</li> <li>Présenter quelqu'un.</li> </ul>	Dans la classe de français, se presenter et remplir une fiche pour le professeur.	<ul> <li>Comprendre les informations essentielles dans un échange en milieu professionnel.</li> <li>Ēchanger pour se presenter et présenter quelqu'un.</li> </ul>

# Unit III J'adore I Page 30

12 h

Objectifs de Communication	Tâche	Activités de réception et de production orale
Exprimer ses gouts.  Dr.NGPASC  COIMBATORE LINDIA	Dans un café, participer à une soirée de rencontres rapides et remplir de taches d'appréciation B.Sc. Biotechnology (St	<ul> <li>Dans une soirée de recontres rapid comprendre des personnes qui échangent sur elles et sur leurs goût</li> <li>Comprendre une personne qui parler des goûts de quelqu'un d'autre sudents admitted during the AY 202</li> </ul>

Unit IV J'adore I Page 30

14 h

Objectifs de Communication	Tâche	Activités de réception et de production orale
Présenter quelqu'un	Dans un café, participer à une soirée de rencontres rapides et remplir de taches d'appréciation	<ul> <li>Exprimer ses goûts</li> <li>Comprendre une demande laissée sur un répondeur téléphonique.</li> <li>Parler de ses projets de week-end</li> </ul>
Autoévaluation du module I Pa	age 40 – Préparation au DELF	A1 page 42
Demander à quelqu'un de faire quelque chose.  Demander poliment.	Organiser un programme d'activités pour accueillir une personne importante	Comprendre une personne demande un service à quelqu'un.
Parler d'actions passes.	or for any position of position from	Demander à quelqu'un de faire quelque chose.
Tu veux bien?		Imaginer et raconter au passé à partir de situations dessinées.

# Unit V Practical Application

10 h

Make in Own Sentences

### **Text Book**

Regine Merieux, Yves Loiseau. 2012. LATITUDES – 1: Méthode de français (Page No: 9-55) Les Editions Dider, Paris, Imprime en Roumanie par Canale en Janvier

Course Code	Course Name	Category	L	Т	P	Credit
231EL1A1EA	ENGLISH- I	LANGUAGE- II	4		1	3

#### **PREAMBLE**

This course has been designed for students to learn and understand

- the effect of dialogue, imagery and varied genres
- any spontaneous spoken discourse and respond to them with proper sentence structure
- the transactional concept of English language

## **COURSE OUTCOMES**

On the successful completion of the course, students will be able to

CO Number	CO Statement	
CO1 Identify the various aspects in poetry		K2
CO2	CO2 Infer linguistic and non-linguistic features of the context for understanding and interpreting	
CO3	CO3 Construct sentences and convey messages effectively in real life situations	
CO4	CO4 Apply different reading strategies with varying speed	
CO5	Prepare modules with their own ideas and present them asked their	

## MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	1		✓	<b>✓</b>	1
CO2		<b>✓</b>			<b>✓</b>
CO3	1	<b>✓</b>		<b>√</b>	Short and
CO4		Taken et As	1	and already	gr Est
CO5	1	1	Part Berk etg	ggo fa mext mex-	1

#### **COURSE FOCUSES ON**

<b>✓</b>	Skill Development	<b>V</b>	Entrepreneurial Development
<b>V</b>	Employability	1	Innovations
✓	Intellectual Property Rights	1	Gender Sensitization
<b>✓</b>	Social Awareness/ Environment	✓	Constitutional Rights/ Human Values/ Ethics

231EL1A1EA	ENGLISH- I	SEMESTER I

**Total Credits: 3** 

Total Instruction Hours: 60 h

## **Syllabus**

#### Unit I Genre Studies

12 h

Nissim Ezekiel: The Worm- Author's Biography- title indications- outline-paraphrasing the poem- context of poem- form- poetic devices- enjambment-techniques- Annotations

Niyi Osundare: Our Earth Will Not Die- Author's Biography- title indicationsoutline- paraphrasing the poem- context of poem- form- poetic devicesenjambment- techniques- Annotations

A. G. Gardiner: On Superstitions- Author's biography- Narrative structure-Exploration of the text- passage analysis- insight of ideas- cohesion and contextstyle- language techniques- Annotation

Nancy Bella: Clever Thief- Author's Biography- Plot Summary- Detailed summary and Analysis- Themes- Important Quotations- Characters- Description - analysis- Terms- Symbols- Critical analysis

H. G. Wells: The Truth about Pyecraft- Author's Biography-narrative structure-passage analysis- insight of ideas- cohesion and context- style- language techniques

## Unit II Listening Skills

12 h

Listening vs. hearing- Types of listening, Tips to enhance Listening Skills, Non-verbal and Verbal signs of active listening - Comprehensive Listening - Listening to pre-recorded audios on speeches, interviews and conversations - Listening Activities- Listening and responding to complaints (formal situation), Listening to problems and offering solutions (informal)

## Unit III Speaking Skills

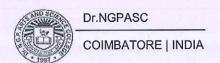
14 h

Formal occasions- Introducing oneself, Introducing others, Enquiries and Seeking permission, Making short presentations- Informal occasions- Requests, Offering help, Congratulating, Farewell party, graduation speech- Giving instructions to do a task and to use a device, Giving and asking directions

## Unit IV Reading Skills

10 h

Study Skills: Skimming and Scanning- Reading different kinds of texts- Types of reading-Developing a good reading speed, reading aloud, Referencing skill - Word



Power (Denotation and Connotation) - Reading comprehension, Data interpretation - Charts, Graphs, Advertisements

## Unit V Writing Skills

12 h

Sentence patterns, Note- making and note taking-Strategies - Paragraph writing: Structure and Principles - Academic Writing - Formal and Informal Letters, Report, Book / Movie Review

### **Text Books**

- Gardiner, A. G. 1926. Alpha of the Plough: Second series, J.M. Dent & Sons Ltd., London, United Kingdom. pg.no-151-156. (Unit I)
- Ezekiel, Nissim. "The Worm," Crazy Romantic Love, www. mianmawaisarain.live/2020/05/poem-worm-nissim-ezekiel.html. Accessed 3 Aug. 2022. (Unit I)
- 3 < http://livros01.livrosgratis.com.br/ln000835.pdf /> (Unit I)
- Mithra, S. M. 1919. Hindu Tales from the Sanskrit, Macmillan & Co Ltd., London, United Kingdom. pg.no-127-142. (Unit I)
- Nation, I. S. P and Jonathan Newton. 2009. Teaching ESL/EFL Listening and Speaking. Routledge, New York, United States. (Unit II)
- Prabha, Dr. R. Vithya & S. Nithya Devi. 2019. Sparkle. (1st Edn.) McGraw Hill Education, Chennai, India. (Unit III– V)

- Our Earth Will Not Die By Niyi Osundare." Studocu.Com, studocu.com /in/document/bangalore-university/bachelor-of-computer-applications /1586771577-our-earth-will-not-die/27675462. Accessed 3 Aug. 2022.
- OnSuperstitions."THEHISTORIAN,thehistorian1947.wordpress.com/2019/03/08/on-superstitions-by-a-g-gardiner. Accessed 3 Aug. 2022.
- Swales, John M. & Feak, Christine B. 2012. Academic Writing for Graduate Students: Essential Tasks and Skills, University of Michigan Press, Michigan, United States.
- Rudzka, Brygida -Ostyn, 2003. Word Power: Phrasal Verbs and Compounds: A Cognitive Approach, Mouton de Gruyter, New York, United States.

Course Code	Course Name	Category	L	Т	P	Credit
233BT1A1CA	CELL BIOLOGY	CORE	4	1	-	4

This course has been designed for students to learn and understand

- The basic components and functions of cell organelles
- The cell signaling, cycle, progression and its regulation
- The pathological progressions of a cell

#### **COURSE OUTCOMES**

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Define the process of cell architecture and composition	K2
CO2	Paraphrase the membrane organization for nutrient uptake	K2
CO3	Report the mode of transport relating to inter and intracellular mechanisms	КЗ
CO4	Sketch signaling events within cells	K3
CO5	Illustrate the cell cycle events and pathological progressions documentation, inspection and certification	К3

#### MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	1	1	<b>✓</b>	1	1
CO2	M 24 / 1	✓	✓		<b>✓</b>
CO3	1	<b>√</b>	1	1	1
CO4	✓	✓	✓		
CO5	<b>/</b>			1	<b>✓</b>

Entrepreneurial Development
Innovations
Gender Sensitization
Constitutional Rights/ Human Values/ Ethics



233BT1A1CA

#### **CELL BIOLOGY**

SEMESTER I

**Total Credits: 4** 

Total Instruction Hours: 60 h

### **Syllabus**

## Unit I Cell Overview and Organelles

13 h

History - cell theory - scope - types and shapes - organization of prokaryotic and eukaryotic cell and their differences. Cytoskeleton - microtubules. Nucleus, endoplasmic reticulum (rough and smooth), golgi apparatus, mitochondria, ribosomes, chromosome, chloroplast, lysosome, peroxisome

## Unit II Cell Organization

12 h

Cell membrane - structure and function, transport of nutrients and ions across the membranes. Diversity of plasma membranes (Trilamilar, bimolecular leaflet, lattice, micellar, fluid mosaic model). Desmosomes, plasmodesmata. Cell junctions - adherent, gap and tight junctions.

## Unit III Cell Transport

10 h

Membrane transport types. General classes of transport systems- uniport, symport, antiport. Diffusion- passive and facilitated. Active transport- primary and secondary. The P-type ATPases (Na+K + -ATPase), ion channels (ligand- gated and voltage-gated).

## Unit IV Cell Signaling

12 h

Cell Signalling-Intercellular signaling & intracellular signaling- forms of cell signaling-types of receptors-Signalling molecules-Responses to the Signaling Pathway-Termination of Signaling Pathways.

## Unit V Cell Cycle

13 h

Cell cycle - Mitosis - meiosis and their significance. Cell Ageing - mechanism - theories (Free radical theory and somatic mutation theory). Cell death - necrosis, apoptosis. Difference between necrosis and apoptosis. Mechanism of apoptosis. Characteristics of cancer cell. Tumor cells - Stages of progression

#### **Text Books**

- Rastogi SC, 2015, "Cell Biology", 3<sup>rd</sup> edition, New Age International Publishers, India
- Islam A, 2011, "Text Book of Cell Biology", 2<sup>nd</sup> edition, Books and Allied (P) Ltd., India

- De Roberties D, 2020, "Cell and Molecular Biology", 8th edition, Wolters Kluwer \_ New Delhi
- 2 Lodish H & Baltimore D, 2016, "Molecular Cell Biology", 8th edition, W.H. Freeman & Company, New York, USA
- 3 Karp G, 2002, "Cell and Molecular Biology", 3<sup>rd</sup> edition, John Wiley Sons. Inc, USA
- 4 Alberts B, 1998, "Essential Cell Biology", 1st edition. Garland Publishers, USA

Course Code	Course Name	Category	L	Т	P	Credit
233BT1A1CB	BIOCHEMISTRY	CORE	4	1	_	3

This course has been designed for students to learn and understand

- The structure & function of bio molecules
- The aspects of metabolism & their regulatory pathways
- The classification, structure, functions of biomolecules and its metabolism

#### **COURSE OUTCOMES**

On the successful completion of the course, students will be able to

CO Number	CO Statement			
CO1	CO1 Identify the concepts of biochemical pathways and carbohydrates			
CO2	Paraphrase the classification, structure, properties and metabolism of amino acids and protein	K2		
CO3	Discuss the classification, structure, properties, biosynthesis and oxidation of lipids	K2		
CO4	Compare the classification, structure, functions of nucleic acids and metabolism of nucleotides	К3		
CO5	Categorize the classification of enzymes, mechanism of action and enzyme kinetics	К3		

#### MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	1	✓	✓		✓
CO2	1.	<b>√</b>		1	1
CO3	1	<b>V</b>		✓	1
CO4		✓		1	1
CO5	1		<b>✓</b>	<b>✓</b>	✓

#### **COURSE FOCUSES ON**

1	Skill Development	Entrepreneurial Development
<b>✓</b>	Employability	Innovations
	Intellectual Property Rights	Gender Sensitization
	Social Awareness/ Environment	Constitutional Rights/ Human Values/   Ethics



Dr.NGPASC

233BT1A1CB

#### **BIOCHEMISTRY**

SEMESTER I

**Total Credits: 3** 

Total Instruction Hours: 60 h

### **Syllabus**

## Unit I Carbohydrates

12 h

Structure, classification and functions of carbohydrates, Glycoproteins, Glycolipids Glycolysis, gluconeogenesis and Regulation. Krebs's cycle. Electron transport chain, Glyoxylate cycle, HMP shunt pathway, Glycogen synthesis and breakdown.

### Unit II Protein

12 h

Amino acid: Biosynthesis of amino acids, Essential and non essential amino acids, Properties and Metabolism of amino acids (Glycine and Tryptophan). Protein: Classification and Properties – four levels of protein structure & conformations, Ramachandran Plot and 3D Structure determination by amino acid sequences.

# Unit III Lipids

12 h

Lipids: Nomenclature, Classification and biological significance. Simple Lipids and Compound lipids. Synthesis and metabolism of fatty acids ( $\alpha$ ,  $\beta$  and  $\omega$  Oxidation of fatty acids). Cholesterol Biosynthesis and regulation. Phospholipids and Glycolipids metabolism- Glycerophospholipids and Sphingoglycolipids.

## Unit IV Nucleic acids

10 h

Nucleic acids: Classification, structure and functions of nucleic acids, Biosynthesis of Purines and pyrimidines -De novo pathway, Salvage pathway, Regulation and Metabolism of Purine and pyrimidine.

## Unit V Enzyme Kinetics

14 h

Enzymes: Nomenclature and Classifications. Coenzymes, Abzymes and Ribozymes. Mechanism of enzyme actions - Active site, Lock and Key model & Induce fit Hypothesis, Enzyme substrate complex formation. Kinetics: Derivation of Michaelis- Menton equation, Types of inhibitions - Competitive, Non Competitive, Uncompetitive, Feedback and Allosteric enzymes inhibition.

#### **Text Books**

- Rodwell VW, Bender DA, Botham KM, Kennelly PJ, and Weil PA, 2018, 1 "Harper's Illustrated Biochemistry", 31st edition, McGraw Hill publications, New Delhi.
- Berg JM, Stryer L et al., 2015, "Biochemistry", 8th edition, Palgrave Macmillan Publications, India

- Ramadevi K, 2016, "Ambika Shanmgam's Fundamentals of Biochemistry for Medical Students", 8th edition, Wolters Kluwer (India) Pvt, Ltd., New Delhi.
- 2 Lehninger AL and Cox MM, 2013, "Principles of Biochemistry", 6th edition. W. H. Freeman and Company, New York
- Voet D and Voet JG, 2011, "Biochemistry", 4th edition, John Wiley and Sons Inc. USA
- Fromm HJ and Hargrovem M, 2012, "Essentials of Biochemistry", Springer publisher

233BT1A1CP

## CORE PRACTICAL - I : CELL BIOLOGY AND BIOCHEMISTRY

SEMESTER I

Total Credits: 2
Total Instructions Hours: 48 h

5.No	Contents
1	Calculations of Molarity, Normality and Percentage Solution and Preparation of buffer in different pH - Phosphate, Acetate, Tris buffer
2	Simple staining of Bacteria and observation under stereomicroscope*
3	Microscopic observation of Monocot and Dicot Leaf, Root and Stem section
4	Staining of plant cells -Onion epidermal cells
5	Staining of starch granules
6	Mitotic preparation from onion root tip
7	Estimation of DNA by diphenylamine method
8	Estimation of Glucose by Anthrone method
9	Estimation of Fructose by Dinitro Salicylic Acid method
10	Estimation of Aminoacids by Ninhydrin method
11	Estimation of Ascorbic acid by DNPH method
12	Estimation of Protein by Lowry's or Bradford's method

<sup>\*</sup> DBT STAR College Status Experiment

- Becker JM, Caldwell GA and Zachgo A, 2007, "Biotechnology- A laboratory Course", 2<sup>nd</sup> edition, Academic Press, USA
- Sambrook J, Green MR, 2012, "Molecular Cloning: A Laboratory Manual", 4th edition, Cold Spring Harbor, USA
- Davey J and Lord M, 2003, "Essential Cell Biology Volume 1: Practical Approach", 1st edition, OUP Oxford, UK
- 4 Lindenmayer D and Burgman M, 2005, "Practical Conservation Biology", 5th edition, CSIRO Publishing, Australia

Course Code	Course Name	Category	L	Т	P	Credit
232CE1A1IB	CHEMISTRY	IDC	4	-	-	4

This course has been designed for students to learn and understand

- The concept of expressing concentration of solutions
- The concepts of Chemical kinetics and catalysis
- About the bonding and basic organic chemistry

#### **COURSE OUTCOMES**

On the successful completion of the course, students will be able to

CO Number		
CO1	Understand the concept of concentration of the solutions	K2
CO2	Infer the acid and basic properties of solutions	K2
CO3	Interpret the concept of the bonding in molecules	K2
CO4	Summarize the basic concepts of the stereo chemistry	K2
CO5	Explain the Chemical kinetics and catalysis	K2

# MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	<b>✓</b>		✓ ,
CO2	-	✓.	✓		✓
CO3	· 🗸		✓ ,	✓	1
CO4		<b>*</b>		✓	
CO5	✓	✓	✓		<b>✓</b>

<b>✓</b>	Skill Development	Entrepreneurial Development
✓	Employability	Innovations
	Intellectual Property Rights	Gender Sensitization
	Social Awareness/ Environment	Constitutional Rights/ Human Values/ Ethics

232CE1A1IB	CHEMISTRY	SEMESTER I

**Total Credits: 4** 

Total Instruction Hours: 48 h

## **Syllabus**

### Unit I Solutions

10 h

Normality, molarity, molality, mole fraction, mole concept. Primary and secondary standards – preparation of standard solutions. Principle of Volumetric analysis (Acid base titrations). Indicators – Theory of indicators- Oswald and quinonoid theory

### Unit II Acids and Bases

10 h

Acid base theories – Strength of acids and bases – Equilibrium constant and Ionic constant of water- pH, pKa, pKb, Buffer solution, pH and pOH simple calculations

## Unit III Chemical bonding

8 h

Types of bonding - Ionic Bond - Nature of ionic bond - Factors influencing the formation of ionic bond - Covalent and coordinate bond- Molecular Orbital Theory- - Configuration of H2, N2, O2, F2 - bond order - Diamagnetism and paramagnetism

## Unit IV Stereo Chemistry

10 h

Electron displacement effect in organic compounds - Inductive effect - Electromeric effect - Resonance effect, Hyperconjugation and Steric effect. Isomerism, Structural isomerism-Symmetry of elements (Plane, Centre and Axis of symmetry), Optical isomerism of lactic acid and tartaric acid, Enantiomers, Diastereomers - Separation of racemic mixture, Geometrical isomerism (maleic and fumaric acid). R/S and E/Z configuration assignments for simple molecules

## Unit V Chemical kinetics and catalysis

10 h

Rate of reaction, rate law, order, molecularity, first order rate law, half life period of first order equation, pseudo first order reaction, zero and second order reactions. Catalysis – Homogenous, heterogeneous and enzyme catalysis, Industrial applications of enzyme catalysis

#### **Text Books**

- Puri. B.R, Sharma. L.R and Pathania. M.S, 2017, "Principles of Physical Chemistry", 47th Edition, John Wiley and Sons & USA
- Madhan. R.D, 2016, "Modern Inorganic Chemistry", 10th Edition, Mc Graw Hill Company & USA.

- Lee. J.D, 2002, "A New Concise Inorganic Chemistry", 5th Edition, ELBS & UK.
- Jain. M.K and Sharma. S.C, 2012, "Modern Organic Chemistry", Vishal publishing Co & New Delhi
- Puri. B.R, Sharma. L.R and Kalia. K.C, 2016, "Principles of Inorganic Chemistry", Vishal Publishing & Co & New Delhi.
- Glasstone. S and Lewis. D, 2014, "Elements of Physical Chemistry", 2nd Edition, Macmillan Ltd, London
- 5 https://www.kau.edu.sa/Files/0009039/Subjects/05-Acid-base.pdf
- 6 https://www.mlsu.ac.in/econtents/1844\_SPOT%20I.pdf

Course Code	Course Name	Category	L	Т	P	Credit
233MB1A1AA	ENVIRONMENTAL STUDIES	AECC	2		71	2

This course has been designed for students to learn and understand

- Multi disciplinary aspects of Environmental studies
- Importance to conserve the Biodiversity
- Causes of Pollution and its control

#### **COURSE OUTCOMES**

On the successful completion of the course, students will be able to

CO Number	CO Statement	
CO1	To understand the importance of natural resources in order to conserve for the future.	K1
CO2	To impart knowledge on Natural resources and its conservation	K2
CO3	To impart knowledge on Biodiversity and its conservation	K3
CO4	To create awareness on effects, causes and control of air, water, soil and noise pollution etc.,	K4
CO5	To build awareness about sustainable development and Environmental protection	K1

#### MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	1	<b>✓</b>	<b>✓</b>	1	<b>✓</b>
CO2		1	- V	✓	1
CO3	1	1	1	1	1
CO4	<b>✓</b>	<b>√</b> -	<b>✓</b>		
CO5	<b>✓</b>	1	✓		1

#### **COURSE FOCUSES ON**

<b>✓</b>	Skill Development	Entrepreneurial Development			
<b>✓</b>	Employability	Innovations			
	Intellectual Property Rights	Gender Sensitization			
	Social Awareness/ Environment	Constitutional Rights/ Human Values/ Ethics			

233MB1A1AA

### **ENVIRONMENTAL STUDIES**

SEMESTER I

**Total Credits: 2** 

**Total Instruction Hours: 24 h** 

### **Syllabus**

## Unit I Introduction to Environmental studies & Ecosystems

5 h

Introduction to Environmental studies& Ecosystems: Multidisciplinary nature of environmental studies; components of environment – atmosphere, hydrosphere, lithosphere and biosphere. Scope and importance; Concept of sustainability and sustainable development. Ecosystem- Structure and function of ecosystem; Energy flow in an ecosystem: food chain, food web and ecological succession.

### Unit II Natural Resources: Renewable and Non-renewable Resources 5 h

Natural Resources: Renewable and Non-renewable Resources: Land Resources and land use change; Land degradation, soil erosion and desertification. Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations. Water: Use and overexploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-state). Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs.

## Unit III Biodiversity and Conservation

5 h

Biodiversity and Conservation: Levels of biological diversity: genetic, species and ecosystem diversity; Biogeography zones of India; Biodiversity patterns and global biodiversity hot spots. India as a mega-biodiversity nation; Endangered and endemic species of India. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

## Unit IV Environmental Pollution, Environmental Policies & Practices 5 h

Environmental Pollution, Environmental Policies & Practices: Environmental pollution: types, causes, effects and controls; Air, water, soil, chemical and noise pollution. Nuclear hazards and human health risks. Solid waste management: Control measures of urban and industrial waste. Pollution case studies. Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture. Environment Laws: Environment Protection Act; Prevention & Control of Pollution Act – Air & Water. Wildlife Protection Act; Forest Conservation Act;

52

4 h

Human Communities and the Environment & Field Work: Human population and growth: Impacts on environment, human health and welfares. Environmental ethics: Role of Indian and other religions and cultures in environmental conservation. Environmental communication and public awareness. Visit to an area to document environmental assets; river/forest/flora/fauna, etc. Population explosion – Family Welfare Programmes. Role of Information Technology in Environment and human health. Role of the Colleges, Teachers and Students in village adoption towards clean, green and make in villages in various aspects.

### **Text Books**

- 1 Carson, R. 2002. Silent Spring. Houghton Mifflin Harcourt
- Gadgil, M., & Guha, R.1993. This Fissured Land: An Ecological History of India. Univ. of California Press.

#### References

- Gleeson, B. and Low, N. (eds.) 1999. Global Ethics and Environment, London, Routledge.
- Gleick, P.H. 1993. Water in Crisis. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.
- Groom, Martha J. Gary K. Meffe, and Carl Ronald carroll. Principles of Conservation Biology. Sunderland: Sinauer Associates, 2006.
- Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from India's Himalaya dams. Science, 339: 36-37.
- McCully, P.1996. Rivers no more: the environmental effects of dams (pp. 29-64). Zed Books.
- 6 McNeil, John R. 2000. Something New Under the Sun: An Environmental History of the Twentieth Century.

Odum, E.P., Odum, h.T. & Andrews, J.1971. Fundamentals of Ecology.

Philadelphia: Saunders Parks and Spiance College.

Dr.N.G.P. Arts and Science College

Department of Biotechnology
Dr. N. G. P. Arts and Science College
Coimbatore — 641 048

COIMBATORE | INDIA

APPROVED

BOS-15th AC-15th GB-25th

10/06/12023 14/07/2023 05/08/202

3.Sc. Biotechnology (Students admitted during the AY 2023-24)

Course Code	Course Name	Category	L	Т	P	Credit
231TL1A2TA	TAMIL- II	LANGUAGE- I	4	1	-	3

This course has been designed for students to learn and understand

- மொழிப்பாடங்களின் வாயிலாக தமிழரின் பண்பாடுநாகரீகம்
   செய்தல்
- ,பகுத்தறிவு ஆகியவற்றை அறியச்

- 🌯 கலை மற்றும் மரபுகளை அறியச் செய்தல்
- ் மாணவர்களின் படைப்பாக்கத்திறன்களை ஊக்குவித்தல்

#### **COURSE OUTCOMES**

On the successful completion of the course, students will be able to

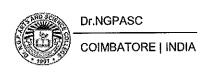
CO Number	CO Statement	
CO1	வாழ்க்கைத்திறன்கள் (Life Skills) மாணவர்களின் செயலாக்கத்திறனை ஊக்குவித்தல்	K1
CO2	மதிப்புக்கல்வி (Attitude and Value education)	K2
CO3	பாடஇணைச்செயல்பாடுகள் (Co-curricular activities)	K2
CO4	சூழலியல் ஆக்கம் (Ecology)	K3
CO5	மொழி அறிவு (Tamil knowledge)	K3

### MAPPING WITH PROGRAMME OUTCOMES

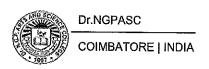
COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓		
CO2	✓			<b>✓</b>	
CO3	✓	<b>✓</b>			
CO4	✓		<b>✓</b>		
CO5	✓			✓	

#### **COURSE FOCUSES ON**

✓ Skill Development	<b>✓</b>	Entrepreneurial Development
✓ Employability	✓	Innovations
✓ Intellectual Property Rights	<b>✓</b>	Gender Sensitization
Social Awareness/ Environment	✓	Constitutional Rights/ Human Values/ Ethics



231TL1A2TA TAMIL- II **SEMESTER II** Total Credits: 3 Total Instruction Hours: 60 h **Syllabus** Unit I அற இலக்கியம் 13 h 1. இலக்கிய வரலாறு- பதினெண்கீழ்க்கணக்குநூல்கள் 2.திருக்குறள் அ. அறன்வலியுறுத்தல்- அ. எண் 04 ஆ. நட்பாராய்தல் - அ. எண் 80 இ. நாடு- அ. எண் 74 ஈ. குறிப்பறிதல்- அ. எண் 110 Unit II அற இலக்கியம் 13 h 1. நாலடியார் - அறிவுடைமை 2. மூதுரை - ஒளவையார் - 10 பாடல்கள் 6, 7, 9, 10, 14, 16, 17, 23, 26, 30 3. இனியவைநாற்பது- பூதஞ்சேந்தனார் - முதல் 10 பாடல்கள் Unit III அறநெறிக் கட்டுரைகள் 09 h 1. இலக்கியவரலாறு - தமிழ் உரைநடையின் தோற்றமும் வளர்ச்சியும் 2. கலைகள்-உ.வே.சா 3. சங்க நெறிகள்- வ.சுப.மாணிக்கம் Unit IV அறநெறிக் கட்டுரைகள் 15 h 1. வீர வணக்கம் - க.கைலாசபதி 2. தமிழர் பண்பாடு - டாக்டர் சோ.நா.கந்தசாமி 3. இணையத் தமிழ் வளர்ச்சி - முனைவர் ப.அர.நக்கீரன் Unit V பயிற்சிப் பகுதி 10 h 1.இலக்கணம்-வழு, வழுவமைதி,வழாநிலை 2.அலுவலகம் சார்ந்த கடிதம் -விண்ணப்பங்கள், வேண்டுகோள்,முறையீடு



3.படைப்பாக்கம்-பொதுத்தலைப்பில் கட்டுரைகள் எழுதுதல்

#### **Text Book**

தமிழ் மொழிப்பாடம்-2023-2024,தொகுப்பு: தமிழ்த்துறை , டாக்டர் என்.ஜி.பி. கலை

அறிவியல் கல்லூரி,கோயம்புத்தூர். வெளியீடு: நியூ செஞ்சுரி புக் ஹவுஸ் ,சென்னை.

(Unit I to V)

- 1 பேராசிரியர் புலவர் சோம. இளவரசு,எட்டாம் பதிப்பு. 2014. தமிழ் இலக்கிய வரலாறு-மணிவாசகர் பதிப்பகம்,சென்னை.
- 2 பேராசிரியர் முனைவர் பாக்கியமேரி ,முதற் பதிப்பு. 2013. இலக்கணம்-இலக்கிய வரலாறு- மொழித்திறன்- பூவேந்தன் பதிப்பகம்,சென்னை. .
- 3 தமிழ் இணையக் கல்விக்கழகம் TAMIL VIRTUAL ACADEMY. வலைதள முகவரி : <a href="https://www.tamilvu.org">https://www.tamilvu.org</a>

Course Code	Course Name	Category	L	Т	P	Credit
231TL1A2HA	HINDI- II	LANGUAGE- I	4	1	-	3

This course has been designed for students to learn and understand

- the writing ability and develop reading skill
- the various concepts and techniques for criticizing literature
- the techniques for expansion of ideas and translation process

#### **COURSE OUTCOMES**

On the successful completion of the course, students will be able to

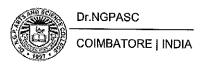
CO Number	CO Statement	Knowledge Level
CO1	Learn the fundamentals of novels and stories	K1
CO2	Understand the principles of translation work	K2
CO3	Expose the knowledge writing critical views on fiction	K2
CO4	Build creative ability	K3
CO5	Apply the power of creative reading	K3

## MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	<b>✓</b>			<b>✓</b>	✓
CO2	✓	<b>√</b>			<b>✓</b>
CO3	✓		✓	<b>✓</b>	✓
CO4	✓		<b>√</b>		✓
CO5	✓	<b>√</b>	✓		<b>√</b>

#### **COURSE FOCUSES ON**

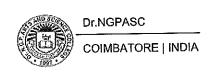
✓ Skill	Development	<b>V</b>	Entrepreneurial Development
Emp	bloyability	<b>✓</b>	Innovations
Intel	llectual Property Rights	✓	Gender Sensitization
Socia	al Awareness/ Environment	✓	Constitutional Rights/ Human Values/ Ethics



231TL1A2HA	HINDI- II	SEMESTER II
	Total	Credits: 3
	Total Instruction	n Hours: 60 h
	Syllabus	
Unit I		13 h
आधुनिकपद्य – शब	री(श्रीनरेशमेहता)	
Unit II		13 h
उपन्यास: सेवासदन	r-प्रेमचन्द	
Unit III		12 h
कहानी-किरीट- डा	उषा पाठक / डा अचला पाण्डेय	
पाठ 1.कफ़न <i>,</i> 3. <del>र्च</del>	ोफ़ की दावत	
Unit IV		12 h
पत्र लेखन: (औपचा	ारिक या अनौपचारिक)	
Unit V		10 h
अनुवाद अभ्यास-II	l (केवल हिन्दी से अंग्रेजी में)  (पाठ 1 to 10)	

### **Text Books**

- प्रकाशक: लोकभारती प्रकाशन पहली मंजिल , दरबारी बिल्डिंग,महात्मा गाँधी मार्ग , इलाहाबाद. (Unit I)
- प्रकाशक: सुमित्र प्रकाशन 204 लीला अपार्ट्मेंट्स , 15 हेस्टिंग्स रोड 'अशोक नगर इलाहाबाद .
   (Unit II)
- 3 प्रकाशक: राधाकृष्ण प्रकाशन दिल्ली. (Unit III)
- पुस्तक: व्याकरण प्रदिप रामदेवप्रकाशक: हिन्दी भवन 36 इलाहाबाद. (Unit IV)
- 5 प्रकाशक: दक्षिण भारत प्रचार सभा चेनैई. (Unit V)



Course Code	Course Name	Category	L	Т	P	Credit
231TL1A2MA	MALAYALAM- II	LANGUAGE - I	4	1	-	3

This course has been designed for students to learn and understand

- the writing ability and develop reading skill
- the various concepts and techniques for criticizing literature, to learn the techniques for expansion of ideas and translation process
- the competency in translating simple Malayalam sentences into English and vice versa

### **COURSE OUTCOMES**

On the successful completion of the course, students will be able to

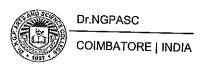
CO Number	CO Statement	Knowledge Level
CO1	Learn the fundamentals of novels and stories	K1
CO2	Understand the principles of translation work	K2
CO3	Expose the knowledge writing critical views on fiction	K2
CO4	Build creative ability	K3
CO5	Apply the power of creative reading	K3

# MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	<b>√</b>			<b>/</b>	/
CO2	✓				
CO3	✓	<b>√</b>	<b>√</b>		,
CO4	✓		<b>✓</b>	<b>√</b>	
CO5	✓	<b>√</b>	<b>V</b>	·	

#### COURSE FOCUSES ON

✓	Skill Development	<b>V</b>	Entrepreneurial Development
<b>✓</b>	Employability	✓	Innovations
<b>✓</b>	Intellectual Property Rights	✓	Gender Sensitization
<b>√</b>	Social Awareness/ Environment	<b>✓</b>	Constitutional Rights/ Human Values/ Ethics



231TL1A2MA	MALAYALAM- II	SEMESTER II
	Total	Craditer 3

Total Credits:

Total Instruction Hours: 60 h

### **Syllabus**

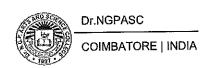
12 h Novel Unit I Enmakaje: Chapter1- Chapter5 10 h Novel Unit II Enmakaje: Chapter 6- Chapter 10 12 h Unit III Novel Enmakaje: Chapter 11- Chapter 15 14 h Unit IV Autobiography NeermathalamPoothaKalam: Chapter 1- Chapter 10 12 h **Autobiography** Unit V

NeermathalamPootha Kalam: Chapter 11- Chapter 20

#### **Text Books**

- Ambika Suthan Mangad, Enmakaje (Novel), DC Books Kottayam, Kerala, 1 India. (Unit I to III)
- Madhavikkutty, NeermathalamPootha Kalam (Autobiography), DC Books 2 Kottayam, Kerala, India. (Unit IV & V)

- MalayalaNovelSahithyam, DC Books Kottayam, Kerala, India. 1
- MalayalaSahithyaCharithram, National Books Kottayam, Kerala, India. 2



Course Code	Course Name	Category	L	Т	P	Credit
231TL1A2FA	FRENCH- II	LANGUAGE - I	4	1	-	3

This course has been designed for students to learn and understand

- the Competence in General Communication Skills Oral + Written- Comprehension & Expression
- the Culture, life style and the civilization aspects of the French people as well as of France
- the students to acquire Competency in translating simple French sentences into English and vice versa

### **COURSE OUTCOMES**

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Learn the Basic verbs, numbers and accents	K1
CO2	Apply the adjectives and the classroom environment in France	K2
CO3	Select the Plural, Articles and the Hobbies	K2
CO4	Measure the Cultural Activity in France	K3
CO5	Evaluate the sentiments, life style of the French people and the usage of the conditional tense	· ·-

## MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	<b>√</b>				100
CO2	✓	<b>✓</b>			
CO3			<b>√</b>		- /
CO4	✓		<b>√</b>	<u>, , , , , , , , , , , , , , , , , , , </u>	- /
CO5	<b>√</b>	<b>✓</b>	<b>√</b>		· ·

### COURSE FOCUSES ON

<b>✓</b>	Skill Development	<b>✓</b>	Entrepreneurial Development
<b>✓</b>	Employability	<b>√</b>	Innovations
✓	Intellectual Property Rights	<b></b>	Gender Sensitization
<b>✓</b>	Social Awareness/ Environment	<b>/</b>	Constitutional Rights/ Human Values/ Ethics

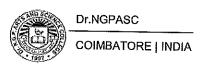
231TL1A2FA	FRENCH- II	SEMESTER II
		Total Credits: 3
	Tota	l Instruction Hours: 60 h
	Syllabus	
Jnit I	•	12 h
Proposer, accepter, refuserune invitation Indiquer la date.	Organiser une soirée au cinéma avec des amis, par téléphone et par courriel.	d'invitationsurunréponde
Unit II		12 h
Prendreet fixer un rendez-vous. Demander etindiquerl'heure.	Organiser une soirée au cinéma avec des amis, par téléphone et par courriel.	personnes qui
Unit III		12 h
Exprimer son poir vue positif et négatif S'informersur le prix S'informersur la quantitité. Exprimer la quantiti	cadeau pour un ami.	Exprimer son point de vuesur des idées de cadeau.  Faire des achatsdans un magasin
Unit IV		14 }
Demander etindique direction.  Localiser (près de, e de).  Exprimerl'obligation Interdit.Conseiller.  Dr.NGPASC	l'aided'indications pa telephone et d'un plan.  Par courrierélectronique	Comprendre de indications de lieu.  Comprendreune chanson

COIMBATORE | INDIA

	Donner des conseils à des personnesdans des situations données.
Unit V	10 h
Make in Own Sentences	

#### **Text Book**

Regine Merieux, Yves Loiseau, "LATITUDES - 1" (Page No: 56-101) (Methode de Français), Goyal Publisher & Distributors Pvt.Ltd., 86 UB Jawahar Nagar (Kamala Nagar), New Delhi-7 Les Editions Dider, Paris, 2008- Imprime en Roumanie par Canale en Janvier 2012. (Unit I to IV)



Course Code	Course Name	Category	L	Т	P	Credit
231EL1A2EA	ENGLISH- II	LANGUAGE- II	4	-	1	3

This course has been designed for students to learn and understand

- the language for specific purposes through various literary manuscripts
- the process of communicative competencies in academics through authentic contexts
- the different formats of business correspondence with lucidity and accuracy via various media

#### **COURSE OUTCOMES**

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Identify and appreciate the eminent writers' works of various genres	K1
CO2	Infer and comprehend complex situational talks	K2
CO3	Relate formal and informal communicative contexts to speak fluently	K2
CO4	Construct the denotative and connotative meanings while reading specialized texts	K3
CO5	Develop the skill of writing through descriptions, narrations and essays	К3

#### MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	<b>✓</b>	✓	<b>✓</b>	
CO2		<b>√</b>			<b>1</b>
CO3		<b>√</b>			✓
CO4	✓	<b>√</b>	<b>√</b>		<b>✓</b>
CO5			<b>✓</b>		<b>✓</b>

#### **COURSE FOCUSES ON**

✓       Employability       ✓       Innovations         ✓       Intellectual Property Rights       ✓       Gender Sensitization         ✓       Social Awareness/ Environment       ✓       Constitutional Rights/ Human Values/ Ethics	<b>✓</b>	Skill Development	<b>✓</b>	Entrepreneurial Development
Constitutional Rights/ Human Values/	<b>✓</b>	Employability	✓	Innovations
1 W   Comin Average and A Community   1 V   1	<b>✓</b>	Intellectual Property Rights	<b>✓</b>	Gender Sensitization
	✓	Social Awareness/ Environment	<b>✓</b>	

231EL1A2EA	ENGLISH- II	SEMESTER II

**Total Credits:** 3

Total Instruction Hours: 60 h

### **Syllabus**

### Unit I Genre Studies

15 h

John Keats: To a Friend Who Sent Me Some Roses - Author's Note - title indicationsoutline-paraphrasing the poem- context of poem- form- poetic devices- techniques-Style

A. G. Gardiner: On Habits - Author's Note- Title indications- Outline -Passage Analysis - context of the Prose - Narrative techniques- Style

Sudha Murthy: The Enchanted Scorpions- Author's Note - title indications-Plot summary- Outline of the story -devices- Narrative techniques- Style

David Pinski: A Dollar- Author's Note- Title indications -Plot Summary- Critical Analysis-Themes- Character analysis - Terms- Symbols

## Unit II Listening Skills

10 h

Listening to Talks/Lectures by Specialists on selected subject-specific topics-Listening to Public Announcements- Listening to Instructions and Directions-Listening to Speeches- Listening to process/event descriptions to identify causes & effects

# Unit III Speaking Skills

11 h

Small Talk- Mini Presentations and Making Recommendations- Group Discussions, Debates, and Expressing opinions through Role play- Picture Description-Giving Instruction to Use a Product- Presenting a Product- Summarizing a Lecture-Narrating Personal Experiences/ Events- Interviewing a Celebrity- Scientific Lectures-Educational Videos- Debates- Different Viewpoints on an Issue

## Unit IV Reading Skills

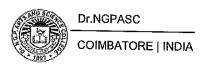
12 h

Reading Biographies, Newspaper Reports, Technical Blogs-Reading Advertisements - Gadget Reviews-Newspaper Articles - Journal Reports - Reading Editorials & Blogs-Case Studies-Excerpts from Literary Texts

# Unit V Writing Skills

12 h

Inferring & Interpreting- Predicting Reorganizing Material- Summary Writing Based on the Reading Passages- Writing - Emails & Essay Writing (Descriptive or Narrative)-Grammar - Tenses- Question Types: Wh/ Yes or No/ and Tags



#### **Text Books**

- Keats, John. To a Friend Who Sent Me Some Roses. <a href="https://www.Poets.org">https://www.Poets.org</a>, 1820, poets.org/poem/ friend-who-sent-me-some-roses.html/> (Unit I)
- Gardiner, Alfred George. On Habits (n.d.). < <a href="https://www.Gutenberg.Org/Files/47429-H/47429-H.Html/">Https://www.Gutenberg.Org/Files/47429-H/47429-H.Html/</a> (Unit I)
  - Murthy, Sudha. The Enchanted Scorpions. (n.d.). <a href="https://www.
- 3 <u>ssgopalganj.in/online/EBooks/CLASS%20VI/Grandma's%20Bag%20of%20</u> <u>Stories%20by%20Sudha%20Murthy.pdf/</u>> pp-34-39. (Unit I)
- Pinski, David. A Dollar a One-act Play.<a href="mailto:www.one-act-plays.com/comedies/dollar.html/">www.one-act-plays.com/comedies/dollar.html/</a> (Unit I)
- Hart, Steve, Aravind R. Nair, Veena Bhambhani. 2016. Embark: English for Undergraduates. Cambridge University Press, New Delhi, India. (Unit II)
- 6 Lakshminarayan. 2012. A Course Book On Technical English. Scitech Publications Pvt. Ltd., New Delhi, India. (Unit III)
- Raman, Meenakshi & Sangeeta Sharma. 2016. Technical Communication-Principles And Practice, Oxford University Press, New Delhi, India. (Unit IV)
- Viswamohan, Aysha. 2017. English For Technical Communication (With CD), McGraw Hill (India) Private Limited, New Delhi, India. (Unit V)

- Bajwa and Kaushik. 2010. Springboard to Success- Workbook for Developing English and Employability Skills. Orient Black Swan, Chennai, India.
- 2 Chellammal, V. 2003. Learning to Communicate. Allied Publishing House, New Delhi, India
- Krishnaswamy. N, LalithaKrishnaswamy& B.S. Valke. 2015. Eco English,
  Learning English through Environment Issues. An Integrated, Interactive
  Anthology. Bloomsbury Publications, New Delhi, India.
- 4 Syamala. V. 2002. Effective English Communication for You. Emerald Publishers, Chennai, Tamil Nadu, India.

Course Code	Course Name	Category	L	Т	P	Credit
233BT1A2CA	GENETICS	CORE	4	1	_	4

This course has been designed for students to learn and understand

- Concepts of Mendelian and Non-Mendelian inheritance
- Theory of inheritance and gene interaction
- Overview on genetic disorders

### **COURSE OUTCOMES**

On the successful completion of the course, students will be able to

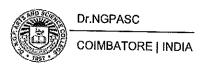
CO Number	CO Statement	Knowledge Level
CO1	Understand the history and concept of Mendelian laws	K2
CO2	Recognize the structure of chromosome, gene and its interaction	K2
CO3	Interpret chromosomal variations and genetic disorders	K2
CO4	Differentiate the natural horizontal gene transfer methods	K3
CO5	Classify the pedigree analysis and understand the population genetics	K3

## MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	РО3	PO4	PO5
CO1	✓	✓	<b>√</b>	<b>✓</b>	✓
CO2	✓	✓	<b>√</b>	✓	✓
CO3	<b>✓</b>				✓
CO4	✓				✓
CO5	✓	✓	<b>✓</b>	✓	✓

#### **COURSE FOCUSES ON**

<b>√</b>	Skill Development	Entrepreneurial Development
<b>✓</b>	Employability	Innovations
	Intellectual Property Rights	Gender Sensitization
<b>√</b>	Social Awareness/ Environment	Constitutional Rights/ Human Values/ Ethics



233BT1A2CA	GENETICS	SEMESTER II

**Total Credits: 4** 

Total Instruction Hours: 60 h

### **Syllabus**

## Unit I Mendelian & Non Mendelian Inheritance

12 h

History of Genetics, Mendel's work: Choice of experimental plant, Monohybrid Experiment, Dihybrid Experiment, Back Cross and Test Cross. Chromosomal theory of Inheritance, Extranuclear inheritance (mitochondrial, chloroplast), Maternal inheritance.

## Unit II Concept of Gene, Alleles and Chromosome

12 h

Gene vs Allele, Multiple Alleles, Pseudo alleles, Lethal genes, penetrance. Gene Interactions: Allelic (Co-Dominance, Incomplete Dominance and pseudodominance), Non Allelic (Epistasis). Concept of loci on Chromosome, Structure of Prokaryotic and Eukaryotic chromosome, Karyotyping.

### Unit III Chromosomal Variations and Abberations

12 h

Mutation: Spontaneous mutations (Point and Frame shift) and Induced mutations, Physical and Chemical mutagens, Numerical–Euploidy and Aneuploidy; Structural(deletion, duplication, inversion and translocation). Single Gene Disorders: Autosomal Dominant-Achondroplasia, Polycystic kidney, Autosomal Recessive –Cystic fibrosis, Sickle cell Anaemia, X-linked Dominant-Rett syndrome, X-linked Recessive-Haemophilia, Multifactorial- Cleft lip and palate

### Unit IV Natural Horizontal Gene Transfer Methods

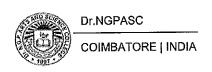
12 h

Genetic analysis of bacteria - Bacterial transformation, Conjugation (sex factor, Hfr strain, F'factor), Transduction in Bacteria (General and Specialized), Linkage and Crossing over, Recombination - Holliday model

# Unit V Transposons and Population Genetics

12 h

Model organism for genetic analysis of development- Drosophila & Arabidopsis. Transposable elements of Prokaryotes (IS Elements, Composite and Tn3 Family) and Eukaryotes (Maize transposable elements), Retrotransposons. Gene frequency, Hardy-Weinberg law, calculating gene frequency, factors affecting gene frequency, Pedigree analysis



#### **Text Books**

- Strickberger MW, 2013, "Genetics", 3<sup>rd</sup> Edition, Prentice Hall College Division, NewDelhi.
- Winter PC, Hickey GI and Fletcher HL, 2000, "Genetics", 1st Edition, VivaBooks Pvt Ltd., India

- Trun N and Trempy J, 2004, "Fundamental Bacterial Genetics", Black well publishing, Singapore
- 2 Strachan T and Read AP, 2006, "Human Molecular Genetics", 3rd Edition, Wiley & Sons, United States
- Maquat L, 2018, "Molecular Biology", 5th Edition, CRC Press, United States
- 4 Brown TA, 1999, "Genetics", 3rd Edition, Chapman and Hall, London, UK

Course Code	Course Name	Category	L	Т	P	Credit
233BT1A2CB	MICROBIOLOGY	CORE	4	1	-	3

This course has been designed for students to learn and understand

- Science of Microbiology and general techniques used
- Beneficial and harmful activities of microorganisms to humans
- Clinical Applications of microbiology.

#### **COURSE OUTCOMES**

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the fundamental concepts of microbiology	K1
CO2	Know the basics of media preparation and different sterilization techniques, Distinguish different phases in microbial growth and learn about nutritional classification	K2
CO3	Discuss the structure, reproduction and the causative diseases of bacteria	K3
CO4	Discuss the structure, reproduction and the causative diseases of Virus	К3
CO5	Discuss the structure, reproduction and the causative diseases of fungus	КЗ

### MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓		<b>✓</b>	
CO2	✓		<b>✓</b>	<b>✓</b>	<b>✓</b>
CO3			✓	<b>~</b>	<b>✓</b>
CO4	<b>✓</b>	✓	<b>✓</b>	<b>~</b>	<b>v</b>
CO5	<b>√</b>	✓	✓	<b>✓</b>	<b>✓</b>

#### COURSE FOCUS ON

Skill Development	Entrepreneurial Development
✓ Employability	Innovations
Intellectual Property Rights	Gender Sensitization
Social Awareness/ Environment	Constitutional Rights/ Human Values/ Ethics

233BT1A2CB MICROBIOLOGY SEMESTER II

**Total Credits: 3** 

Total Instruction Hours: 60 h

### Syllabus

## Unit I Concepts of Microbiology

12 h

History of Microbiology - Biogenesis Vs Abiogenesis, Contributions of Louis Pasteur, Robert Koch, Edward Jenner, Alexander Fleming. Microscopy - Bright field or Light, Dark Field, Phase contrast, Fluorescence; Electron Microscopy - Scanning Electron Microscope (SEM), Transmission Electron Microscope (TEM).

# Unit II Media, Sterilization Techniques and Growth of Microbes

12 h

Sterilization- Methods - Physical - Dry Heat, Moist Heat, Cold sterilization and Chemical sterilization. Preparation of Culture Media - types. Growth curve - Determination of Generation Time, Measurement of Growth - Viable count, Turbidometry and Direct Cell count. Nutritional classification of microbes.

# Unit III Bacteria – Structure and its causative diseases

12 h

Classification (Bergy's manual) - Bacterial Structure, Reproduction of Bacteria. Diseases caused by *Mycobacterium tuberculosis* (Tuberculosis), *Salmonella typhi* (Typhoid), *Vibrio cholera* (Cholera), *Clostridium tetani* (Tetanus) and *Staphylococcus aureus* (Skin Infections), *Corynebacterium diptheriae* (Diptheria).

# Unit IV Virus - Structure and its causative diseases

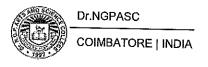
12 h

Virus structure, Classification (Baltimore), Reproduction - Generalized and Specialized, Diseases caused by HIV (AIDS), Hepatitis B Virus (Jaundice), *Varicella zoster* (Chicken Pox), *Polio myelitis* (Polio), Viral gastroenteritis (stomach flu), Ebola and Corona virus 2019 (COVID-19)

# **Unit V** Fungus – structure and its causative diseases

12 h

Fungal structure - classification - reproduction. Diseases caused by *Tinea rubrum* (body ring worm), *Tinea pedis* (athlete's foot), Candida species (bronchitis), *Actinomycetes isrelii* (oral infection), *Aspergillus fumigatus* (sinus), Fungal Eye Infections - Keratitis, Endophthalmitis, Yeast infection (Vaginal), Jock itch (*Tinea cruris*).



#### **Text Books**

- Atlas M Ronald, 2015, "Principles of Microbiology", 2<sup>nd</sup> Edition, McGraw-Hill Publication, India.
- Pelzar M, 2001, "Microbiology", 5<sup>th</sup> Edition, McGraw Hill Education (India) 2 Pvt Ltd, India.

- Brij Mohan Meena, 2018, Microbiology, 1st Edition, Paradise Publisher Jaipur.
- David Greenwood, Richard CB Slack, John F Peutherer, 2002, "Medical Microbiology A Guide to Microbial Interactions: Pathogenesis, Immunity, Laboratory Diagnosis and Control", 16<sup>th</sup> Edition, Churchill Livingstone, Edinburgh.
- Gerard J T, 2012, "Microbiology: An Introduction", 11th Edition, Benjamin Cummings Publishers, USA.
- Joanne Willey, Kathleen Sandman, Dorothy Wood, 2020, "Prescott's Microbiology", 11th Edition, McGraw Hill Education, New York.

233BT1A2CP

## CORE PRACTICAL - II : GENETICS AND MICROBIOLOGY

SEMESTER II

**Total Credits:** 

2

**Total Instructions Hours:** 

48 h

#### S.No

#### **Contents**

- 1. Enumeration of microorganism from soil by serial dilution method
- 2. Staining of Bacteria-Negative and Gram staining, Fungal Staining
- 3. Observation of fungi under stereomicroscope\*
- 4. Bacterial growth curve by turbidimetry method
- 5. Isolation of Auxotropic mutants by Gradient plate technique
- 6. Determination of Thermal death time of bacteria
- 7. Antibiotic sensitivity test Kirby Bauer Method
- 8. Methylene Blue Reduction test
- Determination of Phage Titre
- 10. Sex chromatin observation from Buccal smear \*
- 11. Blood typing in humans for multiple alleles and Rh factor
- 12. Problem solving in Pedigree Analysis

Note: \*DBT STAR College Experiment.

- Sambrook J, Green M R, 2012, "Molecular Cloning: A Laboratory manual", 4th Edition, Cold Spring Harbor, USA.
- Chaitanya K V, 2013, "Cell and Molecular Biology: A Lab Manual", Phi Publisher, India.
- Cappuccino, 2005, "Microbiology: A Laboratory Manual", Pearson Education, UK.
- Kannan N, 2002, "Laboratory Manual in General Microbiology", Panima
  4
  Publishers, India

Course Code	Course Name	Category	L	Т	P	Credit
234CS1A2IB	PYTHON FOR BIOLOGISTS		4	_	-	4

This course has been designed for students to learn and understand

- The problem-solving techniques using Python.
- The basic operations in Python programming language.
- The concepts of Bio python.

# **COURSE OUTCOMES**

On the successful completion of the course, students will be able to

CO Number	COState	
CO1	Understand Digital computer as Data Analytics tool through Python.	K1
CO2	Illustrate Problem solving strategies using Functions.	K3
CO3	Analyze the method of solving simple problems through Python.	K4
CO4	Apply the theory behind Lists, Tuples and Dictionaries.	K3
CO5	Evaluate working knowledge of Bio python and its various functionalities	K5

### MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	<b>√</b>		<b>✓</b>	<b>✓</b>	<b>✓</b>
CO2	✓	<b>√</b>	<b>√</b>		
CO3	✓	✓		<b>√</b>	
CO4	<b>✓</b>		<b>✓</b>		<b>*</b>
CO5		<b>✓</b>			

<b>/</b>	Skill Development	Entrepreneurial Development
<b>✓</b>	Employability	Innovations
	Intellectual Property Rights Social Awareness/ Environment	Gender Sensitization  Constitutional Rights/ Human Values/ Ethics
		Butucs

234CS1A2IB PYTHON FOR BIOLOGISTS SEMESTER II

Total Credits: 4

Total Instruction Hours: 48 h

# **Syllabus**

# Unit I Introduction to Digital Computer and Python

10 h

Introduction to Digital Computer: Von Neumann concept - Storage - Programming Languages - Translators - Problem Solving Strategies: Problem Analysis - Algorithms - Flow Charts - Introduction to Python: Introduction- Python overview- Comments - Python Identifiers - Reserved keywords - Variables - Standard data types - Operators - Statements and Expressions - String Operations - Boolean Expressions

# Unit II Control Statements and Functions

10 h

Control Statements: Iteration - The for loop - While statement - if elif else statement - Input from keyboard Functions: Introduction - Built-in functions - Composition of Functions - Type conversion - Type coercion - Date and time - dir() function - help() function - User defined functions - Parameters & arguments - Function calls - The return statement - Python recursive function - Writing Python Scripts

# Unit III Strings and Lists

10 h

Strings: Compound data type – len function – String slices – String traversal – Escape characters – String formatting operator – String formatting functions. Lists – Values and accessing elements – Traversing a list – Deleting elements from list – Built-in list operators – Built-in list methods.

# Unit IV Tuples and Dictionaries

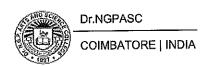
10 h

Tuples: Creating tuples-Accessing values in tuples-Tuple assignment-Tuples as return values-Basic tuple operations-Built-in tuple functions-Dictionaries: Creating a dictionary-Accessing values in a dictionary -Updating dictionary - Deleting elements from dictionary - Operations in dictionary - Built-in dictionary methods.

# Unit V Introduction to Biopython

8 h

Biopython Installation-Biopython Components: Alphabet-Seq-MutableSeq-SeqRecord-Align-AlignIO-ClustalW-SeqIO-AlignIO-BLAST-Biological Related Data-Entrez-PDB-PROSITE-SeqUtils-Sequencing.



### **Text Books**

- E. Balagurusamy, 2016, "Introduction to Computing and Problem-Solving
   UsingPython", First Edition, McGraw-Hill publication, New Delhi.(Unit I to IV).
- Sebastian Bassi, 2017, Python for Bioinformatics, Second Edition, CRC Press (Unit V).

- Fabio Nelli, 2018, "Python Data Analytics", Second Edition, Apress, New York..
- Wes McKinney, 2011, "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPythony", O'Reilly, USA.
- Zed Shaw,2014, "Learn Python the Hard Way", 3rd Edition, Addison-Wesley, USA,
- 4 Mark Summerfield, 2018, "Programming in Python 3", Second Edition, Pearson India Education Services Pvt. Ltd, Noida...

231TL1A2AA

#### **BASIC TAMIL**

SEMESTER II

**Total Credits: 2** 

Total Instruction Hours: 24 h

இளங்கலை 2023–24ஆம் கல்வியாண்டு முதல் சேர்வோர்க்குரியது (10 மற்றும் 12 – ஆம் வகுப்பு வரை தமிழ் மொழிப்பாடம் பயிலாதவர்களுக்கு)

> (பருவத் தேர்வு இல்லை) Syllabus

# Unit I தமிழ் மொழியின் அடிப்படைக் கூறுகள்

05 h

எழுத்துகள் அறிமுகம்

- 1 உயிர் எழுத்துக்கள் குறில் , நெடில் எழுத்துகள்
- 2. மெய் எழுத்துக்கள் வல்லினம், மெல்லினம், இடையினம்
- 3. உயிர்மெய் எழுத்துக்கள்
- 4. பயிற்சி

# Unit II சொற்களின் அறிமுகம்

05 h

- 1.பெயர்ச்சொல்
- 2.வினைச்சொல் விளக்கம் (எ.கா.)
- 3.பயிற்சி

# Unit III குறிப்பு எழுதுதல்

05 h

- 1. பெயர், முகவரி, பாடப்பிரிவு , கல்லூரியின் முகவரி
- 2. தமிழ் மாதங்கள்(12), வாரநாட்கள்(7)
- 3. எண்கள் (ஒன்று முதல் பத்து வரை), வடிவங்கள், வண்ணங்கள்

# Unit IV குறிப்பு எழுதுதல்

05 h

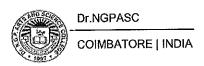
- 1. ஊர்வன, பறப்பன, விலங்குகள்
- 2.மனிதர்களின் உறவுப்பெயர்கள்
- 3. ஊர்களின்பெயர்கள் (எண்ணிக்கை 10)

# Unit V பயிற்சிப் பகுதி

04 h

பயிற்சிப் பகுதி (உரையாடும் இடங்கள்)

வகுப்பறை, பேருந்து நிலையம், சந்தை– பேசுதல்,எழுதுதல்.



### Notes:

அகமதிப்பீட்டுத்தேர்வு – வினாத்தாள் அமைப்புமுறை- மொத்த மதிப்பெண்கள் - 50

பகுதி –அ

சரியான விடையைத் தேர்வு செய்தல் 10 x2=20

பகுதி –ஆ

சரியா? தவறா? 10x2=20

பகுதி – இ

ஒரு பக்க அளவில் விடையளிக்க 1x10=10

#### குறிப்பு:

- அனைத்து அலகுகளில் இருந்தும் வினாக்கள் அமைதல் வேண்டும்
- ∙ பகுதி இ–க்கான வினாக்கள் இதுஅல்லது அதுஎன்ற அடிப்படையில் அமைதல் வேண்டும்

# **Text Book**

அடிப்படைத் தமிழ் - 2023-2024,தொகுப்பு: தமிழ்த்துறை, டாக்டர் என்.ஜி.பி. கலை அறிவியல் கல்லூரி,கோயம்புத்தூர்.வெளியீடு: நியூ செஞ்சுரி புக் ஹவுஸ்,சென்னை. (Unit I to IV)

- 1 ஒன்றாம் வகுப்பு பாடநூல் தமிழ்நாடு அரசு பாடநூல் கழகம், சென்னை.
- 2 தமிழ் இணையக் கல்விக்கழகம் TAMIL VIRTUAL ACADEMY வலைதள முகவரி: <a href="https://www.tamilvu.org/">https://www.tamilvu.org/</a>

231TL1A2AB

### ADVANCED TAMIL

SEMESTER II

**Total Credits: 2** 

Total Instruction Hours: 24 h

இளங்கலை 2023– 2024 ஆம் கல்வியாண்டு முதல் சேர்வோர்க்குரியது
(10 மற்றும் 12– ஆம் வகுப்புகளில் தமிழ் மொழிப்பாடம் பயின்றவர்களுக்கு உரியது)
(பருவத் தேர்வு இல்லை )
Syllabus

# Unit I கவிதைகள்

06 h

- 1. தமிழ்நாடு பாரதியார்
- 2.மனதில் உறுதி வேண்டும் பாரதியார்
- 3. இன்பத்தமிழ் பாரதிதாசன்
- 4.வேலைகளல்லவேள்விகள் தாராபாரதி
- 5.தமிழா! நீ பேசுவது தமிழா! காசியானந்தன்
- 6. நட்புக் காலம்(10 கவிதைகள்)- அறிவுமதி கவிதைகள்

# Unit II கட்டுரை

05 h

கட்டுரைத் தொகுப்பு -நல்வாழ்வு - டாக்டர் மு.வரதராசன்

- 1. நம்பிக்கை
- 2. புலனடக்கம்
- 3. பண்பாடு

# Unit III இலக்கணம்

04 h

- 1.வல்லினம் மிகும் மற்றும் மிகா இடங்கள்
- 2. ர.ற.ல,ழ,ள,ந,ண,ன வேறுபாடு அறிதல்

### Unit IV கடிதங்கள்

05 h

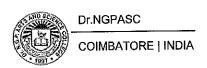
- 1. பாராட்டுக் கடிதம்
- 2. நன்றிக் கடிதம்
- 3. அழைப்புக் கடிதம்
- 4. அலுவலக விண்ணப்பங்கள்

### Unit V பயிற்சிப் பகுதி

04 h

# படைப்பாக்கப் பகுதி

பொதுத் தலைப்புகளில் கவிதை,கட்டுரை எழுதச்செய்தல்



#### **Notes**

அக மதிப்பீட்டுத் தேர்வு - வினாத்தாள் அமைப்பு முறை- மொத்த மதிப்பெண்கள் 50

பகுதி –அ

சரியான விடையைத் தேர்வு செய்தல் 10

x1=10

பகுதி –ஆ

கோடிட்ட இடங்களை நிரப்புக.

10x2=20

பகுதி –இ

இரண்டு பக்க அளவில் விடையளிக்க

2x10=20

### குறிப்பு:

- அனைத்து அலகுகளில் இருந்தும் வினாக்கள் அமைதல் வேண்டும்
- ∙ பகுதி இ–க்கான வினாக்கள் இதுஅல்லது அதுஎன்ற அடிப்படையில் அமைதல் வேண்டும்

#### Text Book

1 சிறப்புத் தமிழ் - 2023-2024, தொகுப்பு: தமிழ்த்துறை , டாக்டர் என்.ஜி.பி. கலை அறிவியல் கல்லூரி, கோயம்புத்தூர். வெளியீடு: நியூ செஞ்சுரி புக் ஹவுஸ், சென்னை. (Unit- I to IV)

- 1 பேராசிரியர் புலவர் சோம. இளவரசு ,எட்டாம் பதிப்பு. 2014 . தமிழ் இலக்கிய வரலாறு மணிவாசகர் பதிப்பகம்,சென்னை.
- 2 டாக்டர் மு.வரதராசன். 2010. நல்வாழ்வு, பாரி நிலையம், சென்னை.
- 3 பேராசிரியர் முனைவர் பாக்கியமேரி,முதற் பதிப்பு.2013. இலக்கணம் இலக்கிய வரலாறு மொழித்திறன்- பூவேந்தன் பதிப்பகம், சென்னை..
- 4 தமிழ் இணையக் கல்விக்கழகம் TAMIL VIRTUAL ACADEMY. வலைதள முகவரி : <a href="https://www.tamilvu.org/">https://www.tamilvu.org/</a>

Course Code	Course Name	Category	L	Т	P	Credit
235CR1A2AA	HUMAN RIGHTS AND WOMEN'S RIGHTS	AECC	2	_	_	2

This course has been designed for students to learn and understand

- Concepts of Human Rights.
- Human Right Violations and Redressal Mechanism.
- Rights to Women and Child.

### **COURSE OUTCOMES**

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the Basic concepts of Human Rights	K1
CO2	Describe the Fundamental Rights	K2
CO3	Relate human Right Violations and Redressal Mechanism.	K3
CO4	State the Rights to Women and Child	K2
CO5	Apply Civil and Political Rights of Women	K3

### MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	A STATE OF THE STA	✓		<b>✓</b>	✓
CO2		<b>✓</b>	✓	<b>✓</b>	<b>/</b>
CO3				✓	<b>*</b>
CO4		<b>√</b>		<b>✓</b>	<b>✓</b>
CO5	✓	<b>/</b>	✓	<b>✓</b>	<b>V</b>

### COURSE FOCUSES ON:

Skill Development	Entrepreneurial Development
Employability	Innovations
Intellectual Property Rights	✓ Gender Sensitization
Social Awareness/ Environment	Constitutional Rights/ Human Values/

235CR1A2AA

# **HUMAN RIGHTS AND WOMEN'S RIGHTS**

SEMESTER II

Total Credits: 2

Total Instruction Hours: 24 h

# **Syllabus**

# Unit I Introduction to Human Rights

04 h

Meaning - Definition - Nature - Content - Legitimacy of Human Rights - Origin and Development of Human Rights - Theories - Principles of Magna Carta - Modern Movements of Human Rights - The Future of Human Rights.

# Unit II Human Rights in India

05 h

The Constitution of India – Fundamental Rights – Right to Life and Liberty – Directive Principles of State Policy – Fundamental Duties – Individual and Group Rights – Other facets of Human Rights – Measures for Protection of Human Rights in India.

# Unit III Human Right Violations and Redressal Mechanism

05 h

Human Rights – Infringement of Human Right by State Machinery and by Individual – Remedies for State action and inaction – Constitutional Remedies – Public Interest Litigation (PIL) - Protection of Human Rights Act, 1993 – National Human Rights Commission – State Human Rights Commissions – Constitution of Human Right Courts.

# Unit IV Rights to Women and Child

05 h

Matrimonial protection - Protection against dowry-Protection to pregnancy-Sexual offences - Law relating to work Place - Directive principles of Constitution (Article 39 a, d, e & Article 42, 43 & 46) - Trafficking of women - Constitutional Rights - Personal Laws - Protection of children against Sexual Offences Act 2012 (POCSO).

# Unit V Civil and Political Rights of Women

05 h

Right of Inheritance - Right to live with decency and dignity - The Married women's Property Act 1874 - Women's right to property - Women Reservation Bill - National Commission for Women - Political participation - Pre independent political participation of women - Participation of Women in post independent period.

### **Text Books**

- LalitParmar, 1998, "Human Rights", Anmol Publications Pvt. Limited, New Delhi.
- 2 Krishna Pal Malik, 2009, "Women & Law", Allahabad Law University, New Delhi.

### References

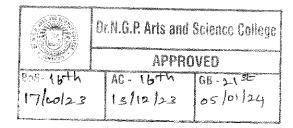
- Mandagadde Rama Jois, 2015, "Human Rights", Bharatiya Values, Bharatiya Vidya Bhavan Publications, Mumbai.
- Paras Diwan and PiyushDiwan, 1994, "Women and Legal Protection", South Asia Books, Andhra Pradesh.
- WenkataramandSandhiya. N, 2001, "Research in Value Education", APH Publishing Corporation, New Delhi.
- Anand A S, 2008, "Justice for Women: Concerns and Expressions", Universal Law Publishing Co., New Delhi.

Bos Chairman/HoD

Department of Biotechnology

DE N. G. P. Arts and Science College

Colmbatore — 641 048





Course Code	Course Name	Category	L	Т	P	Credit
231TL1A3TA	TAMIL- III	LANGUAGE- I	3	1	-	3

This course has been designed for students to learn and understand

- மொழிப்பாடங்களின் வாயிலாக தமிழரின் பண்பாடுநாகரீகம்
   செய்தல்
- ,பகுத்தறிவு ஆகியவற்றை அறியச்

- கலை மற்றும் மரபுகளை அறியச் செய்தல்
- மாணவர்களின் படைப்பாக்கத்திறன்களை ஊக்குவித்தல்

### **COURSE OUTCOMES**

On the successful completion of the course, students will be able to

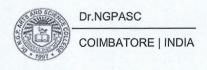
CO Number	CO Statement	Knowledge Level
CO1	வாழ்க்கைத்திறன்கள் (Life Skills)- மாணவர்களின் செயலாக்கத்திறனை ஊக்குவித்தல்	K1
CO2	மதிப்புக்கல்வி (Attitude and Value education)	K2
CO3	பாடஇணைச்செயல்பாடுகள் (Co-curricular activities)	K2
CO4	சூழலியல் ஆக்கம் (Ecology)	К3
CO5	மொழி அறிவு(Tamil knowledge)	К3

#### MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	1		
CO2			The Art San Start	1	20.00 m
CO3		1			
CO4	<b>√</b>		1		
CO5	<b>√</b>			1	

### **COURSE FOCUSES ON**

1	Skill Development	<b>✓</b>	Entrepreneurial Development
<b>✓</b>	Employability	1	Innovations
<b>✓</b>	Intellectual Property Rights	<b>✓</b>	Gender Sensitization
✓	Social Awareness/ Environment	✓	Constitutional Rights/ Human Values/ Ethics



231TL1A3TA TAMIL-III SEMESTER III

**Total Credits: 3** 

Total Instruction Hours: 48 h

# **Syllabus**

# Unit I காப்பியங்கள்

10 h

- 1.சிலப்பதிகாரம் –வழக்குரை காதை
- 2. மணிமேகலை–ஆதிரை பிச்சையிட்ட காதை

# Unit II காப்பியங்கள்

10 h

- 1. கம்பராமாயணம் -கும்பகர்ணன் வதைப்படலம்: பா. எண்: 60 முதல் 100 வரை
- 2. பெரிய புராணம் அதிபத்த நாயனார்புராணம்

# Unit III சிற்றிலக்கியங்கள்

10 h

- 1.திருக்குற்றாலக்குறவஞ்சி வசந்தவல்லி பந்தாடிய சிறப்பு (6: 4கண்ணிகள்)
- 2.கலிங்கத்துப்பரணி-களம்பாடியது: போர்க்களக் காட்சி- பா.எண்: 472 முதல்- 502 வரை

# Unit IV இலக்கிய வரலாறு

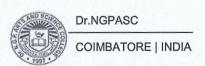
10 h

- 1.காப்பியம் வரையறை,ஐம்பெருங் காப்பியங்கள்,ஐஞ்சிறு காப்பியங்கள்
- 2.கம்பராமாயணம், பெரிய புராணம் குறிப்பு
- 3. சிற்றிலக்கியங்களின் தோற்றமும் வளர்ச்சியும்

# Unit V இலக்கணம் &பயிற்சிப் பகுதி

08 h

- அ. இலக்கணம்
- 1.'பா' வகைகள் : வெண்பா, ஆசிரியப்பா, கலிப்பா, வஞ்சிப்பா பொது இலக்கணம் மட்டும்.
- 2. அணி: உவமையணி, உருவக அணி, இல்பொருள் உவமையணி விளக்கம், உதாரணம்.
- ஆ. பயிற்சிப் பகுதி
- 1.வாசகர் கடிதம்: நாளிதழ்,வானொலி,செய்தி ஊடகங்களுக்கு விமர்சனம் எழுதுதல்
- 2.திரைக்கதை :மத்திய மற்றும் மாநில அரசு விருது பெற்ற தமிழ்த் திரைப்படங்கள் மட்டும்



### **Text Book**

தமிழ் மொழிப்பாடம்-2023 -2024 ,தொகுப்பு: தமிழ்த்துறை , டாக்டர் என்.ஜி.பி. கலை அறிவியல் கல்லூரி ,கோயம்புத்தூர். வெளியீடு: நியூ செஞ்சுரி புக் ஹவுஸ் ,சென்னை. (Unit I to V)

- 1 பேராசிரியர் புலவர் சோம. இளவரசு ,எட்டாம் பதிப்பு-2014,தமிழ் இலக்கிய வரலாறு-மணிவாசகர் பதிப்பகம்,சென்னை.
- 2 பேராசிரியர் முனைவர் பாக்கியமேரி ,முதற் பதிப்பு- 2013,இலக்கணம்-இலக்கிய வரலாறு- மொழித்திறன்- பூவேந்தன் பதிப்பகம்,சென்னை. .
- 3 தமிழ் இணையக் கல்விக்கழகம் TAMIL VIRTUAL ACADEMY. வலைதள முகவரி : https://www.tamilvu.org

Course Code	Course Name	Category	Г	P	Credit
231TL1A3HA	HINDI- III	LANGUAGE- I	3 1	-	3

This course has been designed for students to learn and understand

- the writing ability and develop reading skill
- the various concepts and techniques for criticizing literature
- the techniques for expansion of ideas and translation process

#### **COURSE OUTCOMES**

On the successful completion of the course, students will be able to

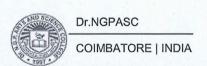
CO Number	CO Statement	Knowledge Level
CO1	Learn the fundamentals of novels and stories	K1
CO2	Understand the principles of translation work	K2
CO3	Expose the knowledge writing critical views on fiction	K2
CO4	Build creative ability	K3
CO5	Apply the power of creative reading	К3

### MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	1			1	<b>✓</b>
CO2		1			✓
CO3	✓		1	1	
CO4					✓
CO5	1	1	1		1

### **COURSE FOCUSES ON**

✓ Skill Development	✓ Entrepreneurial Development
Employability	✓ Innovations
Intellectual Property Rights	✓ Gender Sensitization
✓ Social Awareness/ Environment	Constitutional Rights/ Human Values/ Ethics



231TL1A3HA HINDI- III SEMESTER III

**Total Credits: 3** 

Total Instruction Hours: 48 h

# **Syllabus**

#### Unit I

10 h

पद्य - काव्य पराशर (भोलानाथ)

(प्राचीन- कबीर, तुलसी, सुर, मीरा, आधुनिक- मैथिलीशरण गुप्त, अरूण कमल)

# Unit II

10 h

हिन्दी साहित्य का इतिहास: (साधारण ज्ञान)

# Unit III

10 h

अलंकार:अनुप्रास,यमक, श्लेष, वक्रोक्ति, उपमा,रूपक

### Unit IV

10 h

संवादलेखन

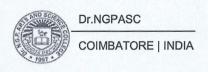
### Unit V

08 h

अनुवादअभ्यास-III (केवलहिन्दीसेअंग्रेजीमें) (पाठ10 to 20)

### **Text Books**

- प्रकाशक: जवाहर पुस्तकालय सदर बाजार, मथुराउत्तर प्रदेश-281001(Unit I)
- 2 आचार्य रामचन्द्र शुक्ललोकभारती प्रकाशन इलाहाबाद. (Unit II)
- 3 प्रकाशक: विनोद पुस्तक मंदिरआगरा-282002 (Unit III)
- 4 पुस्तक: व्याकरणप्रदिप-रामदेवप्रकाशक: हिन्दीभवन36 इलाहाबाद-211024(Unit IV)
- 5 प्रकाशक: दक्षिण भारत प्रचार सभा चेनैई -17(Unit V)



Course Code	Course Name	Category	L	Т	P	Credit
231TL1A3MA	MALAYALAM- III	LANGUAGE-I	3	1	-	3

This course has been designed for students to learn and understand

- the writing ability and develop reading skill
- the various concepts and techniques for criticizing literature, to learn the techniques for expansion of ideas and translation process
- the competency in translating simple Malayalam sentences into English and vice versa

### COURSE OUTCOMES

On the successful completion of the course, students will be able to

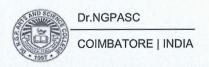
CO Number	CO Statement	Knowledge Level
CO1	Learn the fundamentals of novels and stories	K1
CO2	Understand the principles of translation work	K2
CO3	Expose the knowledge writing critical views on fiction	K2
CO4	Build creative ability	K3
CO5	Apply the power of creative reading	K3

#### MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	1			1	
CO2	✓				1
CO3		<b>✓</b>	✓		
CO4	✓			✓	✓
CO5	1	1	✓		1

#### **COURSE FOCUS ON**

<b>✓</b>	Skill Development	<b>✓</b>	Entrepreneurial Development
<b>✓</b>	Employability	<b>✓</b>	Innovations
1	Intellectual Property Rights	✓	Gender Sensitization
<b>✓</b>	Social Awareness/ Environment	<b>✓</b>	Constitutional Rights/ Human Values/ Ethics



231TL1A3MA	MALAYALAM- III	SEMESTER III
		T 1 1 0 11 0

**Total Credits:** 3

Total Instruction Hours: 48 h

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		Эупириз	
Unit I	Poetry		10 h
Kumaranas	ean		
Unit II	Poetry		10 h
Kumaranas	ean		
Unit III	Poetry		10 h
Kumaranas	san		
Unit IV	Poetry		10 h
VayalarRar	navarma		
Unit V	Poetry		08 h

### **Text Books**

VayalarRamavarma

- 1 Kumaranasan. 1998. Chinthavishtayaya Sitha. DC Books Kottayam, Kerala, India.(Unit I to III)
- 2 Ayisha (Poem), National Book Stall Kottayam, Kerala, India. (Unit IV & V)

# Reference

1 Dr.M.Leelavathy.Kavitha Sahithya Charithram. Sahithya Academy Thrissur, Kerala, India.

Course Code	Course Name	Category	L	Т	P	Credit
231TL1A3FA	FRENCH- III	LANGUAGE- I	3	1	-	3

This course has been designed for students to learn and understand

- the Competence in General Communication Skills Oral + Written- Comprehension & Expression
- the Culture, life style and the civilization aspects of the French people as well as of France
- the students to acquire Competency in translating simple French sentences into English and vice versa

### **COURSE OUTCOMES**

On the successful completion of the course, students will be able to

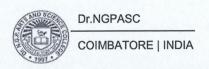
CO Number	CO Statement	Knowledge Level
CO1	Learn the Basic verbs, numbers and accents	K1
CO2	Apply the adjectives and the classroom environment in France	K2
CO3	Select the Plural, Articles and the Hobbies	K2
CO4	Measure the Cultural Activity in France	КЗ
CO5	Evaluate the sentiments, life style of the French people and the usage of the conditional tense	К3

#### MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	1				1
CO2	1	1			
CO3			1	✓	
CO4	1	✓			1
CO5	✓		1	✓	✓

### **COURSE FOCUSES ON**

<b>1</b>	Skill Development	1	Entrepreneurial Development
<b>/</b>	Employability	<b>✓</b>	Innovations
· /	Intellectual Property Rights	<b>✓</b>	Gender Sensitization
✓	Social Awareness/ Environment	· 🗸	Constitutional Rights/ Human Values/ Ethics



231TL1A3FA FRENCH-III SEMESTER III **Total Credits:** 3 Total Instruction Hours: 48 h **Syllabus** Unit I 10 h Décrireun lieu. A Comprehendre la description Comprendreune partird'unerecherche d'un lieu. presentation de catalogue Situer documents, Décrireunevilleouunerégionq touristique. de u'onaime. Comprendre des composer une Interrogersur la situation of presentation pictogrammes. touristique pour un d'un lieu. Comprendre magazine ou un site Comprendre des indications description d'un lieu et internet. sur la fréquenced'actions. d'une situation precise message dans un électronique. Unit II 10 h Se situerdans Comprehendre le Comprendreune partird'unerecherc description d'un lieu. presentation temps. de he de documents, Décrireunevilleouunerégio catalogue touristique. composer une ngu'onaime. Comprendre des Interrogersur la situation presentation pictogrammes. touristique pour un of d'un lieu. Comprendre la magazine ou un Comprendre des description d'un lieu et site internet. indications la d'une situation precise sur fréquenced'actions. dans un message électronique. Unit III 10 h

Raconter.	Raconterune scene	Comprehendre	le récit d	Ecrire une biographie a
° Décrire les	insolite à l'oreal et à	ún voyage.		partir d'eléments écrits.
étapesd'une	l'écrit.	Raconterses	actions	
action.		quotidiennes.		

Unit IV 10 h

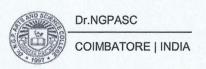
Exprimer	Raconterune scene	Comprehendre le récit d	Ecrire une biographie a
l'intensité et la	insoliteà l'oreal et à	ún voyage.	partir d'eléments écrits.
quantité.	l'écrit.	Raconterses actions	
° Interroger.		quotidiennes.	

Unit V 08 h

Make in Own Sentences based on the above Lessons

#### **Text Book**

LATITUDES 1 (Méthode de français) Pages from 102-127, Author: RegineMérieux, Yves Loiseau( 1 Unit I to IV)



Course Code	Course Name	Category	L	Т	P	Credit
231EL1A3EA	ENGLISH - III	LANGUAGE- II	3	1	-	3

This course has been designed for students to learn and understand

- the basics of English grammar and specific usage
- the importance of the vocabulary and its use in different contexts
- the necessity of communication and composition writing skills

### **COURSE OUTCOMES**

On the successful completion of the course, students will be able to

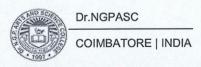
CO Number	(C) Statement			
CO1	Infer the specific usage of while-listening process	K2		
CO2	Organize the various abilities and sub-skills involved in reading	К3		
CO3	Utilize the importance of speaking skills and developing it through various practices	К3		
CO4	Master diverse business communication formats and skills	K4		
CO5	Acquire all-round mature outlook to function effectively in different context	K4		

#### MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1			1		1
CO2	1	1		1	
CO3	1		1	12.1.577 (19.1.5)	<b>✓</b>
CO4	✓		1		
CO5		1		1	

### **COURSE FOCUSES ON**

<b>✓</b>	Skill Development	✓ Entrepreneurial Development	
<b>✓</b>	Employability	✓ Innovations	
<b>✓</b>	Intellectual Property Rights	✓ Gender Sensitization	
<b>✓</b>	Social Awareness/ Environment	Constitutional Rights/ Human Values/ Ethics	The state of the s



231EL1A3EA ENGLISH - III SEMESTER III

**Total Credits: 3** 

Total Instruction Hours: 48 h

# Syllabus

# Unit I Listening and Reading

09 h

Listening in casual conversation, Small group and Conference setting - Listening for Factual Information- Barriers of Listening- Developing Listening skills- Poor listening vs Effective Listening - Basics of Reading- Efficient and Inefficient Readers- Advantages of Reading- Four Basic steps of Effective Reading- Stumbling blocks in becoming an effective Reader- Strategies for Comprehending and Retaining content- Effective Note Taking while Reading

# Unit II Speaking

09 h

Purpose of General Conversations- Advantages, Features of a good conversation-Tips for improving Conversation- Public Speaking- Importance of Public Speaking-Benefits, Tips, Overcoming fear of Public Speaking- Preparatory steps - Structuring the contents- Audience Awareness- Mode of Delivery

# Unit III Writing Skills

10 h

Preparing an Effective CV or a Resume with Job Applications- Employers expectation - Organize the material- Useful suggestions- Cover Letter- Content to be included- Tone of the letter- Report Writing- importance- features- Types - main parts- Feasibility report- Accident report- Scientific report- Memos - Introduction- Structure- Proposal Writing

# Unit IV English for Communication & Skill for Employment

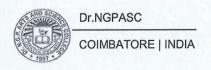
12 h

Notices, Agendas and Minutes- Business correspondence- Speeches- Meetings, Vocabulary Development- Editing Skills, and Reference Skills- Reading and Replying to E-Mails- Making Presentations- Interview Techniques- Group Discussion, and Oral Presentation Skills- Interacting with Superiors, and Listening to Reports and Customer Complaints- Preparing the minutes of a meeting-Presenting Data in Verbal and Non-verbal modes- The Correct Attitude of Employment

# Unit V Soft Skills

08 h

Importance of soft skills- Attributes- Social Skills- Thinking- Negotiating-Exhibiting- Identifying - Soft Skills training - Train Yourself- Practicing soft skills-Measuring attitude - Self-Discovery: Importance of knowing yourself- Process - SWOT analysis - Benefits - Usage - SWOT Analysis grid- Art of Negotiation



#### **Text Books**

- Camp and Satterwhite. 1998. College English and Communication. 7th Edition Glencoe Mchrawttill Publishers, New York, Unites States of America. (Unit I, II, III)
- 2 Kumar, Sanjay and Lata Pushp. 2018. Language and Communication Skills for Engineers. First Edition, Oxford University Press, India. (Unit I, II, III)
- Mohan, Krishna and Banerji, Meera. 2009. Developing Communication skills. 2<sup>nd</sup> Edition, Macmillcan, India. (Unit I, II, III, IV)
- 4 Alex. Soft Skills. 2009. S. Chand Publishing, New Delhi, India. (Unit V)

- Ghosh, B.N. Editor. 2017. Managing Soft Skills for Personality Development. McGraw-Hill Education, Chennai, India.
- Miles Craven. 2008. Cambridge English Skills Real Listening and Speaking. First Edition, Cambridge University Press, United Kingdom.
- Mishra, Gauri and Ranjana Kaul. 2016. Language Through Literature. Primus Books, India.
- 4 Pillai G, Radhakrishna. 2000. English for Success. Emerald Publishers, Chennai, India.

Course Code	Course Name	Category	L	T	P	Credit
233BT1A3CA	MOLECULAR BIOLOGY	CORE	4	-	-	4

This course has been designed for students to learn and understand

- The basic concept of life.
- The process of cellular mechanisms.
- The process of transcriptional events.

### **COURSE OUTCOMES**

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Learn the Basics of DNA and RNA	K1
CO2	Impart knowledge on the mode of DNA replication	K2
CO3	Provide in-depth knowledge of transcriptional events	K3
CO4	Focus on translational events and its role in gene Expression	K4
CO5	Know the concept of DNA Damage and repair Mechanisms	K1

### MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	<b>√</b>	<b>✓</b>	1	✓	1
CO2	✓	<b>✓</b>	✓	1	1
CO3	✓	<b>✓</b>	✓	1	1
CO4	✓	✓	✓		
CO5			✓.		

<b>✓</b>	Skill Development	Entrepreneurial Development
1	Employability	Innovations
	Intellectual Property Rights	Gender Sensitization
	Social Awareness/ Environment	Constitutional Rights/ Human Values/ Ethics

233BT1A3CA

### **MOLECULAR BIOLOGY**

SEMESTER III

**Total Credits: 4** 

**Total Instruction Hours:** 48 h

# **Syllabus**

# Unit I Historical and Conceptual Background

10 h

Discovery of DNA as genetic material - Griffith's experiment, Avery, Macleod and McCarty Experiment and Hershy and Chase experiment. Structure of Nucleoside and Nucleotide. Structure of DNA (Watson and Crick Model), Types of DNA (A-DNA, B-DNA and Z-DNA). Structure and Types of RNA (mRNA, tRNA and rRNA), Small interfering RNA(Si), Micro RNA (Micro RNA), Satellite RNA and Small Nuclear RNA (Sn).

# Unit II Central Dogma & Replication

10 h

Over view of Central dogma, Experimental proof for Semi conservative method. Enzymes & accessory proteins involved in DNA replication. Replication process in prokaryotic & Eukaryotic DNA. Differences between Prokaryotic and eukaryotic replication. Rolling circle model of replication.

# Unit III Transcription

10 h

Importance of DNA binding Proteins, RNA polymerase. Mechanism of Transcription in prokaryotes & Eukaryotes. Differences between Prokaryotic and eukaryotic transcription. Post transcriptional Modifications in RNA - 5' cap formation, 3'-end polyadenylation (Poly A Tail). Splicing and Processing of m-RNA, r-RNA & t-RNA. Transcriptional regulation in prokaryotes – *lac* operon and *trp* operon.

#### Unit IV Translation

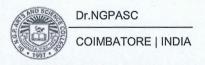
10 h

Overview of Genetic code, wobble hypothesis. Mechanism of translation in Prokaryotes & Eukaryotes. Post translational modifications of proteins-Phosphorylation, Deformylation, Glycosylation, Acetylation, Amidation, Lipidattachment, S - Nitrosylation and Disulfide bond formation. Translational inhibitors.

# Unit V DNA Damage and DNA Repair

8 h

Repair mechanism-Nucleotide excision, base excision, Mismatch repair, Photo reactivation, SOS and recombination repair. Epigenetic Modifications.



#### **Text Books**

- Bruce Alberts,Rebecca Heald, et al., 2022,"Molecular Biology of The Cell", 7<sup>th</sup> Edition, W.W. Norton & Company, New York.
- 2 Lodish H *et al.*, 2007, "Molecular Cell Biology", 4th Edition, American Scientific Books, United States.

- Jocelyn E Krebs, Benjamin Lewin, et al.,, 2011, "Genes XI",11th Edition, Jones & Bartlett Learing, USA.
- 2 Gerald Karp, 2007, "Cell and Molecular Biology, Concept and Experiments", 8th Edition, Wiley & Sons, USA.
- Freifelder D & Malacinski GM, 1996, "Essential of Molecular Biology", 2nd Edition, Panima Publishing Co, New Delhi.
- De Robertis, 2011, "Cell and Molecular Biology", 8th Edition, Lippincott Williams & Wilkins, USA.

Course Code	Course Name	Category	L	Т	P	Credit
233BT1A3CB	BIODIVERSITY	CORE	4	-	-	4

This course has been designed for students to learn and understand

- The diversity and conservation of organisms.
- The importance of diversity.
- The ethics involved in conservation.

### **COURSE OUTCOMES**

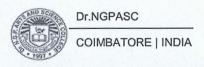
On the successful completion of the course, students will be able to

CO Number	COStatement			
CO1	CO1 Identify the nature, concept and definition of Biodiversity, conservation strategies.			
CO2	Explain the Global patterns of Biodiversity	K2		
CO3	Discuss biodiversity & major biomes of world	K2		
CO4	Demonstrate biodiversity for sustainable development	K3		
CO5	Analyze the ethics involved in conservation	K3		

### MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	1	1	1	1	1
CO2		✓	✓	<b>✓</b>	<b>✓</b>
CO3	1	1	1	<b>✓</b>	<b>✓</b>
CO4	1	1	1		
CO5	1	1	1		✓

<b>✓</b>	Skill Development	Entrepreneurial Development
<b>✓</b>	Employability	Innovations
	Intellectual Property Rights	Gender Sensitization
1	Social Awareness/ Environment	Constitutional Rights/ Human Values/ Ethics



233BT1A3CB BIODIVERSITY SEMESTER III

**Total Credits: 4** 

Total Instruction Hours: 48 h

# **Syllabus**

# Unit I Biodiversity Definition and Concepts

10 h

Definition and Scope of Biodiversity. Biodiversity and its types: Genetic Diversity, Species / Organismal Diversity, Ecological / Ecosystem Diversity, Landscape/Pattern Diversity, Agrobiodiversity, Bicultural Diversity and Urban Biodiversity.

# Unit II Global Patterns of Biodiversity

10 h

Catalogue and Discovering Species, Geographical Patterns of Species Richness, Biogeography, Importance of Distribution Patterns (Local Endemics, Sparsely Distributed Species, Migratory Species), GAP Analysis. Species & individual in the ecosystem - Habitat & niche, Ecological equivalence, Biological clock Basic behavioral patterns.

# Unit III Biodiversity Threats and Conservation

8 h

Specific flora & fauna. Overexploitation, threatening to living species, rare and endangered species, International Trade. Threats to Biodiversity - Animals threatened by International trade, Problems in Controlling International Trade (Enforcement, Reservations, Illegal Trade), In situ and ex situ conservation.

# Unit IV Community Ecology - Plants and Animals

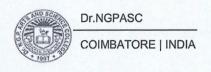
10 h

Interspecific interactions and Competition, Host-Parasite interactions, Predator-prey interactions, Plant herbivore interaction. Community ecology - Structure and function of communities, Stability and change in communities. Regulation of communities - Role of species diversity, Role of predators, Role of competition, Role of nutrients.

# Unit V Biodiversity for Sustainable Development

10 h

Sustainable management of biodiversity - International and regional policies. Biodiversity Act, National Biodiversity Board. International conventions and treaties on conservation. Biodiversity Institutes in India - Zoological Survey of India, Botanical Survey of India, Forest Research Institute, Central Marine Fisheries Research Institute. Ethics of conservation - Legal, Ethical and Conservation issues related to uses of biodiversity, Global Conservation Issues.



### **Text Books**

- 1 Krishnamurthy KV, 2003, "Textbook of Biodiversity", 1st edition, Science Publisher, India.
- Narendran TC, 2006, "An Introduction to Taxonomy", Zoological Survey of India, Kolkata.

- Negi SS, 2008, "Biodiversity and its Conservation in India: Status, Threats and Conservation", 2<sup>nd</sup> edition, Saujanya Books., India.
- 2 Jeffries MJ, 2006, "Biodiversity and Conservation", 1st edi.tion, Routledge, UK.
- Jeffery MI et al., 2008, "Biodiversity Conservation, Law and Livelihoods", 1st edition, Cambridge University Press, UK.
- Singh G, 2008, "Plant Systematics: Theory and Practice", Oxford & IBH Publishing Co. Pvt. Ltd., India.

233BT1A3CP

# CORE PRACTICAL - III: MOLECULAR BIOLOGY AND BIODIVERSITY

**SEMESTER III** 

**Total Credits:** 

2

**Total Instructions Hours:** 

48 h

S.No	Contents
1	Isolation of DNA from Plant
2	Isolation of DNA from Animal tissue
3	Isolation of DNA from Bacteria
4	Isolation of Plasmid from Bacteria
5	UV mutagenesis
6	Transformation
7	Preparation of Herbaria – Five families (1 Plant from each family) with Authentication from authorized agencies*
8	Field visits to nearby Zoo, Forest, Nursery, and Culture collection centre – Herbaria/Botanical Garden*
9	Introduction to Biodiversity Database-IBIN
10	Preparation and Digitalization of Insects and Calculation of Species richness by line and plot analysis*
11	Prepare an audio-visual presentation about conservation to the youth & general public on some environment issues (e.g. Destruction of local biodiversity site like lakes, ponds or a forest patch, Human-wildlife conflict, Developmental activity that has potential threat to local biodiversity.) Minimum of 10 minutes duration.

\*DBT STAR Status Experiment

- Sambrook J, Green MR, 2012, "Molecular Cloning: A Laboratory manual", 4th edition, Cold Spring Harbor, USA.
- 2 Chaitanya KV, 2013, "Cell and Molecular Biology: A Lab Manual", Phi Publisher, India.
- 3 Lindenmayer D and Burgman M, 2005, "Practical Conservation Biology", 5<sup>th</sup> edition, CSIRO Publishing, Australia.
- 4 Singh G, 2008, "Plant Systematics: Theory and Practice", Oxford & IBH Publishing Co. Pvt. Ltd., India.

Course Code	Course Name	Category	L	Т	P	Credit
232MT1A3IE	BASIC MATHEMATICS	IDC	4		-	4

This course has been designed for students to learn and understand

- the basic concept and diagonalization of Matrices.
- the fundamentals of statistics using Measures of central tendency and dispersion.
- the concept of Correlation and Regression.

#### **COURSE OUTCOMES**

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
. CO1	identify the types of Matrices	K1
CO2	compute homogeneous and non-homogeneous linear equations	K2
CO3	explain the concept of Measures of Central Tendency	K2
CO4	solve the problems using Measures of Dispersion	K3
CO5	apply Correlation and Regression Analysis	K3

### MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓		1		
CO2	✓				
CO3	✓	1	1		<b>✓</b>
CO4	<b>√</b>	<b>✓</b>	✓		✓
CO5	1			1	1

#### **COURSE FOCUSES ON**

<b>V</b>	Skill Development	Entrepreneurial Development
<b>1</b>	Employability	Innovations
	Intellectual Property Rights	Gender Sensitization
	Social Awareness/ Environment	Constitutional Rights/ Human Values/ Ethics

232MT1A3IE

#### **BASIC MATHEMATICS**

**SEMESTER III** 

**Total Credits: 4** 

Total Instruction Hours: 48 h

# Syllabus

#### Unit I Matrices

9 h

Kind of matrices- symmetric matrix - skew symmetric matrix - Hermitian matrix skew-Hermitian matrix - orthogonal matrix - unitary matrix - rank of a matrix echelon form.

#### Unit II Homogeneous and Non-Homogeneous Linear Equations

10 h

Vectors - linear dependence and linear independence of vectors - consistency of nonhomogeneous linear equations - homogeneous equations - eigen values and eigen vectors - diagonalization of matrices - Cayley-Hamilton theorem - inverse of a matrix.

#### Unit III **Measures of Central Tendency**

10 h

Averages or Measures of central tendency - Arithmetic Mean(A.M.) - properties calculation - median - calculation of median - mode - calculation of mode advantages and disadvantages of A.M., median and mode - relation between mean, median, mode.

#### Unit IV Measures of Dispersion

9 h

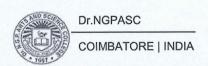
Meaning and necessity of measures of dispersion - range - quartile deviation - mean deviation - standard deviation - properties - calculation of standard deviation

#### Unit V **Correlation and Regression**

10 h

Concepts of correlation and regression - bivariate data - bivariate frequency distribution - scatter diagram - correlation - covariance - correlation coefficient properties - calculation of r - regression - properties - rank correlation.

Note: Theory 20% and Problems 80%



#### **Text Books**

- DuraipandianP and UdayabaskaranS,2014, "Allied Mathematics Volume I", First Edition, S.Chand & Company Pvt Limited, New Delhi. (Unit I to II)
- Das N G,2018,"Statistical Methods", First Edition, Mc Graw Hill Education(India) Private Limited, Chennai.(Unit III to V)

- Howard Anton and Chris Rorres, 2019, "Elementary Linear Algebra", Eleventh Edition, Wiley India Pvt Ltd., New Delhi.
- 2 Hans Schneider and George Phillip Barker, 2013, "Matrices and Linear Algebra", SecondEdition, Dover Publications Inc., New York
- Wayne W. Daniel, 2006, "Biostatistics A Foundation for Analysis in the Health Sciences", Seventh edition, Wiley India Pvt. Ltd, New Delhi.
- 4 Veer Bala Rastogi., 2011, 'Fundamentals of Bio-Statistics', 2nd Edition. Ane Books Pvt.Ltd, New Delhi

Course Code	Course Name	Category	L	Т	P	Credit
233BT1A3EP	BIOTECHNIQUES	SEC	2		4	2

This course has been designed for students to learn and understand

- The function and application of several common measurement systems used in Biotechnology.
- The technical vocabulary associated with instrumentation.
- To design and basic signal analysis.

### **COURSE OUTCOMES**

On the successful completion of the course, students will be able to

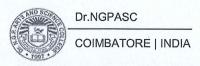
CO Number	CO Statement	Knowledge Level
CO1	CO1 Understand the Principle and the types of Centrifugation	
	Classifying the chromatographic techniques and CO2 analyzing its applications	КЗ
CO3	Imparts knowledge on the Electrophoresis and Blotting Techniques	K5
CO4	Focus on Spectroscopic Techniques and it's applications	K5
CO5	In depth understanding of Radio-isotopic Techniques and its applications	K5

# MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	1	1	1	✓
CO2	✓	✓	<b>√</b>	✓	✓
CO3	<b>✓</b>	✓	1	1	<b>√</b>
CO4	1	✓	<b>√</b>	1	✓
CO5	✓	<b>√</b>	<b>√</b>	✓	<b>√</b>

#### **COURSE FOCUSES ON**

<b>√</b>	Skill Development	Entrepreneurial Development
<b>✓</b>	Employability	Innovations
	Intellectual Property Rights	Gender Sensitization
	Social Awareness/ Environment	Constitutional Rights/ Human Values/ Ethics



233BT1A3EP BIOTECHNIQUES

SEMESTER III

**Total Credits: 2** 

Total Instruction Hours: 72 h

# **Syllabus**

# Unit I pH and Centrifugation

12h

Measurement of pH- Principle and its maintenance. Sedimentation principle, Types of rotors, Preparative and Analytical centrifuges, Density gradient centrifugation, Differential centrifugation.

#### **Practical**

- 1. Preparation of alkaline and acidic buffer solutions
- 2.Measurement of pH of Milk and Lemon juice etc. using pH paper and pH meter.
- 3. Density gradient separation of blood cells by centrifugation.

# Unit II Chromatography techniques

18 h

Theory and Application of Paper Chromatography, TLC, Gel Filtration Chromatography, Ion Exchange Chromatography, Affinity Chromatography, GLC and HPLC.

### **Practical**

- 3. Separation of chlorophyll by paper chromatography.
- 4. Separation of amino acids by thin layer chromatography.
- 5. Extraction of bioactive compounds using soxhlet extraction.
- 6. Preparation of column chromatography

# Unit III Electrophoresis techniques

15h

Theory and Application of PAGE, Agarose Gel Electrophoresis, 2D gel electrophoresis, Iso-electric Focusing.

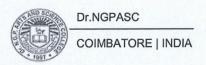
#### **Practical**

- 7. Preparation of Agarose gel electrophoresis.
- 8. Preparation of SDS-PAGE.

# Unit IV Spectroscopic techniques

12 h

Theory and Application of UV and Visible Spectroscopy, Fluorescence Spectroscopy, MS, NMR, ESR, Atomic Absorption Spectroscopy.



#### **Practical**

9.\*Analyzing the purity of nucleic acids and proteins by nanodrop spectrophotometer.

# Unit V Biological applications

15 h

Sonicator-Principle, types and its applications. Lyophilizer-Principle and its applications Introduction to Radioisotopes and their Biological Applications, Radioactive Decay – Types and Measurement, GM counter, Solid and Liquid Scintillation Counter, Autoradiography.

#### **Practical**

10. Extraction of Protein from bacterial cells using Sonicator.

\*Note - DBT star experiment

#### **Text Books**

- Sawhney SK & Randhir S, 2006, "Introductory Practical Biochemistry", 3<sup>rd</sup> edition, Narosa publishing House, India.
- Boyer, Rodney F Benjamin and Cummins, 2001, "Modern Experimental Biochemistry", 2<sup>nd</sup> edition, Pearson Education, UK.

- Freifelder D, 1982, "Physical Biochemistry: Application to Biochemistry and Molecular Biology", 2<sup>nd</sup> edition, W. H. Freeman Publishers, USA.
- WalkerJ&Wilson K, 2000, "Principle &Technique-Practical Biochemistry", 5th edition, Cambridge university press, UK.
- RakeshSSengar, AmitKumar, ReshuChaudhary, AshuSingh, 2018, "Adva ncesinMolecularTechniques", 1stedition, CRCPress, USA.
- Walt Ream, Katharine GF, 1998, "Molecular Biology Techniques: An Intensive Laboratory", Academic Press, USA.

233BT1ASSA

### SELF STUDY - BIOFERTILIZER TECHNOLOGY

SEMESTER III

**Total Credits: 1** 

### **Syllabus**

#### Unit I Introduction to Biofertilizers

An introduction to fertilizers, synthetic fertilizers, natural fertilizers, inorganic fertilizers, organic fertilizers, bio-fertilizers - importance, advantages and constraints.

# Unit II Culturing Methods

Isolation, culturing methods, enumeration and identification of microbial species - Rhizobium, Azospirillum Azotobacters, blue green algae and phosphate solubilisers.

#### Unit III Rhizobium

Morphology of Rhizobium, Azospirilium, Azotobacters, blue green algae and phosphate solubilisers and maintenance - inoculant preparation.

# Unit IV Preparation of Inoculants

Preparation of microbial inoculants - large-scale production of microbes - their application as biofertilizers - crop responses to biofertilizers.

# Unit V Algae and Biofertilizers

Azolla - distribution, morphological and biochemical characteristics – cyanobacterial symbionts - azolla biofertilizer technology - organic matter and composting – method of processes, applications and limitations.

- Rao, N.S. 2000. Biofertilizers in Agriculture. 2nd edition. Oxford & IBH publishing Co. New Delhi
- Sundararaj, D.D. and Thulasidas, G. 1993. Botany of Field Crops. 2nd edition. McMilan India Ltd. India

- Jeswani, L.M. and Balddev, B. 1990. Advances in Pulse Production Technology. 1st edition. ICAR. New Delhi..
- Malsen, L.J.G.V. and S. Somaatmadja. 1993. PROSEA Plant Resources of
   South East Asia. No.1. Pulses. 2nd edition. International Book Distributors,
   Dehradun.
- 3 Prohit, S.S. 2003. Ecology and environment and pollution. 1st edition. Agrobios publications. India
- 4 Varma. P.S. 1998. Concept of ecology. 1st edition. Chand & Co Ltd. India .

233BT1ASSB

# SELF STUDY - ENVIRONMENTAL MANAGEMENT

SEMESTER III

**Total Credits: 1** 

### **Syllabus**

### Unit I Ecology and Ecosystem

Ecology - ecosystem and their types - definitions - environmental components and interrelationships - physical, chemical and biological characteristics of environment energy flow and materials cycling.

#### Unit II Pollution

Definition - source of pollution - types of pollution - air, water, soil, noise and radioactive pollution - environmental sanitation - environmental issues - global - national - regional and local

#### Unit III Environmental Standards

Prescribed environmental standards - WHO - Pollution Control Board - risk probability and hazards to humans - toxicology - chemical hazards - biological hazards: disease development and developing countries.

#### Unit IV Pollution Control Methods

Pollution control methods - physical, chemical and biological - waste water treatment - activated sludge process, oxidation ponds and trickling filter - anaerobic process.

# Unit V Environmental Management

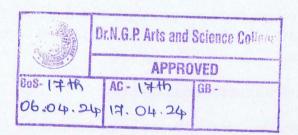
Tool for environment management - Environmental Impact Assessment - waste minimization techniques - environmental planning in urban development - natural resources and sustainable development - environmental ethics.

- Joseph, K. and Nagendra, R. 2004. Essentials of Environmental Studies. 2nd edition. Pearson Education. New Delhi
- Tyler, M.J.R.2004. Environmental Science. 2nd edition. Thomson Brooks/Cole Publishing. Singapore.

#### References

- 1 Dhamejam, S.K. 2005. Environmental Science and Engineering. 2nd edition. Kataria sons. Delhi
- 2 Dubey, R.C. 2006. Environmental Health Ecological Perspectives. 3rd edition. Jones and Bartlett Publishers. USA
- 3 Dash, M.C. 1998. Fundamentals of Ecology. 2nd edition. Tata McGraw Hill. India.
- 4 Scragg, A. 2007. Environmental biotechnology. 2nd edition. Oxford university press. India.

BoS Chairman/HoD
Department of Biotechnology
Dr. N. G. P. Arts and Science College
Coimbatore — 641 048





Course Code	Course Name	Category	L	Т	P	Credit
231TL1A4TA	TAMIL - IV	LANGUAGE- I	3	1	-	3

This course has been designed for students to learn and understand

- மொழிப்பாடங்களின் வாயிலாக தமிழரின் பண்பாடு நாகரீகம், பகுத்தறிவு ஆகியவற்றை அறியச் செய்தல்
- கலை மற்றும் மரபுகளை அறியச் செய்தல்
- மாணவர்களின் படைப்பாக்கத்திறன்களை ஊக்குவித்தல்

#### **COURSE OUTCOMES**

On the successful completion of the course, students will be able to

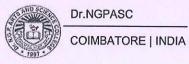
CO Number	CO Statement	Knowledge Level
CO1	வாழ்க்கைத் திறன்கள் (Life Skills)- மாணவர்களின் செயலாக்கத் திறனை ஊக்குவித்தல்	К3
CO2	மதிப்புக்கல்வி (Attitude and Value education)	K4
CO3	பாட இணைச்செயல்பாடுகள் (Co-curricular activities)	K4
CO4	சூழலியல் ஆக்கம் (Ecology)	K4
CO5	மொழி அறிவு (Tamil knowledge)	K5

### MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	РО3	PO4	PO5
CO1		<b>/</b>	1		1
CO2	<b>✓</b>				Alexandra (
CO3		1			<b>✓</b>
CO4		Afficent ten	1		
CO5	✓		Assertant et	1	

#### **COURSE FOCUSES ON**

<b>✓</b>	Skill Development	Entrepreneurial Development
<b>✓</b>	Employability	Innovations
	Intellectual Property Rights	Gender Sensitization
	Social Awareness/ Environment	 Constitutional Rights/ Human Values/ Ethics



231TL1A4TA TAMIL-IV SEMESTER IV

**Total Credits:** 3

Total Instruction Hours: 48 h

## **Syllabus**

# Unit I எட்டுத்தொகை

10 h

1. நற்றிணை – குறிஞ்சித் திணை

l.பா.எண் : 01 – கபிலர்

II.பா.எண் : 88 – நல்லந்துவனார்

III.பா.எண் : 102 – செம்பியனார்

2. குறுந்தொகை – முல்லைத்திணை

l.பா.எண் : 65 – கோவூர்கிழார்

II. பா.எண் : 167 – கூடலூர்கிழார்

மருதத்திணை

l.பா.எண் : 08 – ஆலங்குடி வங்கனார்

ll.பா.எண் : 61 – தும்பிசேர்கீரனார்

III.பா.எண் :196 – மிளைக் கந்தன்

நெய்தல் திணை

l.பா.எண் : 57 – சிறைக்குடி ஆந்தையார்

# Unit II எட்டுத்தொகை

08 h

1. கலித்தொகை – பாலைக்கலி

l.பா.எண் : 09 *–* பெருங்கடுங்கோ

2. அகநானூறு - மருதத்திணை

l.பா.எண் : 86 – நல்லாவூர்கிழார்

3. புறநானூறு -

l.பா.எண் : 188 – பாண்டியன் அறிவுடை நம்பி

II.பா.எண் : 192 – கணியன் பூங்குன்றனார்

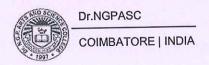
III.பா.எண் : 279 – ஒக்கூர் மாசாத்தியார்

IV.பா.எண் : 312 – பொன்முடியார்

# Unit III பத்துப்பாட்டு

10 h

1. பட்டினப் பாலை – கடியலூர் உருத்திரங் கண்ணனார் -1முதல் 218 வரிகள் வரை மட்டும்.



# Unit IV இலக்கிய வரலாறு

10 h

- 1. எட்டுத் தொகை நூல்கள்
- 2. பத்துப்பாட்டு நூல்கள்

# Unit V இலக்கணம் மற்றும் திறனாய்வுப் பகுதி

10 h

- l. இலக்கணம்
  - 1. அகத்திணை அன்பின் ஐந்திணை விளக்கம்
  - 2. புறத்திணை 12 திணைகள் விளக்கம்
- II. பயிற்சிப் பகுதி

சங்கப் பாடல்கள் குறித்து திறனாய்வு செய்தல்.

Note: பயிற்சிப் பகுதியில் வினாக்கள் அமைத்தல் கூடாது.

#### **Text Book**

செய்யுள் திரட்டு - மொழிப் பாடம் - 2023- 24

1 தொகுப்பு: தமிழ்த்துறை, டாக்டர் என்.ஜி.பி. கலை அறிவியல் கல்லூரி,(Unit I - V)

- 1 பேராசிரியர் புலவர் சோம. இளவரசு, எட்டாம் பதிப்பு -2014, தமிழ் இலக்கிய வரலாறு - மணிவாசகர் பதிப்பகம், சென்னை. பேராசிரியர் முனைவர் பாக்கியமேரி, முதற் பதிப்பு- 2013.
- 2 இலக்கணம் -இலக்கிய வரலாறு மொழித்திறன் -பூவேந்தன் பதிப்பகம், சென்னை.
- 3 தமிழ் இணையக் கல்விக்கழகம்.<http://www.tamilvu.org/>

Course Code	Course Name	Category	L	Т	P	Credit
231TL1A4HA	HINDI - IV	LANGUAGE- I	3	1	-	3

This course has been designed for students to learn and understand

- the writing ability and develop reading skill
- the various concepts and techniques for criticizing literature
- the techniques for expansion of ideas and translation process

# **COURSE OUTCOMES**

On the successful completion of the course, students will be able to

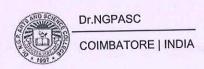
CO Number	CO Statement	Knowledge Level
CO1	Learn the fundamentals of novels and stories	K1
CO2	Understand the principles of translation work	K2
CO2	Expose the knowledge writing critical views on fiction	K2
CO4	Build creative ability	K3
CO5	Apply the power of creative reading	K3

# MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	1	Name of the S		1	<b>✓</b>
CO2		1	el els pard	et l'herby	1
CO3	/		<b>✓</b>	1	
			1884		/
CO4 CO5			/	The converse	/

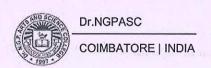
## COURSE FOCUSES ON

<b>/</b>	Skill Development	-	Entrepreneurial Development
✓	Employability		Innovations
	Intellectual Property Rights	-	Gender Sensitization
-	Social Awareness/ Environment	-	Constitutional Rights/ Human Values/ Ethics



231TL1A4HA	HINDI- IV	SEMESTER IV
		Total Credits: 3
	Total Inst	truction Hours: 48 h
	Syllabus	
Unit I		10 h
नाटक		
Unit II		10 h
एकांकी		
Unit III		10 h
काव्य मंजरी		
Unit IV		10 h
सूचना लेखन		
Unit V		08 h
अनुवाद अभ्यास-॥।		

- वडाई सर्वेश्वरदयाल सक्सेना प्रकाशक: वाणी प्रकाशन 21-A, दिरयागंज नई दिल्ली-110002. (Unit I)
- एकांकी पंचामृत डाँ राम कुमार (भोर और तारा छोड्कर) प्रकाशक: जवाहर पुस्तकालय सदर बाजार, मथुरा उत्तर प्रदेश-281001. (Unit II)
- काव्य मंजरी- (डा मुन्ना तिवारी) मैथिलीशरण गुप्त- मनुष्यता, जयशंकर प्रसाद- बीती विभावरी जागरी सूर्यकान्त त्रिपाठी निराला- तोडती पत्थर और भिक्षुक. (Unit III)
- 4 सूचना लेखन पुस्तक: व्याकरण प्रदिप रामदेव प्रकाशक: हिन्दी भवन 36 इलाहाबाद -211024. (Unit IV)
- 3 अनुवाद अभ्यास (केवल अंग्रेजी से हिन्दी में) (पाठ 10 to 20) प्रकाशक: दक्षिण भारत प्रचार सभा चेनैई -17 (पाठ 10 to 20). (Unit V)



Course Course Name		Category		Т	P	Credit	
231TL1A4MA	MALAYALAM- IV	LANGUAGE - I	3	1	-	3	

This course has been designed for students to learn and understand

- the writing ability and develop reading skill
- the various concepts and techniques for criticizing literature, to learn the techniques for expansion of ideas and translation process
- the competency in translating simple Malayalam sentences into English and vice versa

### **COURSE OUTCOMES**

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Learn the fundamentals of novels and stories	K1
CO2	Understand the principles of translation work	K2
CO3	Expose the knowledge writing critical views on fiction	K2
CO4	Build creative ability	К3
CO5	Apply the power of creative reading	К3

# MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓			<b>✓</b>	
CO2	1				✓
CO3		1	1		
CO4	1			1	
CO5	✓	<b>✓</b>	1		<b>√</b>

#### **COURSE FOCUS ON**

<b>V</b>	Skill Development	-	Entrepreneurial Development
✓	Employability	-	Innovations
-	Intellectual Property Rights	_	Gender Sensitization
-	Social Awareness/ Environment	-	Constitutional Rights/ Human Values/ Ethics

231TL1A4M	A	MALAYALAM- IX	5	SEMEST	ER IV
		×	Total C	Credits:	3
			<b>Total Instruction</b>	Hours:	48 h
		Syllabus			
Unit I	Drama				10 h
Saketham-Sı	reekandan Nair				
Unit II	Drama				10 h
Saketham-Si	reekandan Nair				
Unit III	Drama				10 h
Saketham-S	reekandan Nair				
Unit IV	Screen Play				10 h
Perumthacha	an- Vasudevan Na	ir			
Unit V	Screen Play				08 h
Perumthach	an- Vasudevan Na	ir			

- Nair, Sreekandan C.N. 2023. Saketham, Drama. DC Books Kottayam, Kerala, India. (Unit I to III)
- Nair, Vasudevan M.T. 1994. Perumthachan- Screenplay. DC Books Kottayam, Kerala, India. (Unit IV & V)

### Reference

Sankarapillai. 2005. Malayala Nataka Sahithya Charithram, Kerala Sahithya Akademi Publishers, Kerala, India.

Course Code	Course Name	Category	L	Т	P	Credit
231TL1A4FA	FRENCH - IV	LANGUAGE-I	3	1	-	3

This course has been designed for students to learn and understand

- the Competence in General Communication Skills Oral + Written- Comprehension & Expression
- the Culture, life style and the civilization aspects of the French people as well as of France
- the students to acquire Competency in translating simple French sentences into English and vice versa

### **COURSE OUTCOMES**

On the successful completion of the course, students will be able to

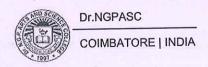
CO Number	CO Statement	Knowledge Level
CO1	Learn the Basic verbs, numbers and accents	K1
CO2	Apply the adjectives and the classroom environment in France	K2
CO3	Select the Plural, Articles and the Hobbies	K2
CO4	Measure the Cultural Activity in France	K3
CO5	Evaluate the sentiments, life style of the French people and the usage of the conditional tense	КЗ

# MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	1				1
CO2	1	1			North Control
CO3			✓	1	
CO4	<b>✓</b>	1	THE THEFT WE		· ·
CO5	1		<b>✓</b>	1	<b>✓</b>

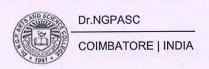
## **COURSE FOCUSES ON**

<b>✓</b>	Skill Development	 Entrepreneurial Development
✓	Employability	Innovations
_	Intellectual Property Rights	 Gender Sensitization
	Social Awareness/ Environment	Constitutional Rights/ Human Values/ Ethics



231TL1A4FA		FR	ENC	H-IV			SEMES	TER IV
			Sylla		otal Inst		al Credits: ion Hours:	
Unit I  *Décrirequelqu'  * Comparer	un.	En milieu professional, recruiter quelquún et justifier sonchoix.	de des	xprimersur les vêtemantRecen personnes à descriptions.	naitre	des	nprendre cription sonnesdar rait de ron	la de ns un
Unit II		Justifier bortertorn.				i i		10 h
ExprimerPacco ou le désaccor ° Se situerdans temps.	d. le	professional, recruiter quelquún et	Com perso expe	ire des person prendre onnes riment leur a urdésaccord.	des qui ccord	diffé de vue de élec Raco	nprendre érences de expriméte r tronique. onter ourvenir.	
Unit III								10 h
° Parler de Pavenir.	l'or voy gro fich	cuter de ganisation d'un vage de supepuispréparerune ne projet et la aplit.	e Ed	omprendreum nanson. changersurses e vacancy		m	omprend lessage arte annivers	d'une
Unit IV								10 h
° Exprimer d souhaits. Décrirequel u'u n	0	Discuter l'organisation ovoyage groupepuisprépares fiche projet et templit.	de d'un de rune la	Discuter programme soire à Addresser souhaits quelqu'un.	du de la venir. des à	m ca d'	omprend lessage arte annivers	d'une
Unit V								08 h

1 LATITUDES 1 (Méthode de français) Pages from 128-151, Author : Regine Mérieux, Yves Loiseau (Unit I to IV)



Course Code	Course Name	Category	L	T	P	Credit
231EL1A4EA	ENGLISH - IV	LANGUAGE II	3	1	-	3

This course has been designed for students to learn and understand

- how language shapes society, enhancing critical reading, writing, and thinking skills through various literary forms
- the fundamentals of writing, including essay composition, persuasive communication, and creative expression
- the process of critical thinking through the analysis of literature

#### **COURSE OUTCOMES**

On the successful completion of the course, students will be able to

CO Number	CO Statement	
CO1	Summarize main points and supporting details from listening to public addresses and demonstrate poem comprehension.	K2
CO2	CO2 Demonstrate clear and expressive speech while engaging in role-play and dramatization activities.	
CO3	Interpret textual elements such as themes, tone, and authorial intent in various reading materials.	К3
CO4	Produce clear summaries and navanhyassa maintaining the	
CO5	Prepare for job interviews by employing appropriate interview techniques, confidence, and professionalism.	

#### MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	<b>✓</b>	<b>✓</b>		1	/
CO2	Kisu Cidne	<b>✓</b>	Marie Total	<b>V</b>	
CO3	1		1		
CO4	T 100 1 10	/			/
CO5	✓		1		1

**COURSE FOCUSES ON** 

<b>✓</b>	Skill Development	Entrepreneurial Development
<b>✓</b>	Employability	Innovations
	Intellectual Property Rights	Gender Sensitization
<b>√</b>	Social Awareness/ Environment	Constitutional Rights/ Human Values/ Ethics



231EL1A4EA ENGLISH - IV SEMESTER IV

**Total Credits: 3** 

Total Instruction Hours: 48 h

#### **Syllabus**

# Unit I Listening

10 h

Nissim Ezekeil - Goodbye Party for Miss Pushpa T.S.

D.H. Lawrence - Last Lessons of the Afternoon

Dr. APJ Abdul Kalam's speech at European Union

Listening for subtext – Tone and Emotion – Vivid Language and Pacing – Listening for Vision and Hope – Use of Storytelling

Punctuations: Periods, Commas, Semicolons, Colons, Apostrophes, Ellipses, Exclamation Points

### Unit II Speaking

10 h

Oscar Wilde - The Importance of Being Earnest

Direct Speech and Indirect Speech - Commands and Requests, Exclamations and Wishes, Conversion of Indirect to Direct

Rules for changing direct speech into indirect speech

## Unit III Reading

09 h

Gita Hariharan - The Remains of the Feast -

Langston Hughes - Thank You M'am

Making Inferences and Predictions - Identifying Author's Purpose and Tone- Contextual Vocabulary Building

Tenses: The Uses of Present, Past and Future Tenses

# Unit IV Writing Skills

10 h

George Orwell - Why I Write

Summarizing vs. Paraphrasing - Expressing Purpose and Intent in Writing- Constructing Strong Arguments and Opinions

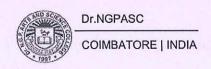
Grammar - Paraphrasing - Use of Paraphrasing, Characteristics of a good paraphrase, The Paraphrase of Poetry, Special Hints, Method of Procedure

#### Unit V Soft Skills

09 h

Steve Jobs - 2005 Stanford Commencement Address - Effective Communication - Presentation Skills

Business Corporate Soft Skills - Six common corporate conversation faux pas, Decision making Techniques, Negotiation Styles Job Interviews - Preparatory Steps for Job Interviews - Interview Skill Tips



- Straus, Jane, Lester Kaufman, and Tom Stern, editors. The Blue Book of Grammar and Punctuation: An Easy-to-Use Guide with Clear Rules, Real-World Examples, and Reproducible Quizzes. 12th ed., Jossey-Bass, 2021. (Unit I)
- Wilde, Oscar. The Importance of Being Earnest. Edited by Norman Page, 2nd ed., Penguin Classics, 2000. (Unit II)
- 3 Hariharan, Gita. The Remains of the Feast. 1st ed., Penguin Books India, 1992. (Unit III)
- Orwell, George. "Why I Write." George Orwell: An Anthology of His Prose, edited by John Carey, Harcourt, 2000. pp. 232-237. (Unit IV)
- Meyer, John. The Soft Skills Handbook for Corporate Success: Essential Strategies for Business Professionals. 2nd ed., Business Insights, 2020. (Unit V)

- Lawrence, D.H. The Complete Poems of D.H. Lawrence. Edited by V.J. Harding, 1st ed., Heinemann, 1992.
- Buczynski, Mark. Soft Skills for the Workplace: How to Build Successful Relationships and Advance Your Career. 2nd ed., Wiley, 2018.
- Hughes, Langston. "Thank You, M'am." The Penguin Anthology of American Poetry, edited by Rita Dove, Penguin Books, 2006, pp. 530-533.
- 4 Nelson, Brian. The Soft Skills Handbook: Essential Skills for the Workplace. 3rd ed., Business Publishing, 2019.

Course Code	Course Name	Category	L	Т	P	Credit
233BT1A4CA	IMMUNOLOGY	CORE	5	-	-	5

This course has been designed for students to learn and understand

- the cells of immune system
- the different techniques in immunology
- the applications of immune techniques.

#### **COURSE OUTCOMES**

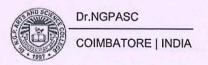
On the successful completion of the course, students will be able to

CO Number	CO Statement			
CO1	Understand the concepts in immunology	K1		
CO2	Learn basics of Immune Response and Transplantation Technology			
CO3	CO3 Discuss and distinguish different antigen antibody interactions, Allergic reactions and Tumour immunology			
CO4	CO4 Learn about different antibody production techniques			
CO5	Awareness on types of vaccines and its significance	K3		

#### MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	<b>✓</b>				<b>*</b>
CO2	<b>✓</b>	<b>/</b>	<b>✓</b>	<b>✓</b>	1
CO3		1	✓ .	1	1
CO4			<b>✓</b>	<b>✓</b>	1
CO5		✓	<b>✓</b>	<b>✓</b>	1

✓ Employability Innovations	
Intellectual Property Rights Gender Sensitization .	
Social Awareness/ Environment  Constitutional Rights/ Human Value Ethics	alues/



233BT1A4CA CORE: IMMUNOLOGY SEMESTER IV

**Total Credits: 5** 

Total Instruction Hours: 60 h

# **Syllabus**

# Unit I Basic concepts of Immunology

12 h

History and scope of immunology - Hematopoiesis - Infections and immunity - types of immunity - cells of the immune system- primary and secondary lymphoid organs - immunoglobulin structure - function and synthesis; memory cells, lymphocyte differentiation.

# Unit II Types of immune response

12 h

Complement systems - structure and function of MHC class I and II molecules - antigen recognition and presentation - Humoral and Cell mediated immune responses - immune suppression and immune tolerance - Transplantation immunology- Graft rejection.

# Unit III Hypersensitivity and Tumor immunology

12 h

Antigen- antibody reaction, Hypersensitivity - IgE mediated, antibody mediated, immune complex mediated and delayed type hypersensitivity. Tumor immunology- tumor associated antigens, Immune response to tumor. Auto immune disorders. Treatment to Auto immune disorder.

# Unit IV New Generation Antibodies

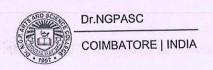
12 h

Hybridoma and monoclonal antibody production, immune diagnosis and applications - human monoclonal antibodies, catalytical antibodies - complement fixation - assessment of immune complexes in tissues.

# Unit V Vaccinology

12 h

Vaccines- Immunization types- Vaccine types- live attenuated vaccines, killed vaccines and purified polysaccharide vaccines- toxoid vaccines - recombinant vaccines - DNA vaccines- Subunit Vaccines-RNA Vaccines and Protein Vaccines



- Kuby J, 2003, "Immunology", 5th edition, W.H. Freeman and Company, New York.
- Rao CV, 2002, "Textbook of Immunology", 1st edition, Narosa Publishing House, India

- Riot I, 1988, "Essentials of Immunology", 6th edition, Blackwell Scientific Publications, USA.
- Tizard A, 1995, "Immunology", 4th edition, Saunders college publishers, USA.
- Ramesh, 2016, "Immunology", 1st edition, McGraw Hill Education, India Private Limited. .
- Ed Harlow, David Lane, 1988, "Antibodies Laboratory Manual", Cold Spring Harbor Laboratory Press, USA.

Course Code	Course Name	Category	L	Т	P	Credit
233BT1A4CB	BIOINFORMATICS	CORE	4	-		4

This course has been designed for students to learn and understand

- Biological databases and their applications.
- The applications of various tools.
- Biology better in terms of computer algorithms..

# **COURSE OUTCOMES**

On the successful completion of the course, students will be able to

CO Number	CO Statement	
CO1	Insight on storage and retrieval of data	K1
CO2	Understanding biological databases with applications	K2
CO3	Discuss and distinguish the types of protein structures and its implications in function	КЗ
CO4	Explain the sequences and its alignment which determines several roles of biomolecules	К3
CO5	Comprehend the molecular modelling and visualization for drug designing	К3

# MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	1	<b>V</b>	1	✓	1
CO2	· ·	✓	1	✓	1
CO3	✓		1	1	1
CO4	<b>✓</b>		1	1	1
CO5	<b>✓</b>	✓	<b>✓</b>	1	

<b>✓</b>	Skill Development	✓ Entrepreneurial Development
<b>✓</b>	Employability	Innovations
	Intellectual Property Rights	Gender Sensitization
	Social Awareness/ Environment	Constitutional Rights/ Human Values/ Ethics



Dr.NGPASC

233BT1A4CB

**CORE: BIOINFORMATICS** 

SEMESTER IV

**Total Credits: 4** 

Total Instruction Hours: 48 h

# Syllabus

### Unit I Introduction to Bioinformatics

10 h

Introduction to Bioinformatics and AI. Big Data – Biological data. Retrieval of information- SRS. Evolution of Bioinformatics –History, scope and applications. Search engines, Entrez, PubMed and DDBJ.

# Unit II Biological databases

10 h

Types of Nucleic acid Databases (NCBI, EMBL, and DDBJ), Protein databases (PDB, Expasy, Swiss Prot and Prosite), Specialized databases (Gene Ontology, Drug Bank, ChEMBL & KEGG), Model organism databases (FlyBase, Mouse Genome Database MGD & ZFIN, Human Genome project).

### Unit III Protein structures

10 h

Physical properties, Primary, secondary, tertiary, super secondary structures of proteins. Structural and sequence database for proteins (CATH, SCOP, FSSP) .Fold classification based on structure. Protein structure prediction (I-TASSER, Phyre2 and QUARK)

# Unit IV Sequence Alignment and Genomics

9 h

Introduction to sequence alignments and dynamic programming: Local alignment, Global alignment, pairwise and multiple alignment. FASTA – characteristics, BLAST and its types. Phylogenetic trees - Evolutionary relationship using PHYLIP and MEGA X. Gene expression analysis – cDNA microarray. EST databases (DBEST, UNIGENE).

# Unit V Molecular Docking

9h

Docking-Working principle and its applications. Lead compound (Celecoxib as a lead COX-2 inhibitor), Protein target (HIV protease for antivirals). Computer Aided Drug Designing and its applications. High throughput screening- Working principle its applications. Molecular modelling and visualization (PyMol). QSAR.

- Shanmughavel P, 2006, "Trends in Bioinformatics", Pointer Publishers, Jaipur, India.
- Lesk AM, 2003, "Introduction to Bioinformatics", Oxford University Press, New Delhi.

- Andrew R Leach, 2001, "Molecular Modeling: Principles and Application", Pearson Publishers, United Kingdom.
- Hans X, 2008, "Basic principles and applications", Wiley publications, United States.
- 3 Yvonne C Martin, 1998, "Designing bioactive molecules three-dimensional techniques and applications", American Chemical Society, United States.
- Leo, Albert, Hockma, Hansch, Corwin, 1995, "Exploring QSAR", 2<sup>nd</sup> edition, American Chemical Society, United States.

233BT1A4CP

# CORE PRACTICAL: IMMUNOLOGY AND BIOINFORMATICS

SEMESTER IV

2

**Total Credits:** 

Total Instructions Hours: 48 h

S.No	Contents
1.	Blood grouping and Rhtyping *
2.	Preparation of Serum
3.	Precipitin ring test
4.	Single Radial Immunodiffusion
5.	Double Radial Immunodiffusion
6.	Immunoelectrophoresis
7.	Rocket Immunoelectrophoresis
8.	Retrieving data from Biological Databases.*
9.	Retrieving articles with filter criteria (PubMed)
10.	Pairwise alignment using BLAST.
11.	Construction of phylogenetic trees.
12.	Visualization of protein structures and interpretation

Note: \*DBT STAR College Experiment.

Molecular Docking

13.

- Tramontano, A., 2005, "Ten Most Wanted Solutions in Protein Bioinformatics", 1st Edition, CRC Press. USA
- 2 Lesk, A.M., 2014, "Introduction to Bioinformatics", 4<sup>th</sup> Edition, Oxford Publications.
- Frank C Hay, Olwyn MR and Westwood, 2002, "Practical Immunology", 4th Edition, Blackwell Publication, USA.

Course Code	Course Name	Category	L	T	P	Credit
232PY1A4IA	BIOPHYSICS	IDC	4	-	_	4

This course has been designed for students to learn and understand

- The fundamentals of physics to biological systems
- The concepts and techniques of biophysics
- The applications of biophysics in molecular studies and medicine.

#### **COURSE OUTCOMES**

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the basics of Molecular Biophysics	K2
CO2	Outline the physical properties of membrane and membrane potentials.	K2
CO3	Summarize the biophysical techniques applied in understating biomolecules.	K2
CO4	Explain about Neurobiophysics; Nervous System, Visionary System and Hearing System.	K3
CO5	Interpret the Role of Radiation Physics in applied medical diagnosis and treatment.	К3

### MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	1	1	1	1	1
CO2	<b>✓</b>	1	1	1	pulling in the
CO3		at the re	/	<b>✓</b>	1
CO4	<b>/</b>	1	wind is all feet.	1	1
CO5	<b>✓</b>	/	/	1	1

#### **COURSE FOCUSES ON**

<b>/</b>	Skill Development	Entrepreneurial Development
<b>1</b>	Employability	Innovations
	Intellectual Property Rights	Gender Sensitization
✓	Social Awareness/ Environment	Constitutional Rights/ Human Values/ Ethics

232PY1A4IA IDC: BIOPHYSICS SEMESTER IV

**Total Credits: 4** 

Total Instruction Hours: 48 h

# **Syllabus**

# Unit I Concepts of Biophysics

10 h

Molecular Biophysics - Bioenergetics: Basic concept of energy coupling reactions in biological processors, Energy requirements in cell metabolism, high energy bonds, energy currency of cell.

# Unit II Membrane Biophysics

09 h

Physical properties of membrane: Elastic properties, Elastic constants, Charge-induced microstructures and domain - Membrane melting - Membrane potentials: Cell surface charge, Resting membrane potential, Action potential, Membrane impedance and capacitance, Transmembrane potential, Total electrochemical potential.

# Unit III Biophysical Techniques and Methods

10 h

Introduction to Light: Reflection, Refraction, Diffraction, Interference - Refractometry: Refraction of light and Snell's law, Refractive index, Principle-Abbe's Refractometer - Applications - Polarimetry, Viscometry, Static scattering techniques, Dynamic scattering techniques - Molecular dynamics, Potential energy contour tracing.

# Unit IV Neurobiophysics

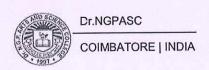
09 h

The nervous system; Synapse, Physics of membrane potentials, Membrane potential due to diffusion, Voltage clamp, Sensory mechanisms: The Eye, The visual receptor, Electrical activity and visual generator potentials, Neural aspects of vision, Visual communications - Physical aspects of hearing: The Ear, Elementary acoustics, Theories of hearing.

# Unit V Radiation and Medical Biophysics

10 h

Basics of radiation physics: Types of Radioactivity, General properties of alpha, beta and gamma radiations, Radiation units - Effect of radiation on nucleic acids, Proteins, Enzymes. Biological applications of radioisotope, Radio-labeling and Tracer techniques, Radiation sterilization of medical product.



- Vasantha Pattabhi, Gautham N, 2002, "Biophysics", 1st Edition, Kluwer Academic Publishers, United States.
- Rodney M.J, Cotterill, 2002, "Biophysics: An Introduction", 2nd edition, John Wiley & Sons Ltd, United States.

- Tom A Waigh, 2007, "Applied Biophysics A Molecular Approach for Physical Scientists", 1st edition, John Wiley & Sons Ltd, United States.
- Jay L Nadeau, 2018, "Introduction to Experimental Biophysics, Biological Methods for Physical Scientists", 2nd Edition, CRC Press, United States.
- Glaser, Roland, 1999, "Biophysics", 1st edition, Springer-Verlag Berlin, Heidelberg.
- Parke, William C, 2020, "Biophysics: A Student's Guide to the Physics of the Life Sciences and Medicine", 1st edition, Springer International Publishing, United States.

Course Code	Course Name	Category	L 2	Т	P 3	Credit
233BT1A4EP	RECOMBINANT DNA TECHNOLOGY					

This course has been designed for students to learn and understand

- To evaluate the concept of rDNA technology
- To determine types of vectors used in rDNA technology.
- The applications of rDNA technology

#### **COURSE OUTCOMES**

On the successful completion of the course, students will be able to

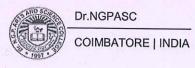
CO Number	CO Statement			
CO1	Impart knowledge on importance of steps in recombinant DNA Preparation, introduction and selection			
CO2	Explain the features of various types of bacterial cloning vectors	K2		
CO3	Explain the various types of DNA amplification techniques and Sequencing techniques	K2		
CO4	Describe the methods of gene transfer into host cells	КЗ		
CO5	Demonstrate the identification specific gene and protein	К3		

## MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓			<b>/</b>
CO2		<b>✓</b>			
CO3	✓	<b>✓</b>			
CO4	✓	<b>✓</b>	/	<b>V</b>	<b>√</b>
CO5	1	1	/	<b>V</b>	<b>√</b>

#### **COURSE FOCUSES ON**

<b>✓</b>	Skill Development	<b>✓</b>	Entrepreneurial Development
<b>✓</b>	Employability		Innovations
	Intellectual Property Rights		Gender Sensitization
	Social Awareness/ Environment	<b>✓</b>	Constitutional Rights/ Human Values/ Ethics



233BT1A4EP

3. Ligation

### SEC PRACTICAL: RECOMBINANT DNA **TECHNOLOGY**

SEMESTER IV

**Total Credits: 2** 

Total Instruction Hours: 60 h

# **Syllabus**

#### Unit I Fundamentals of recombinant DNA Technology 6h History and scope of rDNA technology, Strategies of cloning, Cutting and Joining of DNA - Linker and Adapters, enzyme involved in cloning, Features of host cell. **Practical** 6h 1. Isolation of Genomic DNA from Animal, Plant and Bacteria. 2. Restriction Mapping

#### Unit II Cloning vectors

6h

Plasmids - properties of plasmid, types of plasmids, plasmid compatibility and incompatibility, copy number and its control. Features of Bacterial Vectors, E. coli vectors - pBR322 and pUC vectors.

Practical 6h

- 4. Isolation of Plasmid from bacteria
- 5. Antibiogram analysis

#### Unit III PCR and DNA Libraries

6h

PCR and its types. Construction of cDNA and genomic DNA libraries. DNA sequencing, Probes – probe construction and labeling.

6h **Practical** 

- 6. DNA Amplification by PCR
- 7. cDNA construction

#### Unit IV Gene Transfer methods

6 h

Introduction of cloned genes into cell: transformation, particle bombardment, liposome mediation and Electroporation.

**Practical** 

6h

- 8. Transformation
- 9. Conjugation

#### Unit V **Blotting Techniques**

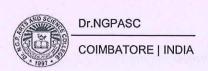
6 h

Blotting techniques - Southern, Northern, Western. ELISA and its Types

Practical 6h

10. Western blotting

11. ELISA



- Brown, T. A, 1998, "Introduction to Gene Cloning", 3rd Edition, Stanley Thornes Publishing Ltd.
- Primrose, S. B, 2003, "Principles of Gene Manipulation", 6th Edition, Blackwell Science Ltd.

#### References

- Ernst. L. Winnacker, 2003, "From Genes to Clones", 2<sup>nd</sup> Edition, Panima Publishing Corporation.
- James. D. Watson, 2001, "Recombinant DNA Technology", 2<sup>nd</sup> Edition, WH Freeman and company.
- Brown, T. A, 2016, "Gene Cloning and DNA Analysis", 7th Edition, Wiley Blackwell.
- Primrose, S.B. and Twyman, R. 2013, "Principles of Gene Manipulation and Genomics", 7th Edition, Wiley Blackwell.

BoS Chairman/HoD

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