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.

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 x 3 = 12	I to IV
II	English	4	4 x 3 = 12	I to IV
III	Core (Credits 2,3,4,5)	16-19	70	I to VI
	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
IV	Environmental Studies(AECC)	1	2	I
	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. Sc BIOTECHNOLOGY

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
First Semester										
Part-I										
231TL1A1TA/ 231TL1A1HA/ 231TL1A1MA/ 231TL1A1FA	Language-I	Tamil-I / Hindi- I/ Malayalam-I/ French-I	4	1	-	3	25	75	100	3
Part-II										
231EL1A1EA	Language-II	English – I	4	-	1	3	25	75	100	3
Part-III										
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	-	-	3	25	75	100	4
Part-IV										
233MB1A1AA	AECC - I	Environmental studies	2	-	-	-	50	-	50	2
Part - V										
233BT1A1XA	Extension Activity	NSS/NCC/YRC/ RRC/Yoga/Sports	-	-	-	-	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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BoS - 15th	AC - 15th	GB - 20th
10.06.2023	14.07.2023	05.08.2023

Academic Council
CHAIRMAN
Dr.N.G.P. Arts and Science College

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Second Semester										
Part-I										
231TL1A2TA/ 231TL1A2HA/ 231TL1A2MA/ 231TL1A2FA	Language - I	Tami-II/Hindi-II/Malayalam-II/French-II	4	1	-	3	25	75	100	3
Part-II										
231EL1A2EA	Language - II	English – II	4	-	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	-	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	-	-	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**

17/10/23
BoS Chairman/HoD
Department of Biotechnology
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Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
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	75	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	-	4	6	40	60	100	2
Total			**20**	**2**	**8**				**700**	**22**

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Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Fourth Semester										
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										
231EL1A4EA	Language - II	English – IV	3	1	-	3	25	75	100	3
Part-III										
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
232PY1A4IA	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**

8.11.24

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Dr. N. G. P. Arts and Science College
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Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
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 Environmental Biotechnology	-	-	6	6	40	60	100	3
233BT1A5SA	SEC - III	Bioprocess Technology	3	-	-	3	25	75	100	2
233BT1A5DA	DSE - I	Clinical Trials	4	-	-	3	25	75	100	4
233BT1A5DB		Bioethics & Bio safety								
233BT1A5DC		Molecular Signaling								
233BT1A5TA	IT	Industrial Training	-	-	-	3	40	60	100	2
Part IV										
	GE		2	-	-	3	50	-	50	2
Total			**21**	**3**	**6**				**750**	**28**

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
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	-	-	3	25	75	100	2
233BT1A6DA	DSE - II	Drug Design & Delivery	4	-	-	3	25	75	100	4
233BT1A6DB		Biomaterials								
233BT1A6DC		Synthetic Biology								
233BT1A6DD	DSE - III	Biomarker Technology	4	-	-	3	25	75	100	4
233BT1A6DE		Molecular Diagnostics								
233BT1A6DF		Food Technology								
Part-IV										
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 85th working day)	5
3	Attendance	5
4	Library Usage	5
5	Skill Enhancement *	5
	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	• Engagement in class • Listening Skills • Behaviour
2	Case Study Presentation/ Term Paper	• Identification of the problem • Case Analysis • Effective Solution using creativity/imagination
3	Field Study	• Selection of Topic • Demonstration of Topic • Analysis & Conclusion
4	Field Survey	• Chosen Problem • Design and quality of survey • Analysis of survey
5	Group Discussion	• Communication skills • Subject knowledge • Attitude and way of presentation • Confidence • Listening Skill
6	Presentation of Papers in Conferences	• Sponsored • International/National • Presentation • Report Submission
7	Industry Visit	• Chosen Domain • Quality of the work

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

ii) Distribution of External Marks (ESE)

Total : 75
Written Exam : 75

Marks Distribution for Practical course

Total : 100
Internal : 40
External : 60

i) Distribution of Internals Marks

S.No.	Particulars	Distribution of Marks
1	Experiments/Exercises	15
2	Test 1	10
3	Test 2	10
4	Observation Notebook	05
	Total	**40**

ii) Distribution of Externals Marks

S.No.	Particulars	External Marks
1	Practical	40
2	Record	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
1	Project Work /Internship /Industrial training Presentation	40
2	Viva –voce	20
	Total	**60**

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 4th semester

Credit transfer will be decided by equivalence committee

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

NPTEL Courses to be carried out during semester I – IV.

S.No.	Student Name	Class	Proposed NPTEL Course		Proposed Course for Exemption
			Course I	Option 1- Paper Title Option 2- Paper Title Option 3- Paper Title	Any one Core Paper in **V or VI semester**
			Course II	Option 1- Paper Title Option 2- Paper Title Option 3- Paper Title	

Class 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
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**	
S. No.	**Particulars**	**Distributionof Marks**	**Particulars**	**Distributionof Marks**
1	CIAI(2.5Units) (On completionof45thworkingday)	15	CIA I (Exercise 1-5)	5
2	Model(5Units)(On completionof85thworkingday)	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 **1 Hour** **First 2.5 Units**	50 x 1 = 50 Marks	MCQ	50 Marks	Marks secured will be Converted to 15 marks
CIA test II/ Model test **1 Hour** **All five Units**	50 x 1 = 50 Marks	MCQ	50 Marks	Marks secured will be Converted to 15 marks

Question paper pattern	Total Marks -50
Basic Tamil	**Advanced Tamil**
Section -A	**Section -A**
Choose the correct answer 10x2=20	**Choose the correct answer 10** x1=10
Section -B	**Section -B**
True or false 10x2=20	**Fill in the blanks** 10x2=20
Section -C	**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 ½ Hours-2.5 Units] - 25 Marks

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

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

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

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

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

Course Code	Course Name	Category	L	T	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	K3
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	✓	✓	✓		✓
CO2	✓			✓	
CO3	✓	✓			✓
CO4	✓		✓		
CO5	✓			✓	✓

COURSE FOCUSES ON

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

231TL1A1TA	TAMIL - I	SEMESTER I

Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I மறுமலர்ச்சிக் கவிதைகள் 13 h

1. இலக்கிய வரலாறு - மறுமலர்ச்சிக் கவிஞர்களின் தமிழ்ப்பணிகள்
2. பாரததேசம் - பாரதியார்
3. படி - பாரதிதாசன்
4. தமிழரின் பெருமை - நாமக்கல் கவிஞர்
5. தமிழ்க் கொலை புரியாதீர் - 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 - புதுக்கவிதையின் தோற்றமும் வளர்ச்சியும்
2. கடமையைச் செய் - மீரா
3. மலையாளக் காற்று - சிற்பி
4. ஒப்பிலாத சமுதாயம் - அப்துல் ரகுமான்
5. கன்னிமாடம் - மு.மேத்தா
6. கரிக்கிறது தாய்ப்பால் - ஆரூர் தமிழ்நாடன்
7. ஐந்தாம் வகுப்பு 'அ' பிரிவு - நா. முத்துக்குமார்
8. ஹைகூ கவிதைகள் - 10 கவிதைகள்

Unit III பெண்ணியம் 09 h

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

1 தமிழ் மொழிப்பாடம் - 2022-2023, தொகுப்பு: தமிழ்த்துறை, டாக்டர் என்.ஜி.பி. 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	T	P	Credit
231TL1A1HA	HINDI – I	LANGUAGE - 1	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
- 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	✓			✓	✓
CO2	✓	✓			✓
CO3	✓		✓	✓	✓
CO4	✓		✓		✓
CO5	✓	✓	✓		✓

COURSE FOCUSES ON

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

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- डॉ 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

1 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	T	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	K3

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

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

231TL1A1MA	MALAYALAM - I	SEMESTER I

Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I **Novel** 14 h

Pathummayude Adu

Unit II **Novel** 10 h

Pathummayude Adu

Unit III **Short Story** 14 h

Nalinakanthi

Unit IV **Short Story** 10 h

Nalinakanthi

Unit V **Practical Application** 12 h

Expansion of ideas, General Essay and Translation

Text Books

1 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	T	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	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	K3

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

✓	Skill Development	✓	Entrepreneurial Development
✓	Employability	✓	Innovations
✓	Intellectual Property Rights	✓	Gender Sensitization
✓	Social Awareness/ Environment	✓	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
• Saluer • Enter en contact • avec quelqu'un. • Se presenter. • S'excuser	En cours de cuisine, premiers contacts avec les members d'un groupe	• Comprendre des personnes qui se saluent. • Ēchanger pour entrer en contact, se présenter, saluer, s'excuser. • Communiquer avec *tu* ou *vous*. • Comprendre les consignes de classe • Ēpeler son nom et son prénom. Computer jusqu'à 10.

Unit II **Enchanté I Page 20** 12 h

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

Unit III **J'adore I Page 30** 12 h

Objectifs de Communication	Tâche	Activités de réception et de production orale
• Exprimer ses gouts.	Dans un café, participer à une soirée de rencontres rapides et remplir de taches d'appréciation	• Dans une soirée de recontres rapid comprendre des personnes qui échangent sur elles et sur leurs goût • Comprendre une personne qui parler des goûts de quelqu'un d'autre

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	• Exprimer ses goûts • Comprendre une demande laissée sur un répondeur téléphonique. • Parler de ses projets de week-end
Autoévaluation du module I Page 40 – Préparation au DELF A1 page 42		
Demander à quelqu'un de faire quelque chose. Demander poliment. Parler d'actions passes. Tu veux bien?	Organiser un programme d'activités pour accueillir une personne importante	Comprendre une personne demande un service à quelqu'un. Demander à quelqu'un de faire quelque chose. Imaginer et raconter au passé à partir de situations dessinées.

Unit V Practical Application 10 h

Make in Own Sentences

Text Book

1 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	T	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	Knowledge Level
CO1	Identify the various aspects in poetry	K2
CO2	Infer linguistic and non-linguistic features of the context for understanding and interpreting	K3
CO3	Construct sentences and convey messages effectively in real life situations	K3
CO4	Apply different reading strategies with varying speed	K3
CO5	Prepare modules with their own ideas and present them coherently in a grammatically correct form	K3

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

✓	Skill Development	✓	Entrepreneurial Development
✓	Employability	✓	Innovations
✓	Intellectual Property Rights	✓	Gender Sensitization
✓	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 indications- outline- paraphrasing the poem- context of poem- form- poetic devices- enjambment- techniques– Annotations

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

1. Gardiner, A. G. 1926. Alpha of the Plough: Second series, J.M. Dent & Sons Ltd., London, United Kingdom. pg.no-151-156. (Unit I)
2. 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)
4. Mithra, S. M. 1919. Hindu Tales from the Sanskrit, Macmillan & Co Ltd., London, United Kingdom. pg.no-127-142. (Unit I)
5. Nation, I. S. P and Jonathan Newton. 2009. Teaching ESL/EFL Listening and Speaking. Routledge, New York, United States. (Unit II)
6. Prabha, Dr. R. Vithya & S. Nithya Devi. 2019. Sparkle. (1st Edn.) McGraw - Hill Education, Chennai, India. (Unit III– V)

References

1. 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.
2. OnSuperstitions."THEHISTORIAN,thehistorian1947.wordpress.com/2019/0 3/08/on-superstitions-by-a-g-gardiner. Accessed 3 Aug. 2022.
3. Swales, John M. & Feak, Christine B. 2012. Academic Writing for Graduate Students: Essential Tasks and Skills, University of Michigan Press, Michigan, United States.
4. 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	T	P	Credit
233BT1A1CA	CELL BIOLOGY	CORE	4	1	-	4

PREAMBLE

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	K3
CO4	Sketch signaling events within cells	K3
CO5	Illustrate the cell cycle events and pathological progressions documentation, inspection and certification	K3

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

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

1 Rastogi SC, 2015, "Cell Biology", 3rd edition, New Age International Publishers, India

2 Islam A, 2011, "Text Book of Cell Biology", 2nd edition, Books and Allied (P) Ltd. , India

References

1 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", 3rd edition, John Wiley Sons. Inc, USA

4 Alberts B, 1998, "Essential Cell Biology", 1st edition. Garland Publishers, USA

Course Code	Course Name	Category	L	T	P	Credit
233BT1A1CB	BIOCHEMISTRY	CORE	4	1	-	3

PREAMBLE

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	Knowledge Level
CO1	Identify the concepts of biochemical pathways and carbohydrates	K2
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	K3
CO5	Categorize the classification of enzymes, mechanism of action and enzyme kinetics	K3

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

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

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 (α, β and ω Oxidation of fatty acids). Cholesterol Biosynthesis andregulation. 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

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

References

1. 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
3. Voet D and Voet JG, 2011, "Biochemistry", 4th edition, John Wiley and Sons Inc. USA
4. 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

S.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

* DBT STAR College Status Experiment

References

1 Becker JM, Caldwell GA and Zachgo A, 2007, "Biotechnology– A laboratory Course", 2nd edition, Academic Press, USA

2 Sambrook J, Green MR, 2012, "Molecular Cloning: A Laboratory Manual", 4th edition, Cold Spring Harbor, USA

3 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	T	P	Credit
232CE1A1IB	CHEMISTRY	IDC	4	-	-	4

PREAMBLE

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	CO Statement	Knowledge Level
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	✓	✓		✓	✓
CO2		✓	✓		✓
CO3	✓		✓	✓	
CO4		✓		✓	
CO5	✓	✓	✓		✓

✓	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

1 Puri. B.R, Sharma. L.R and Pathania. M.S, 2017, "Principles of Physical Chemistry", 47th Edition, John Wiley and Sons & USA

2 Madhan. R.D, 2016, "Modern Inorganic Chemistry", 10th Edition, Mc Graw Hill Company & USA.

References

1 Lee. J.D, 2002, "A New Concise Inorganic Chemistry", 5th Edition, ELBS & UK.

2 Jain. M.K and Sharma. S.C, 2012, "Modern Organic Chemistry", Vishal publishing Co & New Delhi

3 Puri. B.R, Sharma. L.R and Kalia. K.C, 2016, "Principles of Inorganic Chemistry", Vishal Publishing & Co & New Delhi.

4 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	T	P	Credit
233MB1A1AA	ENVIRONMENTAL STUDIES	AECC	2	-	-	2

PREAMBLE

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	Knowledge Level
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	✓	✓	✓	✓	✓
CO2		✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓		
CO5	✓	✓	✓		✓

COURSE FOCUSES ON

✓	Skill Development		Entrepreneurial Development
✓	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;

Unit V Human Communities and the Environment& Field Work 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

2 Gadgil, M., & Guha, R.1993. This Fissured Land: An Ecological History of India. Univ. of California Press.

References

1 Gleeson, B. and Low, N. (eds.) 1999. Global Ethics and Environment, London, Routledge.

2 Gleick, P.H. 1993. Water in Crisis. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.

3 Groom, Martha J. Gary K. Meffe, and Carl Ronald carroll. Principles of Conservation Biology. Sunderland: Sinauer Associates, 2006.

4 Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from India's Himalaya dams. Science, 339: 36-37.

5 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.

7 Odum, E.P., Odum, h.T. & Andrews, J.1971. Fundamentals of Ecology. Philadelphia: Saunders.

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APPROVED
BoS - 15th 10/06/2023 | AC - 15th 14/07/2023 | GB - 28th 05/08/2023

Dr.NGPASC
COIMBATORE | INDIA

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

PREAMBLE

This course has been designed for students to learn and understand

- மொழிப்பாடங்களின் வாயிலாக தமிழரின் பண்பாடுநாகரீகம் ,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	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	✓			✓	
CO3	✓	✓			
CO4	✓		✓		
CO5	✓			✓	

COURSE FOCUSES ON

✓	Skill Development	✓	Entrepreneurial Development
✓	Employability	✓	Innovations
✓	Intellectual Property Rights	✓	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 - ஔவையார் - 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

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

References

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	L	T	P	Credit
231TL1A2HA	HINDI- II	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
- 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	✓			✓	✓
CO2	✓	✓			✓
CO3	✓		✓	✓	✓
CO4	✓		✓		✓
CO5	✓	✓	✓		✓

COURSE FOCUSES ON

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

231TL1A2HA	HINDI- II	SEMESTER II

Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I 13 h

आधुनिकपद्य – शबरी(श्रीनरेशमेहता)

Unit II 13 h

उपन्यास: सेवासदन-प्रेमचन्द

Unit III 12 h

कहानी-किरीट- डा उषा पाठक / डा अचला पाण्डेय

पाठ 1.कफ़न, 3. चीफ़ की दावत

Unit IV 12 h

पत्र लेखन: (औपचारिक या अनौपचारिक)

Unit V 10 h

अनुवाद अभ्यास-III (केवल हिन्दी से अंग्रेजी में) (पाठ 1 to 10)

Text Books

1. प्रकाशक: लोकभारती प्रकाशन पहली मंजिल , दरबारी बिल्डिंग,महात्मा गाँधी मार्ग , इलाहाबाद. (Unit I)
2. प्रकाशक: सुमित्र प्रकाशन 204 लीला अपार्ट्मेंट्स , 15 हेस्टिंग्स रोड 'अशोक नगर इलाहाबाद . (Unit II)
3. प्रकाशक: राधाकृष्ण प्रकाशन दिल्ली. (Unit III)
4. 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	T	P	Credit
231TL1A2MA	MALAYALAM- II	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	Build creative ability	K3
CO5	Apply the power of creative reading	K3

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

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

231TL1A2MA	MALAYALAM- II	SEMESTER II

Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I **Novel** 12 h

Enmakaje: Chapter1- Chapter5

Unit II **Novel** 10 h

Enmakaje: Chapter 6- Chapter 10

Unit III **Novel** 12 h

Enmakaje: Chapter 11- Chapter 15

Unit IV **Autobiography** 14 h

NeermathalamPoothaKalam: Chapter 1- Chapter 10

Unit V **Autobiography** 12 h

NeermathalamPootha Kalam: Chapter 11- Chapter 20

Text Books

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

References

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

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

PREAMBLE

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	K3

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

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

231TL1A2FA	FRENCH- II	SEMESTER II

Total Credits: 3

Total Instruction Hours: 60 h

Syllabus

Unit I 12 h

Proposer, accepter, refuserune invitation. Indiquer la date.	Organiser une soirée au cinéma avec des amis, par téléphone et par courriel.	Comprendreunemessage d'invitationsurunréponde urtéléphonique. Inviter quelqu'un accepter ourefuserl'invitation.

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.	Comprendre des personnes qui fixentunrendez-vous par téléphonique. Prendreun rendez-vous par telephone

Unit III 12 h

Exprimer son point de vue positif et négatif. S'informersur le prix. S'informersur la quantitité. Exprimer la quantitité.	En groupes, choisir un cadeau pour un ami.	Exprimer son point de vuesur des idées de cadeau. Faire des achatsdans un magasin

Unit IV 14 h

Demander etindiquerune direction. Localiser (près de, en face de ….). Exprimerl'obligationl' Interdit.Conseiller.	Suivre un itinéraire à l'aided'indications par telephone et d'un plan. Par courrierélectronique, donner des informations et des conseils à un ami qui veut voyager.	Comprendre des indications de direction. Comprendre des indications de lieu. Comprendreune chanson. Comprendre de courts messages qui experiment l'obligationoul'interdictio n.

		Donner des conseils à des personnesdans des situations données.

Unit V 10 h

Make in Own Sentences

Text Book

1 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	T	P	Credit
231EL1A2EA	ENGLISH- II	LANGUAGE- II	4	-	1	3

PREAMBLE

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	K3

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

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

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 indications- outline-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- ReadingAdvertisements - 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

1. Keats, John. To a Friend Who Sent Me Some Roses. <https://www.Poets.org , 1820, poets.org/poem/ friend-who-sent-me-some-roses.html/> (Unit I)
2. Gardiner, Alfred George. On Habits (n.d.). <Https://Www. Gutenberg. Org/ Files/47429/47429-H/47429-H.Html/> (Unit I)
3. Murthy, Sudha. The Enchanted Scorpions. (n.d.). <https://www. ssgopalganj.in/online/EBooks/CLASS%20VI/Grandma's%20Bag%20of%20 Stories%20by%20Sudha%20Murthy.pdf/> pp-34-39. (Unit I)
4. Pinski, David. A Dollar - a One-act Play.<www.one-act-plays.com/ comedies/dollar.html/> (Unit I)
5. 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)
7. Raman, Meenakshi & Sangeeta Sharma. 2016. Technical Communication-Principles And Practice, Oxford University Press, New Delhi, India. (Unit IV)
8. Viswamohan, Aysha. 2017. English For Technical Communication (With CD), McGraw Hill (India) Private Limited, New Delhi, India. (Unit V)

References

1. 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
3. 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	T	P	Credit
233BT1A2CA	GENETICS	CORE	4	1	-	4

PREAMBLE

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	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓				✓
CO4	✓				✓
CO5	✓	✓	✓	✓	✓

COURSE FOCUSES ON

✓	Skill Development		Entrepreneurial Development
✓	Employability		Innovations
	Intellectual Property Rights		Gender Sensitization
✓	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 pseudo-dominance), 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

1 Strickberger MW, 2013, "Genetics", 3rd Edition, Prentice Hall College Division, NewDelhi.

2 Winter PC, Hickey GI and Fletcher HL, 2000, "Genetics", 1st Edition, VivaBooks Pvt Ltd., India

References

1 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

3 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	T	P	Credit
233BT1A2CB	MICROBIOLOGY	CORE	4	1	-	3

PREAMBLE

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	K3
CO5	Discuss the structure, reproduction and the causative diseases of fungus	K3

MAPPING WITH PROGRAMME OUTCOMES

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

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

1 Atlas M Ronald, 2015, "Principles of Microbiology", 2nd Edition, McGraw-Hill Publication, India.

2 Pelzar M, 2001, "Microbiology", 5th Edition, McGraw Hill Education (India) Pvt Ltd, India.

References

1 Brij Mohan Meena, 2018, Microbiology, 1st Edition, Paradise Publisher - Jaipur.

2 David Greenwood, Richard CB Slack, John F Peutherer, 2002, "Medical Microbiology – A Guide to Microbial Interactions: Pathogenesis, Immunity, Laboratory Diagnosis and Control", 16th Edition, Churchill Livingstone, Edinburgh.

3 Gerard J T, 2012, "Microbiology: An Introduction", 11th Edition, Benjamin Cummings Publishers, USA.

4 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
9.	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.

References

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

Course Code	Course Name	Category	L	T	P	Credit
234CS1A2IB	PYTHON FOR BIOLOGISTS	IDC	4	-	-	4

PREAMBLE

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	CO Statement	Knowledge Level
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	✓		✓	✓	✓
CO2	✓	✓	✓		
CO3	✓	✓		✓	
CO4	✓		✓		✓
CO5		✓			

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

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

1 E. Balagurusamy, 2016, "Introduction to Computing and Problem-Solving UsingPython", First Edition, McGraw-Hill publication, New Delhi.(Unit I to IV).

2 Sebastian Bassi, 2017,Python for Bioinformatics,Second Edition, CRC Press (Unit V).

References

1 Fabio Nelli, 2018, "Python Data Analytics", Second Edition,Apress, New York..

2 Wes McKinney, 2011, "Python for Data Analysis: Data Wrangling with Pandas,NumPy, and IPythony", O'Reilly, USA.

3 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

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

References

1 ஒன்றாம் வகுப்பு பாடநூல் - தமிழ்நாடு அரசு பாடநூல் கழகம், சென்னை.

2 தமிழ் இணையக் கல்விக்கழகம் - TAMIL VIRTUAL ACADEMY வலைதள முகவரி: <https://www.tamilvu.org/>

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)

References

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 : <https://www.tamilvu.org/>

Course Code	Course Name	Category	L	T	P	Credit
235CR1A2AA	HUMAN RIGHTS AND WOMEN'S RIGHTS	AECC	2	-	-	2

PREAMBLE

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 ofHuman 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		✓		✓	✓
CO2		✓	✓	✓	✓
CO3				✓	✓
CO4		✓		✓	✓
CO5	✓	✓	✓	✓	✓

COURSE FOCUSES ON:

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

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

1 LalitParmar, 1998, "Human Rights", Anmol Publications Pvt. Limited, New Delhi.

2 Krishna Pal Malik, 2009, "Women & Law", Allahabad Law University, New Delhi.

References

1 Mandagadde Rama Jois, 2015, "Human Rights", Bharatiya Values, BharatiyaVidya Bhavan Publications, Mumbai.

2 Paras Diwan and PiyushDiwan, 1994, "Women and Legal Protection", South Asia Books, Andhra Pradesh.

3 VenkataramandSandhiya. N, 2001, "Research in Value Education", APH Publishing Corporation, New Delhi.

4 Anand A S, 2008, "Justice for Women: Concerns and Expressions", Universal Law Publishing Co., New Delhi.

17/10/23
BoS Chairman/HoD
Department of Biotechnology
Dr. N. G. P. Arts and Science College
Coimbatore – 641 048

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

BoS - 16th	AC - 16th	GB - 21st
17/10/23	13/12/23	05/01/24

Academic Council
CHAIRMAN
Dr.N.G.P. Arts and Science College

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

PREAMBLE

This course has been designed for students to learn and understand

- மொழிப்பாடங்களின் வாயிலாக தமிழரின் பண்பாடுநாகரீகம் ,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	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				✓	
CO3		✓			
CO4	✓		✓		
CO5	✓			✓	

COURSE FOCUSES ON

✓	Skill Development	✓	Entrepreneurial Development
✓	Employability	✓	Innovations
✓	Intellectual Property Rights	✓	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

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

References

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	L	T	P	Credit
231TL1A3HA	HINDI- III	LANGUAGE- I	3	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	K3

MAPPING WITH PROGRAMME OUTCOMES

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

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

1. 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	T	P	Credit
231TL1A3MA	MALAYALAM- III	LANGUAGE-I	3	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	Build creative ability	K3
CO5	Apply the power of creative reading	K3

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUS ON

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

231TL1A3MA	MALAYALAM- III	SEMESTER III

Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I **Poetry** 10 h

Kumaranasan

Unit II **Poetry** 10 h

Kumaranasan

Unit III **Poetry** 10 h

Kumaranasan

Unit IV **Poetry** 10 h

VayalarRamavarma

Unit V **Poetry** 08 h

VayalarRamavarma

Text Books

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	T	P	Credit
231TL1A3FA	FRENCH- III	LANGUAGE- I	3	1	-	3

PREAMBLE

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	K3

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

✓	Skill Development	✓	Entrepreneurial Development
✓	Employability	✓	Innovations
✓	Intellectual Property Rights	✓	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. ° Situer	A partird'unerecherche de documents, composer une presentation touristique pour un magazine ou un site internet.	Comprehendre la description d'un lieu. Décrireunevilleouunerégionq u'onaime. Interrogersur la situation of d'un lieu. Comprendre des indications sur la fréquenced'actions.	Comprendreune presentation de catalogue touristique. Comprendre des pictogrammes. Comprendre la description d'un lieu et d'une situation precise dans un message électronique.

Unit II 10 h

Se situerdans le temps.	A partird'unerecherc he de documents, composer une presentation touristique pour un magazine ou un site internet.	Comprehendre la description d'un lieu. Décrireunevilleouunerégio nqu'onaime. Interrogersur la situation of d'un lieu. Comprendre des indications sur la fréquenced'actions.	Comprendreune presentation de catalogue touristique. Comprendre des pictogrammes. Comprendre la description d'un lieu et d'une situation precise dans un message électronique.

Unit III 10 h

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

Unit IV 10 h

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

Unit V 08 h

Make in Own Sentences based on the above Lessons

Text Book

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

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

PREAMBLE

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	CO Statement	Knowledge Level
CO1	Infer the specific usage of while-listening process	K2
CO2	Organize the various abilities and sub-skills involved in reading	K3
CO3	Utilize the importance of speaking skills and developing it through various practices	K3
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			✓		✓
CO2	✓	✓		✓	
CO3	✓		✓		✓
CO4	✓		✓		
CO5		✓		✓	

COURSE FOCUSES ON

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

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

1. 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)
3. Mohan, Krishna and Banerji, Meera. 2009. Developing Communication skills. 2nd Edition, Macmillcan, India. (Unit I, II, III, IV)
4. Alex. Soft Skills. 2009. S. Chand Publishing, New Delhi, India. (Unit V)

References

1. Ghosh, B.N. Editor. 2017. Managing Soft Skills for Personality Development. McGraw- Hill Education, Chennai, India.
2. Miles Craven. 2008. Cambridge English Skills Real Listening and Speaking. First Edition, Cambridge University Press, United Kingdom.
3. 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

PREAMBLE

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	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓		
CO5			✓		

✓	Skill Development		Entrepreneurial Development
✓	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 eukaryoticreplication. 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

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

References

1. 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.
3. Freifelder D & Malacinski GM, 1996, "Essential of Molecular Biology", 2nd Edition, Panima Publishing Co, New Delhi.
4. De Robertis, 2011, " Cell and Molecular Biology", 8th Edition, Lippincott Williams & Wilkins,USA.

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

PREAMBLE

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	CO Statement	Knowledge Level
CO1	Identify the nature, concept and definition of Biodiversity, conservation strategies.	K2
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	✓	✓	✓	✓	✓
CO2		✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓		
CO5	✓	✓	✓		✓

✓	Skill Development		Entrepreneurial Development
✓	Employability		Innovations
	Intellectual Property Rights		Gender Sensitization
✓	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.

2 Narendran TC, 2006, "An Introduction to Taxonomy", Zoological Survey of India, Kolkata.

References

1 Negi SS, 2008, "Biodiversity and its Conservation in India: Status, Threats and Conservation", 2nd edition, Saujanya Books., India.

2 Jeffries MJ, 2006, "Biodiversity and Conservation", 1st edi.tion, Routledge, UK.

3 Jeffery MI et al., 2008, "Biodiversity Conservation, Law and Livelihoods", 1st edition, Cambridge University Press, UK.

4 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

References

1. 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", 5th 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	T	P	Credit
232MT1A3IE	BASIC MATHEMATICS	IDC	4		-	4

PREAMBLE

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	✓		✓		
CO2	✓				
CO3	✓	✓	✓		✓
CO4	✓	✓	✓		✓
CO5	✓			✓	✓

COURSE FOCUSES ON

✓	Skill Development		Entrepreneurial Development
✓	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

1 DuraipandianP and UdayabaskaranS,2014, "Allied Mathematics - Volume I", First Edition, S.Chand & Company Pvt Limited, New Delhi.(Unit I to II)

2 Das N G,2018,"Statistical Methods", First Edition, Mc Graw Hill Education(India) Private Limited, Chennai.(Unit III to V)

References

1 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

3 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	T	P	Credit
233BT1A3EP	BIOTECHNIQUES	SEC	2		4	2

PREAMBLE

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	Understand the Principle and the types of Centrifugation	K3
	Classifying the chromatographic techniques and CO2 analyzing its applications	K3
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	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓

COURSE FOCUSES ON

✓	Skill Development	✓	Entrepreneurial Development
✓	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

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

References

1. Freifelder D, 1982, "Physical Biochemistry: Application to Biochemistry and Molecular Biology", 2nd edition, W. H. Freeman Publishers, USA.
2. WalkerJ&Wilson K, 2000, "Principle &Technique-Practical Biochemistry", 5th edition, Cambridge university press, UK.
3. RakeshSSengar,AmitKumar,ReshuChaudhary,AshuSingh,2018,"AdvancesinMolecularTechniques",1stedition,CRCPress,USA.
4. 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.

Text Books

1 Rao, N.S. 2000. Biofertilizers in Agriculture. 2nd edition. Oxford & IBH publishing Co. New Delhi

2 Sundararaj, D.D. and Thulasidas, G. 1993. Botany of Field Crops. 2nd edition. McMilan India Ltd. India

References

1 Jeswani, L.M. and Balddev, B. 1990. Advances in Pulse Production Technology. 1st edition. ICAR. New Delhi..

2 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.

Text Books

1 Joseph, K. and Nagendra, R. 2004. Essentials of Environmental Studies. 2nd edition. Pearson Education. New Delhi

2 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.

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Academic Council CHAIRMAN Dr.N.G.P. Arts and Science College

Course Code	Course Name	Category	L	T	P	Credit
231TL1A4TA	TAMIL - IV	LANGUAGE- I	3	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	K3
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		✓	✓		✓
CO2	✓			✓	
CO3		✓			✓
CO4			✓		
CO5	✓			✓	✓

COURSE FOCUSES ON

✓	Skill Development	_	Entrepreneurial Development
✓	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

I.பா.எண் : 01 – கபிலர்

II.பா.எண் : 88 – நல்லந்துவனார்

III.பா.எண் : 102 – செம்பியனார்

2. குறுந்தொகை – முல்லைத்திணை

I.பா.எண் : 65 – கோவூர்கிழார்

II. பா.எண் : 167 – கூடலூர்கிழார்

மருதத்திணை

I.பா.எண் : 08 – ஆலங்குடி வங்கனார்

II.பா.எண் : 61 – தும்பிசேர்கீரனார்

III.பா.எண் :196 – மிளைக் கந்தன்

நெய்தல் திணை

I.பா.எண் : 57 – சிறைக்குடி ஆந்தையார்

Unit II **எட்டுத்தொகை** 08 h

1. கலித்தொகை – பாலைக்கலி

I.பா.எண் : 09 – பெருங்கடுங்கோ

2. அகநானூறு - மருதத்திணை

I.பா.எண் : 86 – நல்லாவூர்கிழார்

3. புறநானூறு - I.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

I. 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)

References

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.<http://www.tamilvu.org/>

Course Code	Course Name	Category	L	T	P	Credit
231TL1A4HA	HINDI - IV	LANGUAGE- I	3	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	K3

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

✓	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 Instruction 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- III

Text Books

1. लडाई – सर्वेश्वरदयाल सक्सेना प्रकाशक: वाणी प्रकाशन 21-A, दरियागंज नई दिल्ली-110002. (Unit I)
2. एकांकी पंचामृत – डॉ राम कुमार (भोर और तारा छोड्कर) प्रकाशक: जवाहर पुस्तकालय सदर बाजार, मथुरा उत्तर प्रदेश-281001. (Unit II)
3. 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)
5. अनुवाद अभ्यास (केवल अंग्रेजी से हिन्दी में) (पाठ 10 to 20) प्रकाशक: दक्षिण भारत प्रचार सभा चेनैई -17 (पाठ10 to 20). (Unit V)

Course Code	Course Name	Category	L	T	P	Credit
231TL1A4MA	MALAYALAM- IV	LANGUAGE - I	3	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	Build creative ability	K3
CO5	Apply the power of creative reading	K3

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUS ON

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

231TL1A4MA	MALAYALAM- IV	SEMESTER IV

Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I **Drama** 10 h

Saketham- Sreekandan Nair

Unit II **Drama** 10 h

Saketham- Sreekandan Nair

Unit III **Drama** 10 h

Saketham- Sreekandan Nair

Unit IV **Screen Play** 10 h

Perumthachan- Vasudevan Nair

Unit V **Screen Play** 08 h

Perumthachan- Vasudevan Nair

Text Books

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

Reference

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

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

PREAMBLE

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	K3

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

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

231TL1A4FA	FRENCH - IV	SEMESTER IV

Total Credits: 3
Total Instruction Hours: 48 h

Syllabus

Unit I 10 h

°Décrirequelqu'un. ° Comparer	En milieu professional, recruiter quelqúún et justifier sonchoix.	S'exprimersur les styles de vêtemantReconnaitre des personnes à partit de descriptions.	Comprendre la description de personnesdans un extrait de roman.

Unit II 10 h

ExprimerPaccord ou le désaccord. ° Se situerdans le temps.	En milieu professional, recruiter quelqúún et justifier sonchoix.	Décrire des personnes. Comprendre des personnes qui experiment leur accord ouleurdésaccord.	Comprendre des différences de points de vueexprimétesdans de message électronique. Raconter unsourvenir.

Unit III 10 h

° Parler de Pavenir.	Discuter de l'organisation d'un voyage de groupepuispréparerune fiche projet et la templit.	Comprendreune chanson. Echangersurseprojets de vacancy	Comprendre le message d'une carte d'anniversaire

Unit IV 10 h

° Exprimer des souhaits. ° Décrirequelqu'un	Discuter de l'organisation d'un voyage de groupepuispréparerune fiche projet et la templit.	Discuter du programme de la soire à venir. Addresser des souhaits à quelqu'un.	Comprendre le message d'une carte d'anniversaire

Unit V 08 h

Make in Own Sentences based on the above Lessons

Text Book

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

PREAMBLE

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	Knowledge Level
CO1	Summarize main points and supporting details from listening to public addresses and demonstrate poem comprehension.	K2
CO2	Demonstrate clear and expressive speech while engaging in role-play and dramatization activities.	K3
CO3	Interpret textual elements such as themes, tone, and authorial intent in various reading materials.	K3
CO4	Produce clear summaries and paraphrases, maintaining the essence of the original text.	K3
CO5	Prepare for job interviews by employing appropriate interview techniques, confidence, and professionalism.	K3

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

✓	Skill Development		Entrepreneurial Development
✓	Employability		Innovations
	Intellectual Property Rights		Gender Sensitization
✓	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

Text Books

1. 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)
2. 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)
4. Orwell, George. "Why I Write." George Orwell: An Anthology of His Prose, edited by John Carey, Harcourt, 2000. pp. 232-237. (Unit IV)
5. Meyer, John. The Soft Skills Handbook for Corporate Success: Essential Strategies for Business Professionals. 2nd ed., Business Insights, 2020. (Unit V)

References

1. Lawrence, D.H. The Complete Poems of D.H. Lawrence. Edited by V.J. Harding, 1st ed., Heinemann, 1992.
2. Buczynski, Mark. Soft Skills for the Workplace: How to Build Successful Relationships and Advance Your Career. 2nd ed., Wiley, 2018.
3. 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	T	P	Credit
233BT1A4CA	IMMUNOLOGY	CORE	5	-	-	5

PREAMBLE

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	Knowledge Level
CO1	Understand the concepts in immunology	K1
CO2	Learn basics of Immune Response and Transplantation Technology	K2
CO3	Discuss and distinguish different antigen antibody interactions, Allergic reactions and Tumour immunology	K3
CO4	Learn about different antibody production techniques	K3
CO5	Awareness on types of vaccines and its significance	K3

MAPPING WITH PROGRAMME OUTCOMES

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

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

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

Text Books

1 Kuby J, 2003, "Immunology ", 5th edition, W.H. Freeman and Company, New York.

2 Rao CV, 2002, "Textbook of Immunology", 1st edition, Narosa Publishing House, India

References

1 Riot I, 1988, "Essentials of Immunology", 6th edition, Blackwell Scientific Publications, USA.

2 Tizard A, 1995, "Immunology ", 4th edition, Saunders college publishers, USA.

3 Ramesh, 2016, "Immunology", 1st edition, McGraw Hill Education, India Private Limited. .

4 Ed Harlow, David Lane, 1988, "Antibodies Laboratory Manual", Cold Spring Harbor Laboratory Press, USA.

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

PREAMBLE

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	Knowledge Level
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	K3
CO4	Explain the sequences and its alignment which determines several roles of biomolecules	K3
CO5	Comprehend the molecular modelling and visualization for drug designing	K3

MAPPING WITH PROGRAMME OUTCOMES

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

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

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** 9 h

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.

Text Books

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

References

1. Andrew R Leach, 2001, "Molecular Modeling: Principles and Application", Pearson Publishers, United Kingdom.
2. 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.
4. Leo, Albert, Hockma, Hansch, Corwin, 1995, "Exploring QSAR", 2nd edition, American Chemical Society, United States.

233BT1A4CP	CORE PRACTICAL: IMMUNOLOGY AND BIOINFORMATICS	SEMESTER IV

Total Credits: 2
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.
13.	Molecular Docking

Note: *DBT STAR College Experiment.

References

1 Tramontano, A., 2005,"Ten Most Wanted Solutions in Protein Bioinformatics", 1st Edition, CRC Press. USA

2 Lesk, A.M., 2014, "Introduction to Bioinformatics", 4th Edition, Oxford Publications.

3 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

PREAMBLE

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.	K3

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

✓	Skill **Development**		Entrepreneurial Development
✓	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.

Text Books

1 Vasantha Pattabhi, Gautham N, 2002, "Biophysics", 1st Edition, Kluwer Academic Publishers, United States.

2 Rodney M.J, Cotterill, 2002, "Biophysics: An Introduction", 2nd edition, John Wiley & Sons Ltd, United States.

References

1 Tom A Waigh, 2007, "Applied Biophysics - A Molecular Approach for Physical Scientists", 1st edition, John Wiley & Sons Ltd, United States.

2 Jay L Nadeau, 2018, "Introduction to Experimental Biophysics, Biological Methods for Physical Scientists", 2nd Edition, CRC Press, United States.

3 Glaser, Roland, 1999, "Biophysics", 1st edition, Springer-Verlag Berlin, Heidelberg.

4 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	T	P	Credit
233BT1A4EP	RECOMBINANT DNA TECHNOLOGY	SEC	2		3	2

PREAMBLE

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	Knowledge Level
CO1	Impart knowledge on importance of steps in recombinant DNA Preparation, introduction and selection	K2
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	K3
CO5	Demonstrate the identification specific gene and protein	K3

MAPPING WITH PROGRAMME OUTCOMES

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

COURSE FOCUSES ON

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

233BT1A4EP	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
3. Ligation

Unit II Cloning vectors 6 h

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.

Practical 6 h

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

Text Books

1 Brown, T. A, 1998, "Introduction to Gene Cloning", 3rd Edition, Stanley Thornes Publishing Ltd.

2 Primrose, S. B, 2003, " Principles of Gene Manipulation", 6th Edition, Blackwell Science Ltd.

References

1 Ernst. L. Winnacker, 2003, "From Genes to Clones", 2nd Edition, Panima Publishing Corporation.

2 James. D. Watson, 2001, "Recombinant DNA Technology", 2nd Edition, WH Freeman and company.

3 Brown, T. A, 2016, "Gene Cloning and DNA Analysis", 7th Edition, Wiley Blackwell.

4 Primrose, S.B. and Twyman, R. 2013, "Principles of Gene Manipulation and Genomics", 7th Edition, Wiley Blackwell.

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