Pune District Education Association's

Annasaheb Magar Mahavidyalaya

Hadapsar, Pune- 411028

Affiliated to Savitribai Phule Pune University, Pune

Self Study Report: 2024 (4th Cycle)

Criterion - 1

Curricular Aspects

Key Indicator- 1.3 Curriculum Enrichment

Metric: 1.3.1(QlM)

Institution integrates crosscutting issues relevant to Professional Ethics, Gender, Human Values, Environment and Sustainability in transacting the Curriculum

Submitted to

NATIONAL ASSESSMENT AND ACCREDITATION COUNCIL BENGALURU

Crosscutting issues: Environmental Sustainability

LIST OF THE COURSES THAT INTEGRATE ENVIROMENT AND SUSTAINABILITY IN THEIR CURICULUM

Sr. No.	Program	Name of the Department	Page Numbers
1.	B.A	ECONOMICS	04-17
2.	B.A	PSYCHOLOGY	18-28
3.	B.A	B.Voc (Tourism)	29-36
4.	B.A	GEOGRAPHY	37-55
5.	B.A	POLITICAL SCIENCE	56-63
6.	M.Sc	ENVIRONMENTAL SCIENCE	64-80
7.	B.Sc.	ZOOLOGY	81-87
8.	B.Sc.	MICROBIOLOGY	88-96
9.	B.Sc.	BOTANY	97-120
10.	BBA	BBA	121-124
11.	BCA	BCA (Sci.)	125-128
12.	B.SC, B.A. B.COM	ENVIRONMENT STUDIES	129-134
13.	Ph.D.	ENVIRONMENTAL SCIENCES	135-137
14.	Links to SPPU Syllabi	All	138-139

Annasaheb Magar Mahavidyalaya Hadapsar Senior

ECONOMICS

FYBA ECONOMICS

Sr/No.	Crosscutting issue	Program	subject	class	Name of the course	Content in the course:	outcome
1	**Environment and sustainability**	BA	Economics	FY BA	Indian Economic Environment	Unit 3: Points - 3.1 and 3.2	This course will enhance the Ability to develop an understanding of the economic environment and the factors affecting economic environment.

- **Develop an understanding of the economic environment and the factor affecting Indian economic environment.**

F.Y.B.A. Economics

G-1 Indian Economic Environment

Annexure –II

1) Title of the course:

Class: F.Y.B.A.

Subject: Economics.

Title: Year of Implementation: From June - 2019

2) Preamble of the syllabus:

The proposed curriculum is with an objective to enhance the existing syllabus, make it contextual as well as applicable and to incorporate all the latest changes in the national economy. The board examined the short comings of the existing syllabus and expressed the need to change it. While doing so the board analyzed other curricula of existing universities in respective subjects in terms of content, relevance, quality and pattern of teaching that has been synthesized in the present proposal. While framing the draft of syllabus, guidance from industrial experts and professionals was seeked.

The present era is that of structural transformation especially within the country. Moreover fast changing international scenario and approach of other countries towards our human resource makes it mandatory for the educational system to impart latest knowledge to our students, so that they are prepared to merge themselves in the challenging economic and corporate environment.

Hence, a change in the paper and restructuring of syllabus becomes imperative. The syllabus needs to be holistic in nature. It should be contextual and clear the basics of economics but at the same time it should teach application of the theories in day to day life.

In the modern world, competition is an inseparable part of our lives. To inculcate a competitive spirit among the students, the syllabus should include all the recent advancement with in and out of the country with its pros and cons.

3) Objectives of the paper

and modified to suitably align with the changing Indian scenario. The paper will set an apt background for students to comprehend knowledge of economics in their academic career and apply the knowledge in their life.

9) University terms

Academic calendar of the affiliating university will be followed.

10) Subject wise detail syllabus

Semester 1		
Units	**Name and sub titles of the Chapter**	**No of lectures**
Unit 1	**Introduction**	**16**
	1.1 Meaning, Factors affecting Economic Environment- Economic, Political, Technological, Social & Cultural	08
	1.2 Challenges to Indian Economy: Natural Resources, Energy Resources, Education, Health, Environment	04
	1.3 Comparison of Indian Economy with the World Economy- Population, Agriculture, Industry and Service Sector	04
Unit 2	**Agricultural Environment**	**16**
	2.1 Role of Agriculture in Indian Economy	04
	2.2 Challenges to Indian Agriculture-Productivity, Rural Credit, Marketing, Rural Entrepreneurship	08
	Recent Trends in Indian Agriculture: Cropping pattern, Technology, Crop Insurance, Water Management, Agri-Business	04
Unit 3	**Industrial Environment**	**16**
	3.1 Role of Industry in Indian Economic Development	04
	3.2 Industrial Policy Resolution, 1991- Liberalization, Privatization and Globalization (LPG)	03
	3.3 Challenges to Indian Industry-Labour & Employment, Regional Imbalance, Finance, Technology	03
	3.4 Micro, Small and Medium Enterprises (MSME)- Definition & Role	03
	3.5 Recent trends in Indian Industry- Indian Multinationals & New Policies	03
Semester 2		
Unit 1	**Service Sector Environment**	**12**
	1.1 Role and Growth of Service Sector in Indian Economy	02

	1.2 Challenges to Indian Service sector- Business-based & Knowledge-based Sector, Education sector, Health sector, Insurance, Tourism, Banking	06
	1.3 Recent Trends in Indian Service Sector- Digital Economy, E-Commerce, E- Finance	04
Unit 2	**Banking Environment**	**18**
	2.1 Banking- Definition, Functions, Changing Structure of Banking in India- New Private Banks, Small Banks, Payment Banks	08
	2.2 Bank Accounts- Types, Procedure and Operation of Accounts	05
	2.3 Recent Trends in Indian Banking Environment- E-Banking, E- Wallets, Bank Mergers and Amalgamations	05
Unit 3	**Overview of Indian economy**	**18**
	3.1 Challenges of Indian Economy- Poverty, Employment, Inequality, Informal Sector	09
	3.2 Policy Measures (Two-Three recent Programmes)- Poverty Alleviation Programmes; Employment Generation Programmes; Agriculture Development Programmes, Skill Development Programmes ……..	09

11) Recommended books

Semester I: Basic Reading List

- Agrawal A.N., Problems of Development & Planning, (Latest Edition)
- Ashwani Mahajan, 'Indian Economy' S. Chand & Company Ltd., New Delhi.
- Cherunilam Francis, 'Business Environment-Text and Cases' Himalaya Publishing House(Latest Edition)
- Faisal Ahmed 'Business Environment: Indian and Global Perspective' PHL Learning Pvt. Ltd. (Latest Edition)
- Fernando A.C. (2014) 'Business Environment' Pearson Education,
- Misra & Puri, 'Business Environment', Himalaya Publication House, Mumbai. (Latest Edition)
- Misra & Puri, 'Indian Economy', Himalaya Publication House, Mumbai. (Latest Edition)

Recommended Reading

- Asian Development Bank (2009) 'Urban Poverty in India' BS Books

SYBA ECONOMICS

Sr/No.	Crosscutting issue	Programme	Subject	class	Name of the course	Contentinthecourse:	Outcome
1	**Environment and sustainability**	BA	**ECONOMICS**	SYBA	MicroEconomics	**Unit1:**Point-1.3 **Unit4**	Students will be able To develop an understanding of basic theories of micro economics and their application.
2					MacroEconomics	**Unit1:**Point 1.2 **Unit2** **Unit3**	This course introduces students to the conceptual and theoretical frameworks of inflation, deflation and stagflation, Business Cycle .

- Students will be able to develop an understanding of basic theories of micro economics and their application.

S.Y.B.A. Economics (Revised Syllabus)
Choice Based Credit System (CBCS)

S -1. Micro Economics

Preamble

As a foundation course, in this Paper, student is expected to understand the definition, nature and scope of economics, method and approaches to the study of Economics. The chapters incorporated in this Paper deal with the theory of consumer's behavior, theory of demand and supply, analysis of production function, cost and revenue analysis, market structures and the equilibrium of a firm and industry. In addition, the principles of factor pricing and commodity pricing and welfare economics have been included.

Objectives of the Paper:

- To develop an understanding about subject matter of Economics.
- To impart knowledge of microeconomics.
- To clarify micro economic concepts
- To analyze and interpret charts, graphs and figures
- To develop an understanding of basic theories of micro economics and their application.
- To demonstrate that the theories discussed in class will usually be applied to real-life situations.
- To help the students to prepare for varied competitive examinations

Method of Teaching:

Classroom lectures, Use of ICT, YouTube lectures, Online PPTs, Group Discussions, Teacher driven Power Point Presentations

	Semester III DSE – 1A - Micro Economics I	
Unit	**Name and Contents**	**Number of Lectures**
Unit 1	**Introduction**	10
1.1	Meaning, Nature, Scope, Importance of Micro economics	
1.2	Basic Economic Problems	
1.3	Tools of economic analysis- Functional Relationship, Schedules, Graphs and Equations.	
1.4	Variables- Dependent and Independent Variable, Endogenous and Exogenous	
Unit 2	**Theory of Consumer Behavior**	14
2.1	Utility – Meaning and Types Cardinal Approach: Law of Diminishing Marginal Utility, Law of Equi-Marginal Utility, Consumer's Equilibrium	
2.2	Ordinal Approach: Indifference Curve Analysis- Meaning and Definition, Characteristics of Indifference Curve, Consumer's Equilibrium	
Unit 3	**Theory of Demand**	12
3.1	Meaning of Demand, Determinants of Demand	
3.2	The Law of Demand & Its Exceptions, Market Demand	
3.3	Elasticity of Demand –Meaning and Types 3.3.1 Price Elasticity of Demand: Meaning, Types, Methods of Measurement 3.3.2 Income Elasticity of Demand: Meaning and Types 3.3.3 Cross Elasticity of Demand: Meaning and Types	
Unit 4	**Supply and Production Analysis**	12
4.1	Meaning, Definition and Determinants of Supply	
4.2	The Law of Supply	
4.3	Elasticity of Supply: Meaning and Types	
4.4	The Production Function: Meaning and Definition	
4.5	Total, Average and Marginal Production	

S.Y.B.A. Economics (Revised Syllabus)

Choice Based Credit System (CBCS)

S -2. Macro Economics

Preamble -

Macroeconomics is the branch of economics that deals with the functioning of an economy as a whole. Macroeconomic analysis involves theoretical, empirical as well as policy-related aspects. The theoretical aspect of macroeconomics involves the conceptual as well as theoretical framework of macroeconomics. It deals with various macroeconomic concepts as well as various macroeconomic theories. The theoretical framework of macroeconomics focuses on functioning of an economy in its totality, determination of the level of national income and employment in an economy, role of aggregate demand as well as aggregate supply, role of money, determination of value of money, determination of general price level as well as rate of inflation and business cycles. The empirical aspect of macroeconomics applies macroeconomic theories to the study of real economies and tests the validity of macroeconomic theories. The policy-related aspect focuses on the role of fiscal and monetary policy in achieving macroeconomic objectives with the help of various policy instruments.

This curriculum integrates conceptual, theoretical, empirical and policy-related aspects of macroeconomics. This curriculum introduces the undergraduate students to the field of macroeconomics and enables them to learn the functioning of the economy in a systematic manner.

Objectives –

- To introduce students to the historical background of the emergence of macroeconomics
- To familiarize students with the differences between microeconomics and macroeconomics
- To familiarize students with various concepts of national income
- To familiarize students with keynesian macroeconomic theoretical framework of consumption and investment functions
- To introduce students to the role of money in an economy.
- To introduce students to the conceptual and theoretical frameworks of inflation, deflation and stagflation, Business Cycle .

- To familiarize students with the conceptual and theoretical framework of business cycles
- To introduce students to the role of monetary and fiscal policies in fulfilling the macroeconomic objectives of stability, full employment and growth.
- To introduce students to the various instruments of monetary and fiscal policies

Method of Teaching:

- Classroom lectures, Use of ICT, You Tube lectures, Online PPTs, Group Discussions, Teacher driven Power Point Presentations

Semester III
DSE – 2A - Macro Economics I

Unit	Name and Contents of the Chapter	Number of Lectures
Unit 1	**Introduction**	12
1.1	Meaning, Nature and Scope of Macro Economics	
1.2	Importance and Limitations of Macro Economics	
1.3	The difference between Micro Economics and Macro Economics	
Unit 2	**National Income**	12
2.1	Meaning and Importance of National Income	
2.2	Various Concepts of National Income – GDP, GNP, NNP, PCI, Personal Income, Disposable Income	
2.3	Methods of National Income Measurement Difficulties in the Measurement of National Income	
2.4	Circular Flow of National Income	
Unit 3	**Theory of Employment and Output**	12
3.1	Classical Theory of Employment , Say's Law of Market.	
3.2	Keynes' Criticism on Classical Theory	
3.3	Keynesian Theory of Employment – Aggregate Supply Price and	

- To familiarize students with the conceptual and theoretical framework of business cycles
- To introduce students to the role of monetary and fiscal policies in fulfilling the macroeconomic objectives of stability, full employment and growth.
- To introduce students to the various instruments of monetary and fiscal policies

Method of Teaching:

- Classroom lectures, Use of ICT, You Tube lectures, Online PPTs, Group Discussions, Teacher driven Power Point Presentations

Semester III
DSE – 2A - Macro Economics I

Unit	Name and Contents of the Chapter	Number of Lectures
Unit 1	**Introduction**	12
1.1	Meaning, Nature and Scope of Macro Economics	
1.2	Importance and Limitations of Macro Economics	
1.3	The difference between Micro Economics and Macro Economics	
Unit 2	**National Income**	12
2.1	Meaning and Importance of National Income	
2.2	Various Concepts of National Income – GDP, GNP, NNP, PCI, Personal Income, Disposable Income	
2.3	Methods of National Income Measurement Difficulties in the Measurement of National Income	
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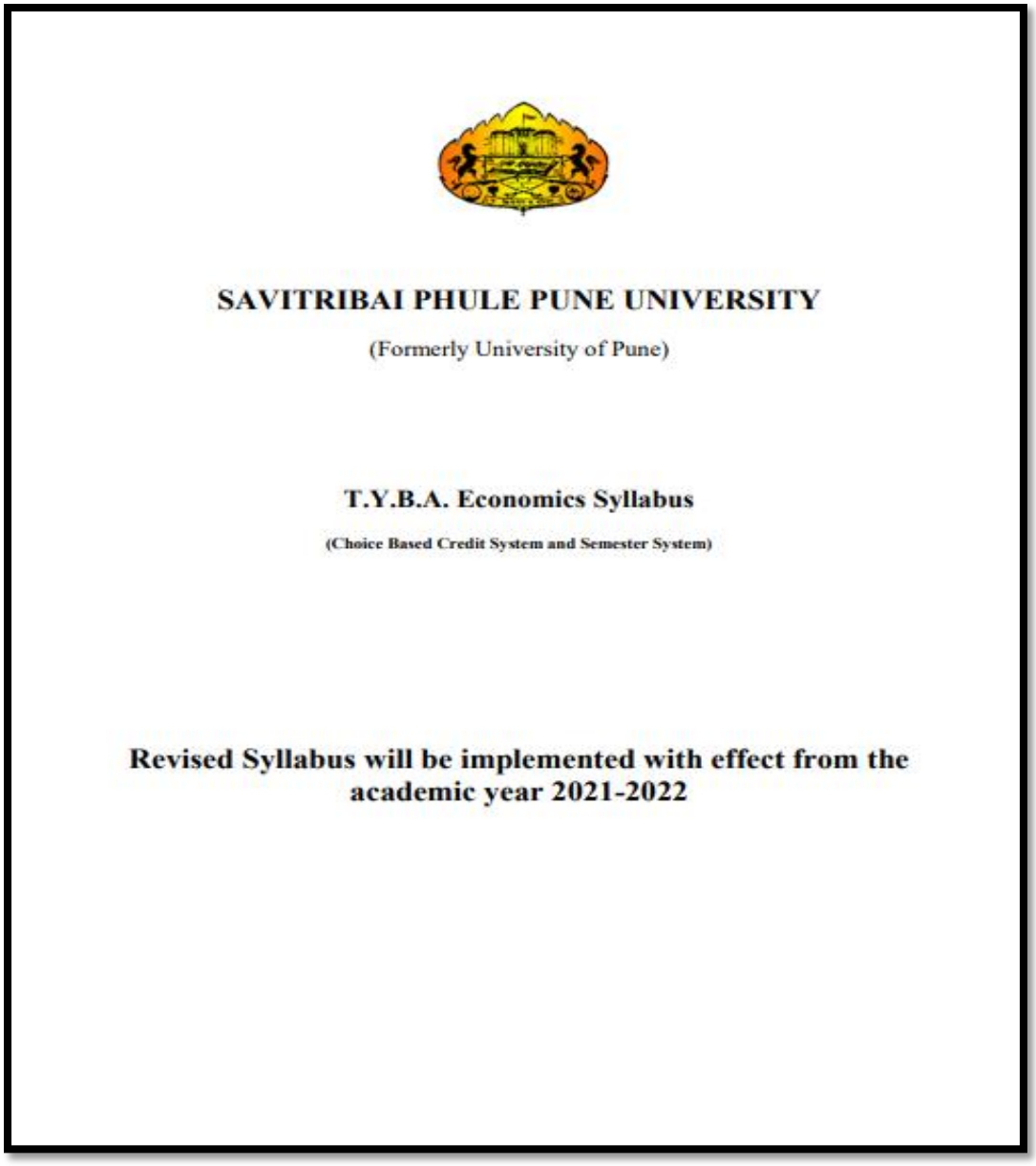
Unit 3	**Theory of Employment and Output**	12
3.1	Classical Theory of Employment , Say's Law of Market.	
3.2	Keynes' Criticism on Classical Theory	
3.3	Keynesian Theory of Employment – Aggregate Supply Price and	

TYBA ECONOMICS

Sr/No.	Crosscutting issue	Programme	Subject	class	Name of the course	Content in the course:	Outcome
1	**Environment and sustainability**	BA	**Economics**	TYBA	Indian Economic Development-II	**Unit1:**3,4	**S**tudents will be able to understand the sustainability at a international level. Students will get a better insight of sustainable goals. Students will be able to describe the relation between environment and economic development.

- Students will be able to describe the relation between environment and economic development.



SAVITRIBAI PHULE PUNE UNIVERSITY

(Formerly University of Pune)

T.Y.B.A. Economics Syllabus

(Choice Based Credit System and Semester System)

Revised Syllabus will be implemented with effect from the academic year 2021-2022

T.Y.B.A. Economics
General Paper- III: Indian Economic Development-II
(Course Code:)

Semester VI

Preamble:

This course would take an overview of the process of Economic Planning and the Development Goals. The course aims to introduce the learner to the main concepts in Economic Planning, equip them with understanding of the planning process in India and changing in recent times and familiarize them to the Sustainable Development Goals. The Course also reviews the relation between Economic Development and Environment.

Course Learning Outcomes

At the end of the course the learner will have ability-

- To describe and explain the process of Economic Planning.
- To describe and examine the changing structure of planning process in India.
- To describe and explain the relation between Economic Development and Environment.

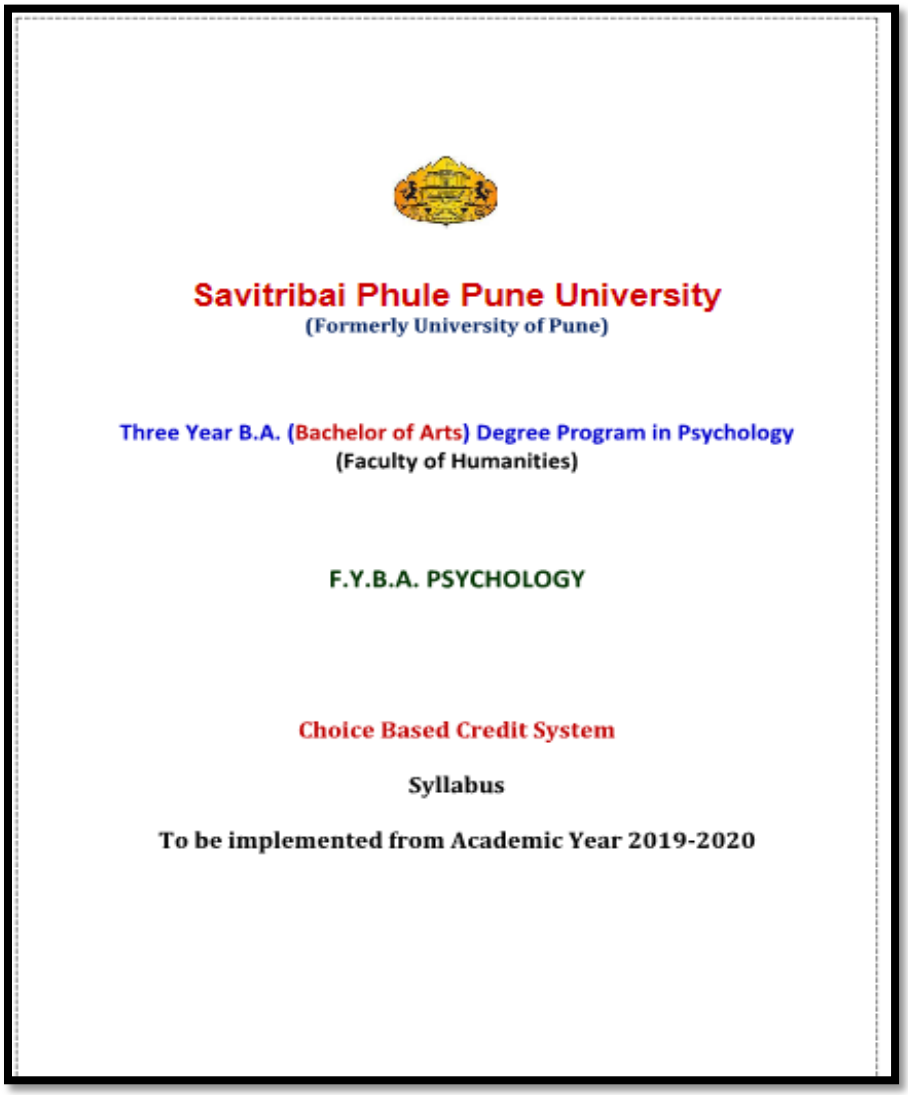
Unit No.	Name and Sub Titles of the Topic	No. of Lectures
1	**Economic Planning**	12
	1.1 Economic Planning – Meaning, Definition and Features	
	1.2 Need of Economic Planning	
	1.3 Objectives of Economic Planning in India	
2	**National Institution for Transforming India Aayog (NITI Aayog)**	12
	2.1 NITI Aayog- Objectives and Structure	
	2.2 Role of NITI Aayog	
	2.3 Difference between Planning Commission and NITI Aayog	
3	**Sustainable Development**	12
	3.1 Sustainable Development : Meaning and Importance	
	3.2 17 SDGs (Sustainable Development Goals)	
	3.3 Measures for Sustainable Development	
	3.4 Current Scenario of SDG in India	
4	**Environment and Economic Development**	12
	4.1 Relation between Environment and Economic Development	
	4.2 Environment and Sustainable Development	
	4.3 Environmental Policies in India: **4.3.1** National Conservation Strategy (1992) - Highlights **4.3.2** National Environmental Policy (2006) - Highlights	
	4.4 Global Warming	

PSYCHOLOGY

FYBA PSYCHOLOGY

Sr/No.	Crosscutting issue	Program	subject	class	Name of the course	Contentinthe course:	Outcome
1	**Environment and sustainability**	BA	Psychology	FYBA	**Foundations of Psychology**	UNIT: 1 Introduction to psychology	This course helps to Develop the ability to evaluate cognitive processes, learning and memory of an individual and understand the personality and intelligence of the individuals by developing their psychological processes and abstract potentials which in turn make individual ready for professional life
2					**Introduction to Social Psychology**	**Unit-:1,3,4** .	Students will be able Understand the nature of self, concept of attitude and prejudice of the individual. Understand group dynamics and individual in the social world which builds their professional ethics.

- Students will understand personality and intelligence of the individuals by developing their psychological motivation towards the Environment and sustainability.
- Know the clinical psychology related mechanisms, social issues, and criminal behaviour which affects the environment, Classify the intellectual ability, abnormality, criminal behaviour.



Savitribai Phule Pune University
(Formerly University of Pune)

Three Year B.A. (Bachelor of Arts) Degree Program in Psychology
(Faculty of Humanities)

F.Y.B.A. PSYCHOLOGY

Choice Based Credit System

Syllabus

To be implemented from Academic Year 2019-2020

F.Y.B.A. Psychology
(w.e.f. 2019-2020)
(Choice Based Credit System) 70:30-Pattern
(70-Semester-End Exam & 30-Internal Evaluation)

Course DSC-PSY- 1A: Foundations of Psychology

Course objectives and learning outcomes:

After the completion of this course students will be able to demonstrate the following competencies:

a) Understand the basic psychological processes and their applications in day to day life.

b) Develop the ability to evaluate cognitive processes, learning and memory of an individual.

c) Understand the importance of motivation and emotion of the individual.

d) Understand the personality and intelligence of the individuals by developing their psychological processes and abstract potentials.

Unit 1: Psychology -Introduction: **(12 lectures)**

1.1 Psychology : a Science, goals of psychology

1.2 The brief history & perspective of Psychology: (Structuralism, Functionalism, Gestalt, Psychoanalysis, Behaviorism)

1.3 Career Avenues in Psychology & Fields of Psychology: (Clinical, Industrial & Organizational, Educational, Social, Developmental, Health, Criminal & Forensic, Military, Sports, Neuropsychology, Environmental, Positive, Spiritual and Women & Child psychology.)

1.4 The Indian Psychology: Past and present

1.5 Application: Understanding Behaviour through Methods in Psychology

Unit 2: Cognitive processes: **(12 lectures)**

2.1 Sensation, Attention and Perception, nature of perception, laws of perceptual organization

2.2 Learning- Classical and Operant conditioning, observational learning

2.3 Memory-processes, information processing model(s)

2.4 Forgetting: Theories of forgetting

2.5 Application: Techniques for improving memory.

Unit 3: Motivation and Emotion: **(12 lectures)**

3.1 Motivation: Definition, Concept of Homeostasis & Maslow's Hierarchy of Motivation

3.2 Types of Motivation: Physiological, Psychological & Social

3.3 Motivational Conflicts: Intra-Conflicts & Inter-Conflicts

3.4 Emotion: Definitions, Nature & Importance, Basic Emotions (Joy, Excitement, Tenderness, Sadness, Anger, Fear & Love)

3.5 Application: Conflict Resolving Skills

Unit 4: Personality and Intelligence: **(12 lectures)**

4.1 Personality – Definitions, Nature

4.2 Personality as a set of traits: Cattell's, Allport's & Big Five Theory of Personality

4.3 Freud's Psychoanalytical Theory of Personality and Transactional Analysis

4.4 Intelligence: Definitions, Theories of Intelligence (Gardner's Theory, Cattell's Theory of Intelligence)

4.5 Applications: Testing and enhancing Emotional Intelligence.

References:

1. Ciccarelli, S. K.; White J. N. Adapted by Girishwar Misra (2018). Psychology (5th Edition). Pearson.

2. Chadha, N.K. & Seth, S. (2014). The Psychological Realm: An Introduction. Pinnacle Learning, New Delhi.

3. Carole, W. and Carol, T. (2007). Psychology (7th Edition). Pearson Education, India.

4. Feldman S. R.(2009). Essentials of understanding psychology (7th Ed.) New Delhi : Tata Mc Graw Hill.

Books in Marathi Language:

1. बच्छाव, बडगुजर आणि शिंदे (२००१). सामान्य मानसशास्त्र. स्वयंभू प्रकाशन, नाशिक

2. मुंदडा आणि खलाने (२०१३). मानसशास्त्राची मूलतत्त्वे. अथर्व प्रकाशन, जळगांव

3. अभ्यंकर, ओक आणि गोलविलकर (२०१४). मानसशास्त्र: वर्तनाचे शास्त्र. पिअर्सन

4. देशपांडे चंद्रशेखर आणि सहकारी (२०१४). सूक्ष्म कौशल्ये: मानसशास्त्रीय समुपदेशन प्रक्रियेचा गाभा. उन्मेष प्रकाशन

F.Y.B.A. Psychology
(w.e.f. 2019-2020)
(Choice Based Credit System) 70:30-Pattern
(70-Semester-End Exam & 30-Internal Evaluation)

Course DSC-PSY- 1B : Introduction to Social Psychology

Course objectives and learning outcomes:

After the completion of this course students will be able to demonstrate the following competencies:

a) Understand the basics of social psychology.

b) Understand the nature of self, concept of attitude and prejudice of the individual.

c) Assess the interactional processes, love and aggression in our day today life. .

c) Understand group dynamics and individual in the social world.

Unit 1: Introduction: **(Total 12 Lectures)**

1.1 Definition, Brief history of social psychology (special emphasis on India),

1.2 Scope of social psychology

1.3 Levels of social behaviour

1.4 Approaches towards understanding social behaviour

1.5 Application: Community mental health

Unit- 2.Individual Level Processes **(Total 12 Lectures)**

2.1 Difference between Social Cognition & Social Perception.

2.2 Self –Concept: Nature, Self-regulation and self-presentation.

2.3 Attitude: Definition, components, Dimensions and formation of attitude

2.4 Prejudice: Causes.

2.5 Application: Formation of attitude and Prejudice eradication

TYBA PSYCHOLOGY

Sr/No.	Crosscutting issue	Program	subject	class	Name of the course	Content intheco urse:	outcome
1	**Environment and sustainability**	BA	Psychology	TY BA	Industrial and organizational psychology	**Unit-2,3,4:**	Students will be able to Identify and classify the appraisal rating system. Compare different theories of motivation. Evaluate the training Program and job performance.
2					Personality Development-1	**Unit-:2,3**	Students will be able to Apply psychological skills in daily life situations.
3					Applied Psychology	**Unit-2,3**	Students will be able to Know the clinical psychology related mechanisms, social issues, and criminal behaviour which affects the environment Classify the intellectual ability, abnormality, criminal behaviour. Identify the problems and solutions in the field of education, Evaluate the interpersonal relations.

SAVITRIBAI PHULE PUNE UNIVERSITY

TYBA Psychology Syllabus

From the academic year 2021-22

Outcome Based Syllabus

	Semester-V	Semester-VI
G-3 35223	SEC- 1C (Industrial and Organizational Psychology) (3)	SEC- 1D (Applied Psychology) (3)
S-3 35221	DSE-1C (Psychological Testing) (Theory) (3)+ (1) Testing Project	DSE-1D Experimental Psychology (Theory) (3)+(1) Testing Project
S-4 35222	DSE-2C (Psychological Tests) (Practical) (3)+(1) Statistics	DSE-2D (Psychological Experiments) (Practical) (3)+(1) Statistics
35224	SEC-2C (Personality Development-1) (2) (Value/skill based course)	SEC-2D (Personality Development-2) (2) (Value/skill based course)
	G.E. 1 (2)	G.E.2 (2)

- One credit is equal to one clock hour
- It is expected to refer Bloom's taxonomy

SEC 1 C (3) : INDUSTRIAL AND ORGANIZATIONAL PSYCHOLOGY

After completing the course, student should be able to:

CO1: Describe the concept of industrial and organizational psychology, selection and training, evaluation and motivation at workplace.

CO2: Explain job profile, job analysis, recruitment techniques and employee training.

CO3: Identify and classify the appraisal rating system.

CO4: Compare different theories of motivation.

CO5: Evaluate the training programme and job performance.

UNIT-1: INDUSTRIAL AND ORGANIZATIONAL (I/O) PSYCHOLOGY- NATURE AND SCOPE

1.1: I/O Psychology: Meaning, subject matter and functions of Industrial Psychology

1.2: The history of I/O Psychology

1.3: I/O Psychology in the present

1.4: Future of I/O Psychology

UNIT-2: PERSONNEL SELECTION AND TRAINING

2.1: Job Profile, job analysis and Recruitment techniques

2.2: Interviews, psychological testing and Needs assessment for training

2.3: Psychological Principles in training and training for knowledge and skill

2.4: Evaluation of Training Programme

UNIT- 3: EVALUATING JOB PERFORMANCE, JOB SATIFACTION

3.1: Uses of performance evaluation: Downsizing, promotion, seniority

3.2: Sources of evaluation: The evaluator and performance appraisal

3.3: Appraisal rating and non-rating evaluation methods

3.4: Job satisfaction: Concept and theories

UNIT-4: MOTIVATION AND LEADERSHIP AT THE WORKPLACE

4.1: Work motivation: Concept, Self-discipline – seven step process

4.2: Need and cognitive theories: McClelland, Herzberg, Goal Setting Theory, Self Efficacy Theory

4.3: Leadership- Styles, Theories

4.4: Communication: Concept, Process

3

SEC 2 C (2) (VALUE/SKILL-BASED COURSE) : PERSONALITY DEVELOPMENT-1

After completion of this course, student should be able to:

CO1: Describe the concept of personality.

CO2: Identify and classify various personality traits.

CO3: Correlate real life behavioural patterns with theoretical assumptions.

CO4: Apply psychological skills in daily life situations.

UNIT 1: PERSONALITY

-Concept and Role of Personality: Definitions,

-Factors affecting personality

UNIT -2: TRAITS

-Personality Traits

- The 7 habits of highly effective people

UNIT 3: FIVE PILLARS OF PERSONALITY DEVELOPMENT

-Introspection,

-Self- Assessment,

-Self-Appraisals,

-Self-Development,

-Self-Introduction

READINGS:

Covey Stephen (2004). The 7 habits of highly effective people. Franklin Covey Co.

Hurlock Elizabeth (1988). Personality Development, McGraw Hill

Natu, S.A, (2021). Personality Development, Revised Edition, Nirali Prakashan, Pune

SEC 1 D (3): APPLIED PSYCHOLOGY

After completing the course, student should be able to:

CO1: Describe the concept of applied psychology, educational psychology, family structure and developmental patterns.

CO2: Know the clinical psychology related mechanisms, social issues, and criminal behavior.

CO3: Classify the intellectual ability, abnormality, criminal behavior.

CO4: Identify the problems and solutions in the field of education,

CO5: Evaluate the interpersonal relations.

CO6: Apply psychological remedies to assess abonormal behaviour, to tackle the social issues and to rectify the problematic behaviour.

UNIT-1: INTRODUCTION APPLIED PSYCHOLOGY

1.1 Definition, Nature and Scope of applied Psychology

1.2 Fields of Applied psychology

1.3 Clinical applications (classification of mental disorders DSM V , ICD 10 , therapies – CBT, Clint centered therapy, REBT)

1.4 Cognitive Neuro Science (nature and major applications – PNI, EEG, MRI, CT, PET etc)

UNIT-2: APPLICATIONS IN EDUCATION

2.1 Definition, Nature and Scope of Educational Psychology

2.2 Effective Teaching – Learning Methodologies / Pedagogies (group discussions, projects, presentations, interactive methods)

2.3 Issues of Various Categories of Challenged Students – Physically, mentally, economically challenged, Intellectual Disabilities (ID)

2.4 Problems and Solutions to Educational Problems – physical environment, Government policies, school and higher education, Ashramshalas

B.VOC (Tourism and service industry)

FY B.VOC

Sr/No.	Crosscutting issue	Program	subject	class	Name of the course	Content in the course:	outcome
1	**Environment and sustainability**	BA	B.VOC tourism	FY B.VOC tourism	Tourism Principles and Practices	UNIT : 4	Students will be able to understand the environmental factors that affect the tourism industry.

- Students will be able to understand the environmental factors that affect the tourism industry.

Module TSI 101: Tourism Principles and Practices

No. of Credits: 04
Contact Hours/ Week: 04

Assignments: 30 Marks
Semester Exam: 70 Marks

Course Objective:
It is planned to develop and communicate basic framework and conceptual heritage of the discipline of Tourism, Methods, practices and techniques of analysis, motivation and processes of decision-making. To realize its potentials, as against the achieved in the Indian context. To understand the various elements of Tourism Management. To evaluate the role of various organizations of tourism. To identify the methods to improve tourism.

THEMES AND TOPICS

Unit I:
Tourism: Concepts:
Definitions and Historical development of tourism. Distinction between Tourist-Traveler-Visitor-Excursionist. Types and Forms of Tourism; importance of tourism, Tourism system: Nature, characteristic. Components of tourism and its characteristics.

Unit II:
Domestic and International tourism: Domestic tourism: features, pattern of growth, profile. International tourism: Generating and Destination regions. Pattern of growth and Profile.

Unit III:
Tourism Demand and Supply: Introduction to Tourism Demand; Determinants of tourism demands; Motivation and tourism demand; Measuring the tourism demand. Tourism Statistics (National and International). Emerging Trends and new thrust areas of Indian tourism.

Unit IV:
Tourism Impacts: Impacts: Positive and Negative Impacts of Tourism; Socio Cultural, Economic, Environmental and Political

Unit V:
Status of Tourism in India The Tourism Industry: Nature and characteristics, components of Tourism Industry. Attractions, Transport, Accommodation, Shopping, Entertainment, Hospitality, Airlines, Travel agencies, Tourism declared as an Industry in India, consequences of Industry status.

Unit VI:
International Tourism Institutions and organizations, and their role in promoting international movement-UNWTO, WTTC, TAAI, IATO, IATA, ITC.

Text Books:
1. Bhatia. Tourism Development (New Delhi, Sterling)
2. Seth: Tourism Management (New Delhi, Sterling)
3. Kaul: Dynamics of Tourism (New Delhi, Sterling)

SY B.VOC

Sr/No.	Crosscutting issue	Program	subject	class	Name of the course	Content in the course:	outcome
1	**Environment and sustainability**	BA	B.VOC tourism	SY B.VOC tourism	**Tourism Impact Analysis**	UNIT : 3	Students will be able to understand the environmental factors that affect the tourism industry and evaluate more sustainable options for tourism.

Module TSI 120: Tourism Impact Analysis

No. of Credits: 04 **Assignments: 30 Marks**
Contact Hours/ Week: 04 **Semester Exam: 70 Marks**

Unit No	Topic	No of Lectures
UNIT 1	**Economic Impact** 1. Positive impact. 2. Negative impact. 3. Analysis/case study. 4. Solutions/Assessment.	10
UNIT 2	**Socio-Cultural impact** 1. 1)positive impact 2. 2) Negative impact. 3. Analysis/case study. 4. Solutions/assessment.	10
UNIT 3	**Environmental impact** 1. Negative impact. 2. Positive impact. 3. Analysis/case study. 4. Solutions/assessment.	10
UNIT 4	**Political impact** 1. Negative impact. 2. Positive impact. 3. Analysis/case study. 4. Solutions/assessment.	10
UNIT 5	**Tourism satellite accounting** 1. Tourism Supply 2. Tourism Demand 3. Tourism GDP 4. Tourism Employment 5. TSA measures only direct effects on GDP	10
UNIT 6	**Sustainable tourism** 1. Tourism 2. Definition 3. Importance 4. Examples 5. Pillars	10

Reference books:

1) Sustainable tourism development – WTO
2) Successful tourism management – Pran Nath Seth
3) Tourism impact planning and management- Petes Maso
4) Economic Impact and tourism development- kunal chattopadyay

TY B.VOC

Sr/No.	Crosscutting issue	Program	subject	class	Name of the course	Content in the course:	outcome
1	**Environment and sustainability**	BA	B.VOC tourism	TY B.VOC tourism	**Responsible Tourism And Destination Management**	UNIT : 2,3	Students will be able to understand the environmental factors that affect the tourism industry and evaluate more sustainable options for tourism.
2					**Tourism Information & Management System**	UNIT :3	Students will be able to understand the environmental factors that affect the tourism industry and evaluate more sustainable options for tourism.

MODULE TSI 132: RESPONSIBLE TOURISM AND DESTINATION MANAGEMENT

NO.OF.CREDIT: 04 **INTERNAL: 30 MARKS**

CONTACT HOURS/WEEKS: 04 **SEMESTER EXAM: 70 MARKS**

Unit No	Topic	No of Lectures
UNIT 1	**Introduction** - Role of destination management - Organizations & companies - Work ethics - Results	15
UNIT 2	**Destination management** - Destination mix - Sustainability - Destination enhancement - Destination marketing	10
UNIT 3	**Responsible tourism** - Responsible tourism and destinations - Shaping sustainable spaces into better places - Guiding principles for economic responsibility - Guiding principles for social responsibility - Guiding principles for environmental responsibility	10
UNIT 4	**Responsible tourism related architecture** - Preserve & restore historic buildings, neighborhoods, & landscapes - Focus on the authentic - Ensure the tourism support facilities are compatible with their surroundings - Interpret the resource - Protect community gateways - Control outdoor signs - Enhance the journey as well as the destinations - Recognize that tourism has limits & must be managed	15
UNIT 5	**Responsible tourism: concepts, theory, & practices** Different concepts of tourism responsibilities and there Ethics ,Various theories and Practices in Responsible tourism	10

MODULE TSI 134: TOURISM INFORMATION & MANAGEMENT SYSTEM

NO.OF.CREDIT: 04 **INTERNAL: 30 MARKS**

CONTACT HOURS/WEEKS: 04 **SEMESTER EXAM: 70 MARKS**

Unit No	Topic	No of Lectures
UNIT 1	**INFORMATION SYSTEMS IN TOURISM** - Analysis - Implementation - Requirements - Development - Design	15
UNIT 2	**TOURISM ORIENTED APPLICATION AREAS OF GEOGRAPHICAL INFORMATION** - Tourism resource inventories - Location sustainability - Measuring & monitoring tourism impacts - Visitor flows & management - Relationships associated with resource use - Assessing potential impacts of tourism development	20
UNIT 3	**TOURISM INFORMATION SYSTEM** - Ecological environment - Technological environment - Social environment - Political environment - Economic environment	15
UNIT 4	**COCLUSION**	10

Suggested Reading

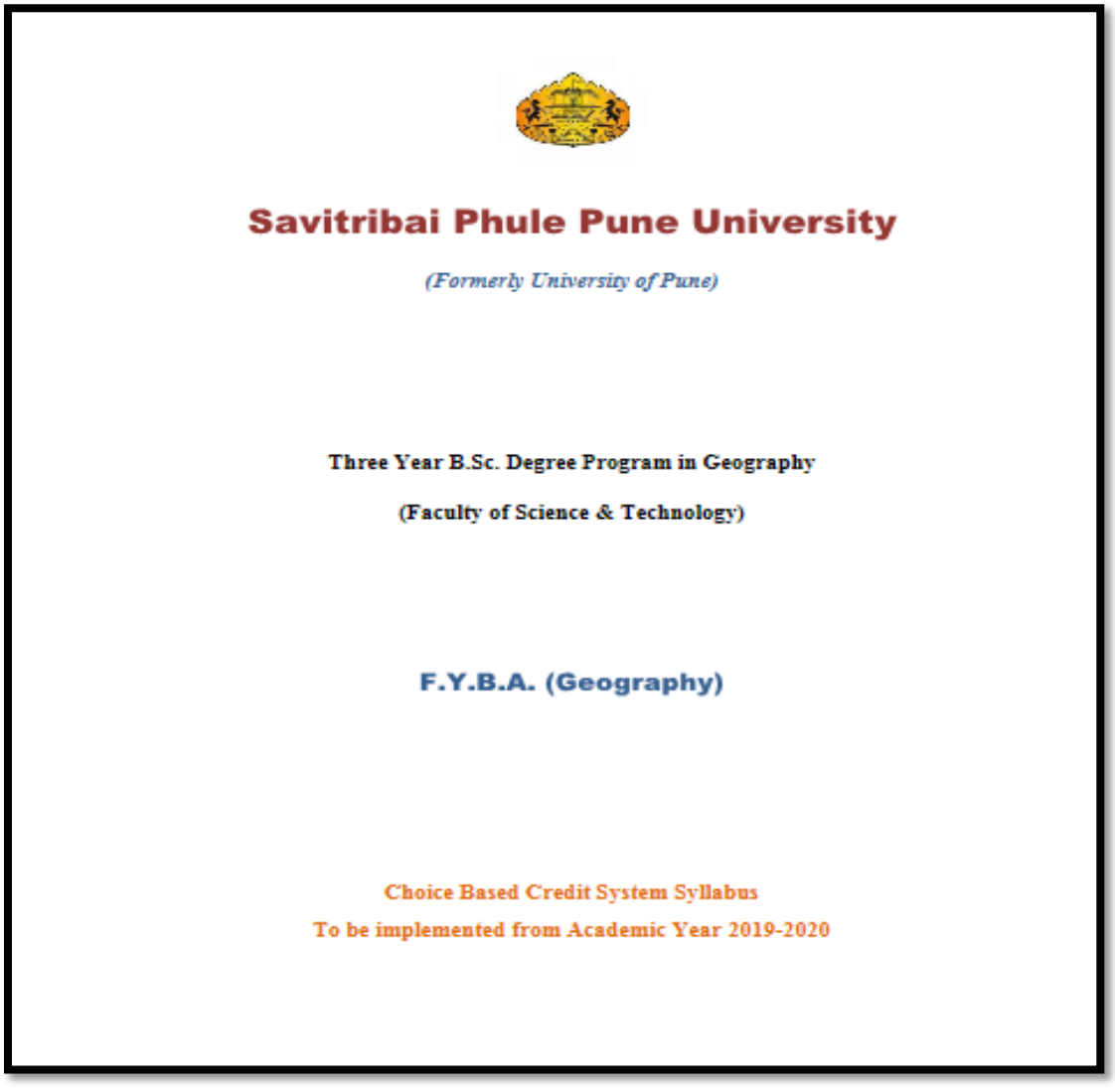
1. Tourism ~Mohan Mishra
2. Tourism development: products, operations, & case studies ~Gully baba
3. Tourism: operations,& managements ~S.Roday, A.Biwal, V.Joshi
4. Travel & tourism ~Cambridge international
5. Hospitality & tourism management systems ~M.C. Metti

GEOGRAPHY

FYBA GEOGRAPHY

Sr/No.	Crosscutting issue	Programme	Subject	class	Name of the course	Contentinthecourse:	Outcome
1	**Environment and sustainability**	BA	**Geography**	FY BA	Human Geography	• Nature and scope of Human Geography • Types of Agriculture	Students will be able to demonstrate the application of Human Geography in various region of environment.
2					Physical Geography	• Introduction about the Earth system • Field Visit	Students will be to understand the utility and application of Physical geography in various regions and environment.

- Students will be able to demonstrate the application of Human Geography in various region of environment.
- The students will be able to integrate various factors of Environment and dynamic aspect of Environmental geography. To make students aware about the problems of environment , their utilization and conservation in the view of sustainable development



Savitribai Phule Pune University

(Formerly University of Pune)

Three Year B.Sc. Degree Program in Geography

(Faculty of Science & Technology)

F.Y.B.A. (Geography)

Choice Based Credit System Syllabus

To be implemented from Academic Year 2019-2020

Semester II

DSE (Discipline Specific Elective) - II Geography

Human Geography

Course Outcome:

1. To describe the basic and latest concepts in Human Geography
2. To demonstrate applications of Human Geography in different regions of environment.
3. To define the Settlement pattern and rural and urban settlement.
4. To describe the Agriculture types and pattern.

Sr. No	Topic	Sub Topics	Teaching Hours	Credits
1.	Introduction to Human Geography	1)Definitions of Human Geography 2) Nature and scope of Human Geography 3) Branches and importance of Human Geography	12	03
2	Population	1)Factors affecting on distribution of population 2) Theory of demographic transition 3) Composition of Indian population (Gender and literacy)	12	
3	Settlements	1) Types and pattern of rural Settlements 2)Urbanisation in India 3) Urbanisation in Maharashtra	12	
4	Agriculture	1Types of Agriculture 2) Factors affecting on Agriculture activity 3) Problems of Indian agriculture	12	

Reference Books

1. Chandna, R.C. (2010) Population Geography, Kalyani Publisher.
2. Hassan, M.I. (2005) Population Geography, Rawat Publications, Jaipur
3. Daniel, P.A. and Hopkinson, M.F. (1989) The Geography of Settlement, Oliver &Boyd,London.
4. Musmade Arjun, Sonawane Amit and Jyotiram More, Population & SettlementGeography, (2015), Diamond Publication Pune.
5 Jyotiram More and Musmade Arjun(2015) Regional Geography of India .Diamond Publication Pune.
6. Johnston R; Gregory D, Pratt G. et al. (2008) TheDictionary of Human Geography,Blackwell Publication.
7. Jordan-Bychkov et al. (2006) The Human Mosaic: A Thematic Introduction to CulturalGeography. W. H. Freeman and Company, New York.
8. Kaushik, S.D. (2010) ManaviBhugol, Rastogi Publication, Meerut.
9. Maurya, S.D. (2012) ManavBhugol, ShardaPustakBhawan. Allahabad.
10. SudeeptaAdhikari (2016) Orient BlackswanPVT,New Delhi.

Semester I Physical Geography

Course Outcome:

1. To recognize the basic concepts in Physical geography.
2. To discuss the utility and application of Physical geography in different regions and environment.
3. To acquaint with Earth system (Lithosphere, Atmosphere, Biosphere and Hydrosphere).
4. To identify the principles and applications of Hydrology and Oceanography to address water resource and environment related problems.

Details of Syllabus:

Sr. No	Topic	Sub Topics	Teaching Hours	Total Credits
1.	Introduction to Physical Geography	1)Definitions of Physical Geography 2)Nature and scope of Physical Geography 3)Branches of Physical Geography 4) Introduction about the Earth system (Lithosphere, Atmosphere, Hydrosphere and Biosphere)	12	03
2	Lithosphere	1) Interior of the earth 2)Wegner's Continental Drift Theory 3) Davis Concept of Cycle of erosion	12	
3	Atmosphere	1) Structure of the atmosphere 2)Heat Balance 3)Pressure belts and wind system 4) Forms and types of Precipitation	12	
4	Hydrosphere	1) Hydrological cycle 2) General structure of ocean floor 3)Waves and Tides 4) Field Visit (Not more than one day) for observations geographical places and landforms.	12	

Reference Books

1) Clyton K., (1986), Earth Crust, AdusBook , London.
2) Davis W. M., (1909), Geographical Essay, Ginnia Co.
3) Dayal P., (1996), Text Book of Geomorphology, Shukla Book Depot, Patna.
4) Kale V.S. and Gupta A., (2015), Introduction of Geomorphology, University Press, PVT Kolkata.
5) Kale V.S. and Gupta A., (2001), Elements of Geomorphology, Oxford Univ. Press.
Monkhouse, (1951), Principle of Physical Geography, McGraw Hill Pub New York.
6) Pitty A. F., (1974), Introduction to Geomorphology, Methuen London.
7) Singh Savindra, (2000), Physical Geography,PrayagPustakBhavan, 20-A, University Road, Allahabad – 211002.
8) Steers J. A., (1964), The Unstable Earth Some Recent Views in Geography, Kalyani Publishers, New Delhi.
9) Swaroop Shanti, (2006), Physical Geography, King Books, NaiSarak, Delhi –110006.
10) Wooldridge S. W. and Morgan R. S., (1959), The Physical Basis of Geography and Outline of Geomorphology, Longman Green and Co. London.

SYBA GEOGRAPHY

Sr/No.	Crosscutting issue	Program me	Subject	class	Name of the course	Content in the course:	Outcome
1	**Environment and sustainability**	BA	**GEOGRAPHY**	SYBA	Geography OF Maharashtra I& II	**Unit 2 & 4** 1. Physical Structure (Mountain, V plateau, Plains) 2. Drought prone Areas- Problems and Management 3. Flood areas - Problems and Management 4. SEM IV - 2,3,4	Students will be able Understand the relationship between geographic variations and environmental conditions of the society in Maharashtra.
2					Environment Geography I & II	UNIT 4 SEM V1 UNIT 3, 4. • Air Pollution-Causes, effects and control measures • Water Pollution-Causes, effects and control measures • Soil	The students will be able to integrate various factors of Environment and dynamic aspect of Environmental geography. To make students aware about the problems of environment ,

						Pollution-Causes, effects and control measures	their utilization and conservation in the view of sustainable development

SavitribaiPhule Pune University

(Formerly University of Pune)

S.Y.B.A. (Geography) Correction

Choice Based Credit System Syllabus

To be implemented from Academic Year 2020-2021

Semester	Core Courses	Paper No	Paper Code	Subject	Total Lecture	Credit
III	Geography CC-1C	G2	Gg: 201(A)	Environmental Geography I OR Economic Geography -I	48	3
	Geography DSE – 1A	S1	Gg: 220(A)	Geography of Maharashtra - I OR Population Geography – I	48	3
	Geography DSE – 2A	S2	Gg: 210(A)	Practical Geography – I (Scale and Map Projections)	60	4
	SEC-I		SEC - A	Introduction to Geographical Information System (GIS) / Applied Course of Disaster	30	2

CBSE: 2020-21 S.Y.B.A. Geography

S.Y.B.A. Geography (G2) Syllabus for Semester III

Name of Subject: Environment Geography- I, Subject Code: Gg.210 (A)

Objectives:

1. To create the awareness about dynamic environment among the student.
2. To acquaint the students with fundamental concepts of environment geography for development in different areas.
3. The students should be able to integrate various factors of Environment and dynamic aspect of Environmental geography.
4. To make aware the students about the problems of environment , their utilization and conservation in the view of sustainable development

Course Outcome:

1. Create awareness about dynamic environment among the student.
2. To acquaint the students with fundamental concepts of environment geography for development in different areas.
3. The students should be able to integrate various factors of economic development and dynamic aspect of economic geography.
4. To make aware the students about the problems of environment, their utilization and conservation in the view of sustainable development.

Sr. No.	Topic	Sub Topics	Teaching Hours	Total Credits
1	Introduction to Environmental Geography	1. Definition, Nature and scope of Environmental Geography. 2. Types of Environment 3. Importance of Environmental Geography 4. Approaches to study of environmental Geography	12	03
2	Ecosystem	1. Meaning, concept and definition of ecosystem. 2. Structure (Biotic and Abiotic factors) and food chain, Tropic Level, food web, energy flow 3. Types of ecosystem a) Equatorial Forest and b) Pond Ecosystem	12	
3	Biodiversity and its conservation	1. Concept of biodiversity 2. Economic value and potential of biodiversity 3. Loss of biodiversity and hotspots in India 4. Conservation of biodiversity	12	
4	Environmental Pollution	1. Concept of Pollution 2. Air pollution-Causes, effects and control measures 3. Water pollution-Causes, effects and control measures 4. Soil pollution-Causes, effects and control measures	12	

Savitribai Phule Pune University

CBSE: 2020-21 S.Y.B.A. Geography

S.Y.B.A. Geography (G2) Syllabus for Semester IV

Name of Subject: Environment Geography- II, Subject Code: Gg.210 (B)

Objectives:

1. To create awareness about dynamic environment among the students.
2. To acquaint students with the fundamental concepts of Environment Geography.
3. To acquaint students about the past, presents and future utility and potentials of natural resources.
4. To make aware students about the problems of environment, its utilization and conservation in the view of sustainable development.

Course Outcome:

1. Create awareness about dynamic environment among the students.
2. To acquaint students with the fundamental concepts of Environmental Geography.
3. To acquaint students about the past, presents and future utility and potentials of natural resources.
4. To make aware students about the problems of environment, its utilization and conservation in the view of sustainable development.
5.

Sr. No.	Topic	Sub Topics	Teaching Hours	Total Credits
1	Environmental Disaster	1. Meaning and concepts of environmental disaster 2. Classification of Disaster 3. Natural Disaster a) Earthquake b) Flood 4. Biological Disaster a) Swine flu b) Novel Corona (COVID-19)	12	03
2	Environmental Problems	1. Global Warming and climate change 2. Ozone Depletion 3. Acid rain 4. Over use of chemical fertilizers, pesticides and insecticides	12	
3	Environmental Planning and Management	1. Need of Planning and Management 2. Micro, macro and meso level Planning and Management with reference to India 3. Environmental impact assessment	12	
4	Environmental Policies	1. Introduction of environmental policies 2. Environmental education in India 3. Kyoto Protocol	12	

Reference Book:

1. Miller G.T., 2004, Environmental Science Working with the Earth, Thomson Books Cole, Singapure
2. Saxena H.M., 2017, Environmental Geography,(III ED) Rawat Publicastions, Jaipur
3. Odum E.P. et al.2005, Fundamentals of Ecology, Ceneage Learning, India
4. Sharma P.D.2015, Ecology and Environment, Rastogi Publications,Meerut

CBSE: 2020-21 S.Y.B.A. Geography

S.Y.B.A. Geography (S1), Syllabus for Semester III

Name of Subject: Geography of Maharashtra, Subject Code: Gg.220 (A)

Objectives:

1. To acquaint students with Geography of our State.
2. To make students aware of the magnitude of problems and prospects in Maharashtra.
3. To help students understand the inter relationship between the subject and the society.
4. To help students understand the recent trends in regional studies

.Course Outcome:

1. Learn the geography of Maharashtra state.
2. Aware about problems and prospects of Maharashtra.
3. Understand the relationship between geographic variations and society in Maharashtra.
4. Learn the recent trends in regional studies.

Sr. No.	Topic	Sub Topics	Teaching Hours	Total Credits
1	Administrative Set up of Maharashtra	1. Historical and Political Background of the state 2. Geographical location of State 3. Adjoining States 4. Administrative Divisions	12	
2	Physical settings	1. Geological Structure of Maharashtra. 2. Physical Structure (Mountain, plateau, Plains) 3. Drainage Pattern (East and West flowing rivers) 4. Major Soil types and Distribution.	12	03
3	Climate	1. Climatic Regions of Maharashtra 2. Distribution of Rainfall 3. Draught prone areas- Problems and Management 4. Flood areas - Problems and Management	12	
4	Resources	1. Water :Problems in Utilization and conservation 2. Forest : Types and Conservation 3. Mineral; Iron ore, Manganese and Bauxite 4. Power : Hydro, Thermal, Atomic	12	

Reference Book:

1. Dikshit K.R ., Maharashtra in Maps,
2. Deshpande C. D. , Maharashtra
3. Sadhu Arun, Maharashtra, National Book Trust
4. Savadi A. B., Geography of Maharashtra: Nirali Prakashan, Pune.
5. Dastane S., Maharashtra, Ramchandra and company, Pune
6. Sawadi A. B., The Mega State Series : Nirali Publication, Pune.

S.Y.B.A. Geography (S1), Syllabus for Semester IV

Name of Subject: Geography of Maharashtra, Subject Code: Gg.220

(B) Objective :

1. To make students aware about the Agriculture problems and prospects of Maharashtra.
2. To understand the population distribution and settlement pattern in Maharashtra.
3. To understand the concept of rural development.
4. To understand the prospectus in Tourism activity in Maharashtra and the role of MTDC and Role of MIDC in industrial development in rural area of Maharashtra

Course Outcome:

1. Aware about the problems and prospects of agriculture in Maharashtra.
2. Learn the distribution of population and patterns of settlements in Maharashtra.
3. Learn the concepts in rural development.
4. Understand the prospectus of tourism activities in Maharashtra with role of MTDC development.
5. Understand the role of MIDC in industrial development in rural Maharashtra.

Sr. No.	Topic	Sub Topic & Learning Point	Hours	Credits
1	Agriculture	1. Importance of Agriculture in Economy of Maharashtra 2. Major Crops - Wheat, Rice, Jawar, Bajra. 3. Cash Crops and Horticulture - Cotton, Sugarcane, Pomegranate, Grapes. 4. Problems of agriculture in Maharashtra.	12	
2	Population and Settlement	1. Population distribution of Maharashtra 2. Population composition - Sex Ratio, Literacy, Occupational structure, Migration 3. Rural and Urban Settlements 4. Potential of Major Cities in Maharashtra Mumbai, Pune, Nagpur	12	03
3	Rural Development of Maharashtra	1. Concept of Rural Development 2. Parameters of Rural Development 3. Schemes For Rural Development 4. Case Studies – Hivare Bazar and Ralegan Siddhi (Ahmednagar), Patoda (Aurangabad)	12	
4	Tourism	1. Growth and development of tourism in Maharashtra 2. Tourism Potential of Maharashtra 3. Agro-Tourism 4. Role of MTDC	12	

TYBA GEOGRAPHY

Sr/No.	Crosscutting issue	Program me	Subject	class	Name of the course	Content in the course:	Outcome
1	**Environment and sustainability**	BA	**Geography**	TYBA	Geography of Tourism- I& II	unit 4: - • Role of Infrastructure in Tourism Development UNIT 2, 3 – • Impact of Tourism • Planning and Polices of tourism development	This course Introduce the students to the basic concepts in Tourism Geography. Students will be able to have more insight of the environmental factors of tourism Geography.
2					Geography of India I &II	Content in the course: unit 4: Climate, Soils and Natural Vegetation UNIT 2, 3- • Transportation and Communication • Agriculture	Students will be able to understand the inter relationship between the subject and the environmental conditions of the society.

CBCS: 2021-22 T.Y.B.A. Geography

Savitribai Phule Pune University

(Formerly University of Pune)

Three Year B.A. and B.Sc. Degree Program in Geography (Faculty of Science & Technology)

T.Y.B.A. (Geography)

Semester V

Geography of Tourism- I CC1E (No. of Credits: 03)

Objectives:

1) To understand the importance of Tourism
2) To introduce the students to the basic concepts in Tourism Geography.
3) To understand the types of Tourism
4) To gain knowledge different aspects of Tourism Geography.

Course Outcome:

1. Understand the history of Tourism.
2. Introduce the students to the basic concepts in Tourism Geography
3. Understand the types of Tourism.
4. To gain knowledge different aspects of Tourism Geography.

Sr. No.	Topic	Sub Topic & Learning Point	No. of Lectures
1	Introduction	a) Definition and Nature i. Definition of Tourists and Tourism ii. Nature of Tourism iii. Importance of Tourism b) Scope and Extent i. Tourism and Travel as basic needs of mankind. ii. Tourism and Development. iii. Tourism as product c) Role of Geography in Tourism	12
2	Determinants of Tourism Development	a) Physical i. Relief ii. Climate iii. Forest b) Socio-Cultural i. Religious ii. Historical iii. Sports c) Political i) Policies, ii) Safety of Tourists, iii) Accessibility	12
3	Concept and Classification of Tourism	a) Classification of tourism based on: i. Nationality ii. Travel Time iii. Purpose b) Concept of Tourism - I i. Agro-Tourism ii. Eco- Tourism iii. Wildlife Tourism iv. Geo-Tourism c) Concept of Tourism - II i. Health/medical Tourism ii Sports Tourism	12

4	Role of Infrastructure in Tourism Development	a) Mode of Transportation: i) Road, ii) Rail, iii) Water, iv)Air b) Communication: i. Role of Guide in tourism development ii. Internet/Telephone/Mobile/TV iii. Electronic and Printing Media c) Travel and Tourism Agencies:	12

Reference Books

1. Geography of Tourism: Robinson H. (1996)
2. Tourism Development, Principles and Practices: Bhatia A.K., Sterling Publisher Ltd., New Delhi
3. Geography of Tourism and Recreation: S. N. Singh (1985)
4. Tourism Today: A Geographical Analysis: Douglas Pearce (1987)
5. Tourism: Economic Physical and Social Impact: Mathiseson A. and Wall C, Logman, U.K.
6. India: A Tourist Paradise: Manoj Das.
7. Tourism Today: An Indian Perspectives: Maneet Kumar
8. Geography of Travel and Tourism: Hudman L.E.
9. Successful Tourism Management: Seth P.N. (1985) Sterling Publisher Ltd., New Delhi.
10. Tourism Analysis: Smith S.L.J.
11. Tourism in India: Gupta V.K.
12. Dynamics of Tourism: Kaul R. N., Sterline Publisher Ltd.
13. Geography of Tourism: S.B. Shinde, Phadke Prakashan, Kolhapur
14. Muluk, Musmade, Doke, More, (2021), Geography of Tourism-I, Nirali Publication, Pune.

CBCS: 2021-22 T.Y.B.A. Geography

Semester V

Geography of India -I DSE 1 C(No. of Credits: 03)

Objective:

1. To acquaint the students with geography of our Nation.
2. To make the student aware of the magnitude of problems and Prospects at National level.
3. To help the students to understand the inter relationship between the subject and the society.
4. To help the students to understand the recent trends in regional studied

Course Outcome:

1. Explain the importance of geography of our Nation.
2. Make the aware of the magnitude of problems and Prospects at National level.
3. Identify the inter relationship among the subject and the society.
4. Understand the current trends in regional studied
5. Realize about diversity of our nation i.e. Religious, Languages, Tribes etc
6. Acquaint the knowledge about different types of resources and their utility

Sr. No	Unit	Subunit	No. of Lectures
1	Introduction	a) Location and Extent b) Historical Background c) International boundaries of India and related issues d) States and Union territories	12
2	Physiography	a) The Northern Mountains b) The North Indian Plains c) The Peninsular Plateau d) The Coastal lowlands and Islands	12
3	Drainage System	a) Himalayan Rivers: Indus , Ganga, Brahmaputra b) East Flowing Rivers: Mahanadi, Godavari, Krishna,Kaveri c) Major West Flowing Rivers: Narmada, Tapi, Mahi d) Minor West Flowing Rivers: originating in WesternGhat	12
4	Climate, Soils and Natural Vegetation	a) Various Seasons and Weather Associated with them b) Types of Soils and its Distribution c) Types of Natural Vegetation and its Distribution	12

Reference Books

1. Aher A.B , Chaodhari A. P & Chaodhari Archna. Regional Geography of India Prashant Publication Jalgaon 2015
2. Deshpande C.D: India-A Regional Interpretation Northern Book Centre, New Delhi.1992.
3. Farmer, B.H.: An Introduction to South Asia. Methuen, London, 1983.
4. Govt. of India: India - Reference Annual, 2001 Pub. Div, New Delhi, 2001.
5. Govt. of India: National Atlas of India, NATMO Publication, Calcutta..
6. Govt. of India: The Gazetteer of India. Vol I & III Publication Division, New Delhi, 1965.
7. Learmonth, A.T.A. et.al(ed.) : Man and Land of South Asia Concept, New Delhi.

Geography of Tourism- II CC1F(No. of Credits: 03)

Objectives:

1. To understand the activities of Tourism
2. To introduce the students to the basic concepts in Tourism Geography.
3. To understand the types of Tourism
4. To gain knowledge different aspects of Tourism Geography.

Course Outcome:

1. Understand the accommodation types.
2. The students should be able to integrate various factors of economic development and dynam aspect of tourism geography.
3. Understand the planning and policy of tourism word wide.
4. To make aware the students about some Hill Station, Historical and National Parks

Sr. No.	Topic	Sub Topic & Learning Point	No. of Lectures
1.	Role of Accommodation in Tourism	a) Accommodation Types i. Hotels, Motels, Inn, Dharmashalas, Youth Hostel ii. Govt. Accommodation, Tourist Homes iii. Private accommodations and unrecognized accommodations b) Factors affecting choice of Accommodation c) Role of Accommodation in Tourism Development	12
2.	Impact of Tourism	a) Economic impacts i. Effect on foreign exchange ii. Employment generation iii. Infrastructure development b) Physical and Environmental impacts i. Land Degradation ii. Impacts on Bio-diversity iii. Air and water pollution c) Social cultural impacts i. Crime and Gambling activities ii. Languages iii. Traditional arts	12
3.	Planning and Polices of tourism development	a) World Tourism Organization (WTO) b) India Tourism Development Corporation (ITDC) c) Maharashtra Tourism Development Corporation (MTDC)	12
4.	Case studies of Major Tourist Centers in India	a) Hill Station- Manali and Mahabaleshwar b) Historical- Tajmahal and Raigadh Fort c) National Parks- Kaziranga, Melghat d) Preparation of Tourist Plan on any of above tourist destination	12

Semester VI

Geography of India -II DSE1 D (No. of Credits: 03)

Objective:

1. To acquaint the students with geography of our Nation.
2. To make the student aware of the magnitude of problems and Prospects at National level.
3. To help the students to understand the inter relationship between the subject and the society.
4. To help the students to understand the recent trends in regional studied

Course Outcome:

1. Explain the importance of geography of our Nation.
2. Make the aware of the magnitude of problems and Prospects at National level.
3. Identify the inter relationship among the subject and the society.
4. Understand the current trends in regional studied
5. Realize about diversity of our nation i.e. Religious, Languages, Tribes etc
6. Acquaint the knowledge about different types of resources and their utility

Sr. No	Unit	Subunit	No. of Lectures
1	Cultural Setting	a) Religions of India b) Languages of India c) Major tribes, tribal areas and their problems : Naga and Gond Tribe	12
2	Transportation and Communication	a) Land ways, Airways and Waterways b) Role of Transportation in regional development of India c) Developments in communication technology	12
3	Resources	a) Iron ore and Manganese b) Coal and Petroleum c) Hydro Power and Thermal Power	12
4	Agriculture	a) Significance of agriculture in Indian Economy. b) Agro Based Industries: Sugar, Cotton and Textile c) Agriculture Revolution in India: Green, White and Blue	12

Reference Books

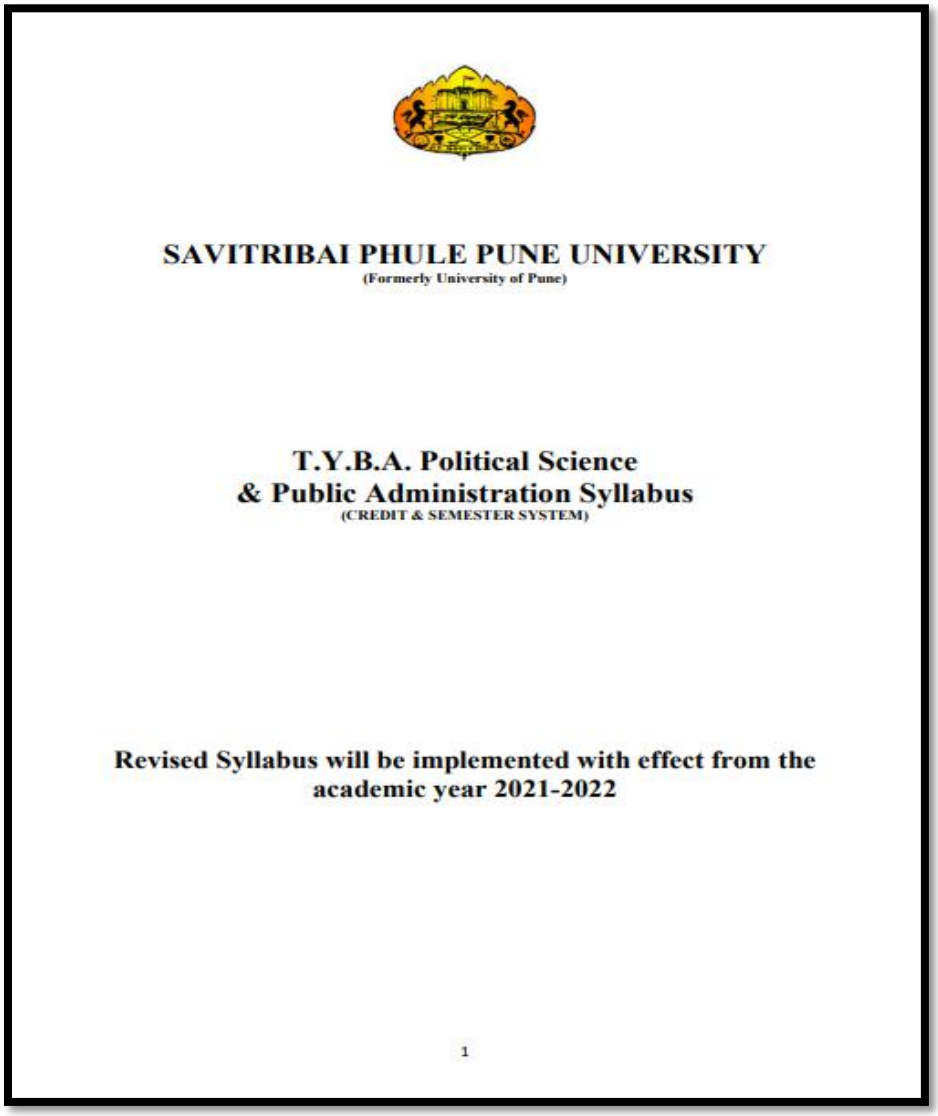
1. Aher A.B , Chaodhari A. P & Chaodhari Archna. Regional Geography of India Prashant Publication Jalgaon 2015
2. Deshpande C.D: India-A Regional Interpretation Northern Book Centre, New Delhi.1992.
3. Farmer, B.H.: An Introduction to South Asia. Methuen, London, 1983.
4. Govt. of India: India - Reference Annual, 2001 Pub. Div, New Delhi, 2001.

POLITICAL SCIENCE

TYBA POLITICAL SCIENCE

Sr/No.	Crosscutting issue	Program	subject	class	Name of the course	Contentinthe course:	outcome
1	**Environment and sustainability**	BA	Political Science	TY BA	International relations	**Unit: 4** (Sem V & VI)	Students will gain the insight of the various international organizations and they will be able to address various issues related to environment and sustainability.

- Students will gain the insight of the various international organizations and they will be able to address various issues related to environment and sustainability.



SAVITRIBAI PHULE PUNE UNIVERSITY
(Formerly University of Pune)

T.Y.B.A. Political Science
& Public Administration Syllabus
(CREDIT & SEMESTER SYSTEM)

Revised Syllabus will be implemented with effect from the academic year 2021-2022

1

Savitribai Phule Pune University

T.Y.B.A. Political Science

(CBCS pattern to be implemented from 2021-2022)

DISCIPLINE SPECIFIC ELECTIVE COURSE

INTERNATIONAL RELATIONS

Objectives:

This paper deals with concepts and dimensions of International Relations and makes an analysis of different theories highlighting the major debates and differences within the different theoretical paradigms. The dominant theories of power and the question of equity and justice, the different aspects of balance of power leading to the present situation of a unipolar world are included. It's highlights various aspects of conflict and conflicts resolution, collective security and in the specificity of the long period of the post second world war phase of the cold war, of Detent and Deterrence leading to theories of rough parity in armaments.

SEMESTER-V

DSE 2 C (3)+1

	PERIOD
Unit 1: Introduction to International Relations	**12**
a) Development and Meaning	
b) Nature	
c) Scope	
Unit 2: Approaches to International Relations	**12**
a) Idealism	
b) Realism – Neo realism	
c) System approach	
d) Marxism	
Unit 3: World War II and the Cold War	**12**
a) Causes and Consequences of the world war II	
b) Emergence of the cold war and its phase	
c) End of cold war and the emerging world order	

12

Unit 4: International Organizations 12

a) The United Nations - its structure and peacekeeping Functions- Reforms of UN
b) International Financial institutions : World Bank, IMF, WTO
c) Regional Organizations : EU, SAARC, ASEAN, BRICS

SEMESTER-VI

DSE 2 D (3)+1

Unit 1: The Theory of Non-Alignment 12

a) Meaning and basic principles of Non-Alignment
b) Emergence of Non-Alignment
c) Non-Alignment as a Movement
d) Relevance of NAM In Post cold war period

Unit 2: Globalization 12

a) Meaning of Globalization
b) Evolution and Impacts of Globalization
c) Limits of Globalization
d) Role of The state

Unit 3: International Political Economy 12

a) Neo-Colonialism
b) New International Economic Order
c) North-South Divide
d) South-South Co-operation

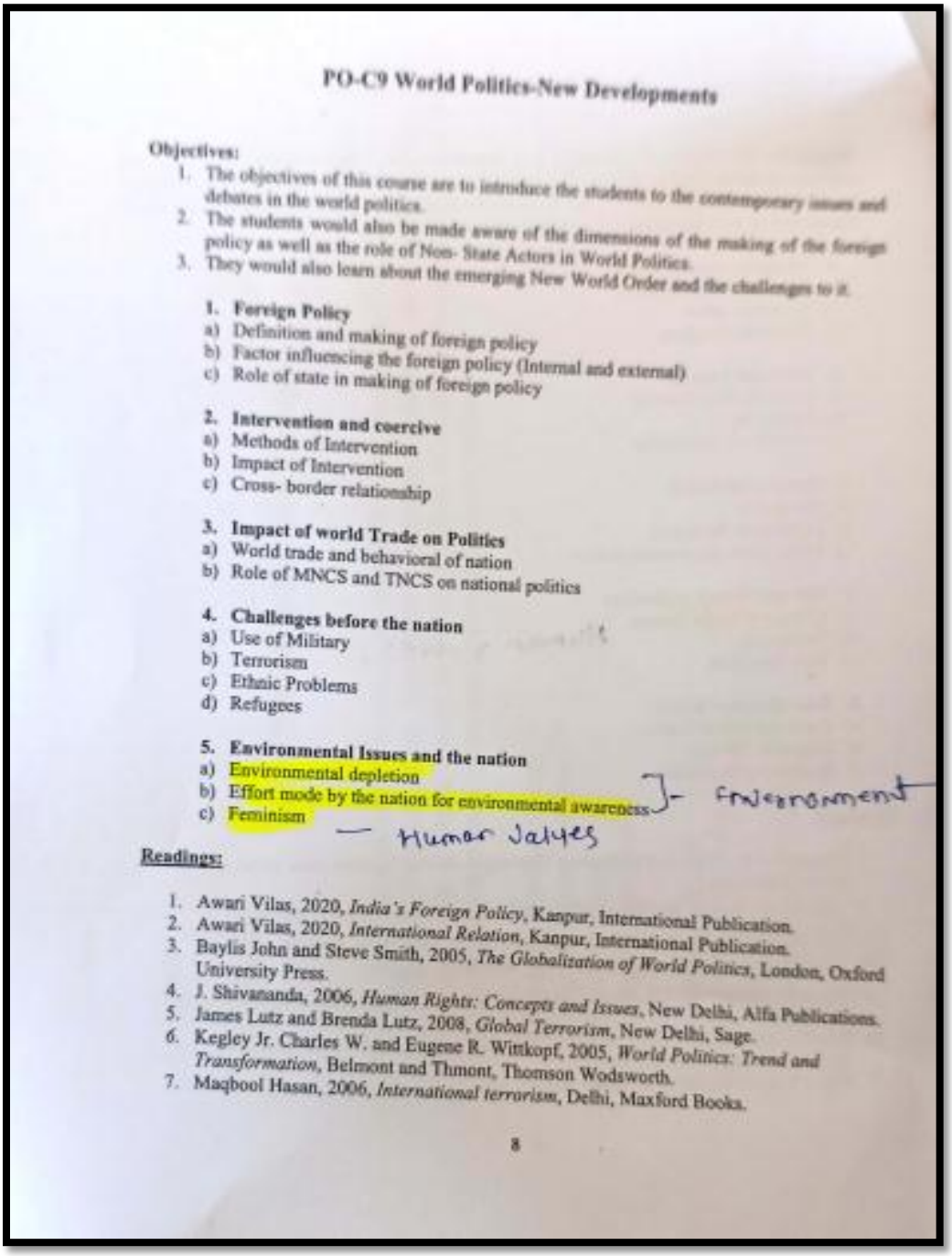
Unit 4: Contemporary Global Issues 12

a) International Terrorism
b) Environmental Issues
c) Poverty, Development and Hunger
d) Human Rights

13

MA II POLITICAL SCIENCE

Sr/No.	Crosscutting issue	Program	subject	class	Name of the course	Contentinthecourse:	outcome
1	**Environment and sustainability**	MA	Political Science	MA	World politics	**Unit: 4**	Students will gain the insight of various developments in world politics related to Environment which develops their values to act in the society.
					Politics and Society	**Unit: 4,5**	Students will gain the insight of the interface of politics with social structure.



PO-C9 World Politics-New Developments

Objectives:

1. The objectives of this course are to introduce the students to the contemporary issues and debates in the world politics.
2. The students would also be made aware of the dimensions of the making of the foreign policy as well as the role of Non- State Actors in World Politics.
3. They would also learn about the emerging New World Order and the challenges to it.

1. Foreign Policy
a) Definition and making of foreign policy
b) Factor influencing the foreign policy (Internal and external)
c) Role of state in making of foreign policy

2. Intervention and coercive
a) Methods of Intervention
b) Impact of Intervention
c) Cross- border relationship

3. Impact of world Trade on Politics
a) World trade and behavioral of nation
b) Role of MNCS and TNCS on national politics

4. Challenges before the nation
a) Use of Military
b) Terrorism
c) Ethnic Problems
d) Refugees

5. Environmental Issues and the nation
a) Environmental depletion
b) Effort mode by the nation for environmental awareness
c) Feminism

Environment
Human Values

Readings:

1. Awari Vilas, 2020, *India's Foreign Policy*, Kanpur, International Publication.
2. Awari Vilas, 2020, *International Relation*, Kanpur, International Publication.
3. Baylis John and Steve Smith, 2005, *The Globalization of World Politics*, London, Oxford University Press.
4. J. Shivananda, 2006, *Human Rights: Concepts and Issues*, New Delhi, Alfa Publications.
5. James Lutz and Brenda Lutz, 2008, *Global Terrorism*, New Delhi, Sage.
6. Kegley Jr. Charles W. and Eugene R. Wittkopf, 2005, *World Politics: Trend and Transformation*, Belmont and Thmont, Thomson Wodsworth.
7. Maqbool Hasan, 2006, *International terrorism*, Delhi, Maxford Books.

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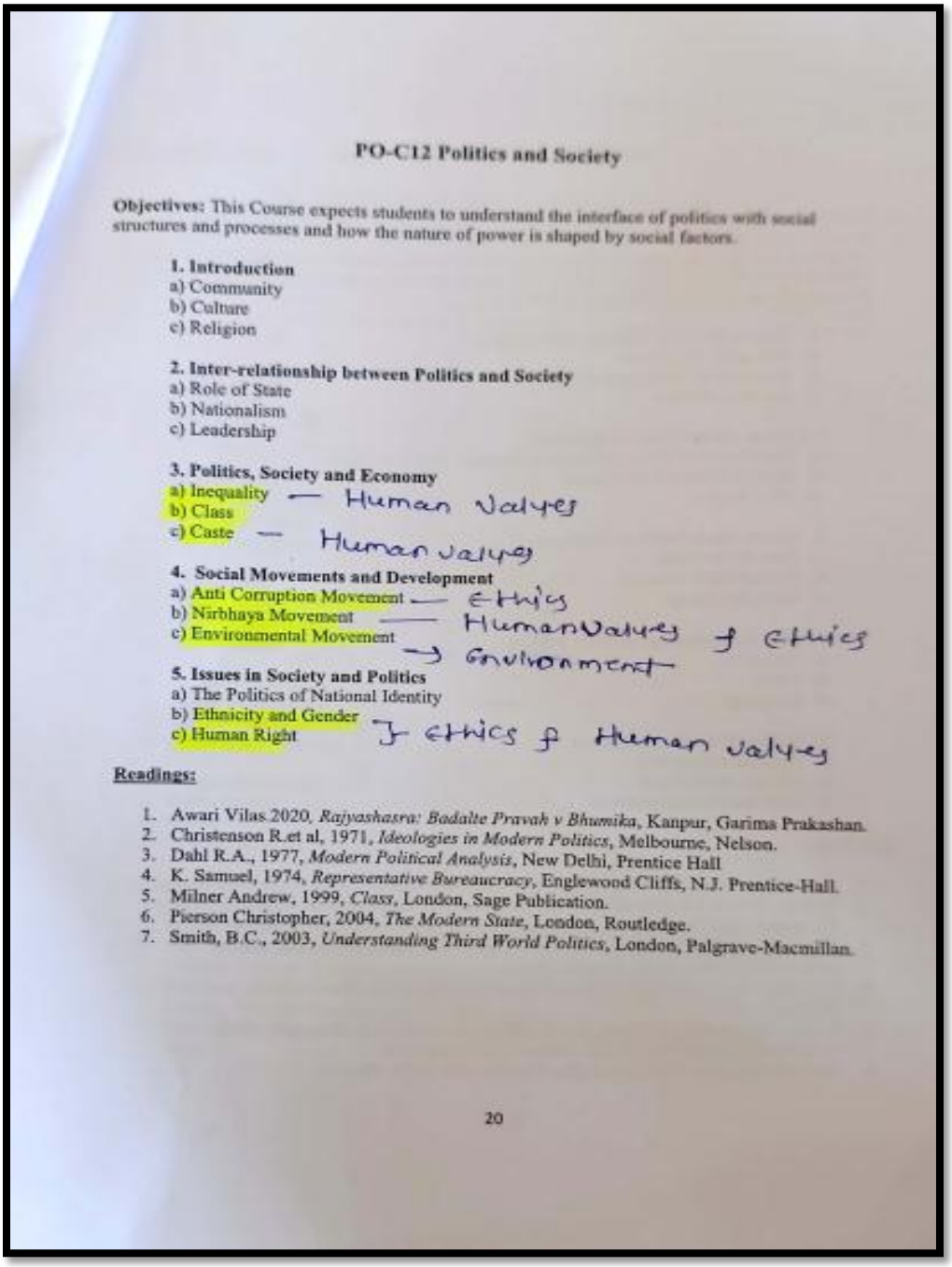


PO-C12 Politics and Society

Objectives: This Course expects students to understand the interface of politics with social structures and processes and how the nature of power is shaped by social factors.

1. Introduction
a) Community
b) Culture
c) Religion

2. Inter-relationship between Politics and Society
a) Role of State
b) Nationalism
c) Leadership

3. Politics, Society and Economy
a) Inequality — Human Values
b) Class
c) Caste — Human Values

4. Social Movements and Development
a) Anti Corruption Movement — Ethics
b) Nirbhaya Movement — Human Values & Ethics
c) Environmental Movement → Environment

5. Issues in Society and Politics
a) The Politics of National Identity
b) Ethnicity and Gender
c) Human Right — & Ethics & Human Values

Readings:

1. Awari Vilas 2020, *Rajyashastra: Badalte Pravah v Bhumika*, Kanpur, Garima Prakashan.
2. Christenson R.et al, 1971, *Ideologies in Modern Politics*, Melbourne, Nelson.
3. Dahl R.A., 1977, *Modern Political Analysis*, New Delhi, Prentice Hall
4. K. Samuel, 1974, *Representative Bureaucracy*, Englewood Cliffs, N.J. Prentice-Hall.
5. Milner Andrew, 1999, *Class*, London, Sage Publication.
6. Pierson Christopher, 2004, *The Modern State*, London, Routledge.
7. Smith, B.C., 2003, *Understanding Third World Politics*, London, Palgrave-Macmillan.

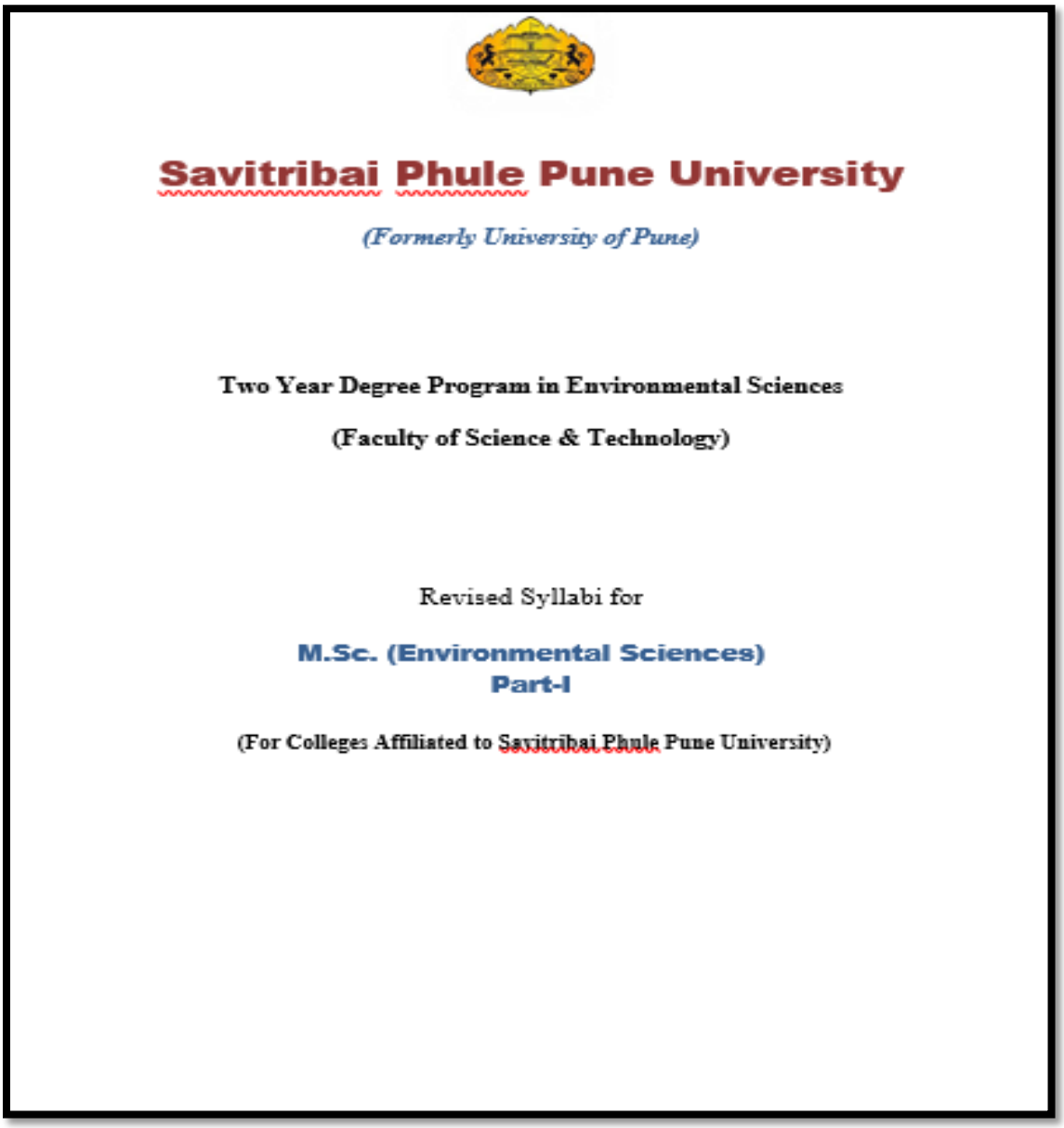
20

ENVIRONMENTAL SCIENCES

SY B.A., BCOM, B.Sc.

Sr/ No.	Crosscutting issue	Program	subject	class	Name of the course	Content in the course:	outcome
1	**Environment and sustainability**	M.ScEnv. Sci	Environmental science	M.Sc.	Environmental science	UNIT : 1,2,3,4,5,6	Students will be able to understand the concept of environment, ecology, environmental problems their solutions.

- Students will be able to understand the concept of environment, ecology, environmental problems theirsolutions



Savitribai Phule Pune University

(Formerly University of Pune)

Two Year Degree Program in Environmental Sciences

(Faculty of Science & Technology)

Revised Syllabi for

M.Sc. (Environmental Sciences)
Part-I

(For Colleges Affiliated to Savitribai Phule Pune University)

Detailed Syllabus

SEMESTER – 1 (COMPULSORY)

EVSUT-111	ENVIRONMENTAL BIOLOGY & BIODIVERSITY (4 CREDITS)	Lectures
1.	**Environmental Biology: Concepts and Scope:** • Concept of Ecosystem; Biosphere as an ecosystem; its ecological processes and life support systems. • Ecotone, and Role of biological processes in remedial measures and restoration.	4
2.	**a) Fundamental Concepts of Ecology.** • Ecology: Definition, development and scope. Ecology as an experimental science • Ecosystems: concept, components and functioning. • Energy Fixation (photosynthesis and chemosynthesis) and energy flow through food chains (grazing and detrital) and webs (include Y shaped energy flow model). • Ecological efficiencies and pyramids. Trophic levels • Influence of environmental factors (including temperature, light, moisture, soil, nutrients) on organisms and their adaptations in response to them. **b) Ecology of Populations And Communities.** **(I) Population Ecology:** • Factors determining the abundance and distribution of a species • Factors leading to the commonness, rarity and vulnerability of extinction of a species. • Population Dynamics: Patterns of survival, age distribution, dispersal and rates of change. Attributes of K- selected and r-selected species, Population Growth. **(II) Community Ecology:** • Competition, Exploitation (including herbivore, predation, parasitism), Mutualism (including commensalism, cooperation, symbiosis) • Food webs and concepts of niche and keystone species. • Nutrient cycling and retention: Biogeochemical cycles (Carbon, Nitrogen, Phosphorus), limiting factors and their tolerance	15

	• Role of microbes in bio-remedial processes, ecological restoration and other environmental applications • Environmental factors affecting microbes, their cultivation and growth. • Concept of bioindicators, bioindicators as plants, animals, bioindicators in manmade environment, role of bioindicator in pollution control. • Fundamentals of microbial nitrogen fixation and other pathways in terms of enzymology.	
6.	**Concept of Carrying Capacity** Biotic and abiotic components of environment, concept of sustainability and carrying capacity, tragedy of commons, human population and food, water and energy security, present status of environment and future scenarios.	6
7	**Introduction to Biodiversity** Biodiversity: An inventory of Global and Indian biological resources and their present and potential uses; Values of biodiversity; threats to biodiversity; Strategy for conservation of bio-resources.	5

	• Concept of Engineering & Urban Geology	
3.	**Soil:** Genesis of Soil; Soil Profile; Soil texture, structure; Bio-, Physico-, Chemical properties of soil; Soil Classification; Soil types w.r.t. genesis; Fertility; Lateritization; Land use and Land capability classification; Water-logging, salinization, desertification and degradation of soil.	4
4.	**Hydrology:** • Concept of Hydrology & Hydrogeology • Hydrological Cycle (Precipitation, Infiltration, Surface Run off, Evapo-transpiration) • Surface & Groundwater Resources; • Vertical distribution of groundwater: Types of Aquifers & Springs; Hydrological properties of rocks: Darcy's Law, Storativity, Hydraulic Conductivity, Transmissivity, • Concept of Drainage Basin and Watershed.	8
5.	**Ocean Science:** • Ocean Basins and Physical structure of ocean floor; Oceanic environments • Vertical stratification of water column (Temperature, Pressure, Salinity, pH, Oxygen, CO_2, Nutrients) • Waves, Tides, Currents, Tsunamis; Importance of winds & Hadley's Cell; Corriolis Effect; Geostrophic Currents; Ekman Spiral; Upwelling & Productivity; Surface; Thermohaline and Bottom water circulation	8
6.	**Earth Resources:** Occurrence, exploitation and environmental impacts Coal, Hydrocarbons and mineral resources.	5

Savitribai Phule Pune University 9

EVSUT 115	PRACTICALS RELATED TO EVSC- 101, 102, 103 & 104 (4 Credits)
	EVSUT-111 FUNDAMENTALS OF ENVIRONMENTAL BIOLOGY & BIODIVERSITY 1. Determining the rate of photosynthesis in an aquatic plant (hydrilla or elodea) 2. Estimation of chlorophyll content from given plant leaves 3. Vegetation studies by line and belt and quadrates methods 4. To study wetland bird diversity 5. Phytoplankton and zooplankton analysis from freshwater samples 6. Estimation of Productivity of lake 7. Preparation of media for microbial culture, Isolation and culturing of microbes from soil / water samples, Gram Staining. 8. Bacterial growth curve 9. Enzyme analysis from soil samples

Semester 2 (Compulsory)

EVSUT-121	Water and Soil Pollution: Management & Mitigation (4 Credits)	Lectur 88
1.	**Freshwater Pollution** Types and sources, Inorganic and organic pollutants responsible for water pollution: Biological pollutants; Pesticides; Radioactive pollutants, etc. effluent standards, Drinking water standards, Characteristics of Domestic waste, Characteristics of Agricultural waste. Consequences of water pollution: Effects on health, on biosphere and on economy. • Remedial measures of Freshwater pollution. • Case studies based on freshwater remediation using traditional and modern technology.	16
2.	**Ground water Pollution:** • Sources, groundwater contamination zones, groundwater remediation *in situ* and *ex situ* techniques; • bioremediation strategies of groundwater using bio-venting, bio-sparging, bio-slurrping, permeable reactive barriers; • groundwater monitoring using Piezometer, slug and pumping tests; • Darcy's Law for estimation of hydraulic parameters, Numerical simulation for aquifer yield prediction, Artificial recharge and induced infiltration, Land subsidence; • Coastal aquifers & Sea water intrusion • Environmental regulatory bodies preventing groundwater pollution; • Case studies based insight in to groundwater remediation techniques.	16
3.	**Marine Water Pollution:** • Sources, types and consequences; • Ballast water pollution • pollution due to off shore drilling, deep mining and oil extraction and other sources; prevention methods, control measures using bioremediation (bio-surfactants, microcosms), physical (booms, skimmers, absorbents etc) and chemical methods (dispersants, detergents etc). • Case studies based analysis of marine water pollution and prevention strategies.	12
	Soil Pollution and Control	

	• Types, Effects and sources and consequences. Mechanism of interaction of waste with soil. Transport processes — biological process-microbial transformation of heavy metals. Specifications for disposal of sewage and effluent on land for irrigation and ground water recharge. • Methodology of wastewater disposal on land in India. Impacts of usage of land for solid waste disposal both municipal solid waste and industrial solid wastes (fly ash from thermal power station, lime sludge from pulp and paper mills). Disposal of hazardous solid waste (heavy metals, toxic organic compounds) on land and its impact on soil pollution. Deterioration of soil due to mining activities • Case study of restoration of land due to a disposal of fly ash, dumping overburden and tailing in iron ore extraction.	15

EVSUT-122	ENVIRONMENTAL POLLUTION II: AIR, NOISE AND RADIATION (4 CREDITS)	Lectures
1.	**Air Pollution: Causes and Effects:** Definition, Composition of air, Classification of air pollution, Sources, Effect of gaseous and particulate pollutants on animals, plant and human health, Economic effects of air pollutants, Vehicular Pollution, Industrial Pollution.	4
2.	**Air Pollution Meteorology& Chemistry** Wind as a factor, Temperature structure, The role of atmospheric stability, Dispersion of air pollutants. Chemical Principles and Troposphere and Stratospheric Ozone Chemistry: Ozone formation & destruction, Polar Stratospheric Clouds (PSPs).	8
3.	**Air Quality Analysis** Air monitoring instruments and techniques: SOX, NOX, O3, C6H6, Pb, CO, Particulate Matters.	8
4.	**Air Pollution Control Technology:** Equipment's and Basic Operating Principle; Control of air pollution by fuel selection, principle and working of – cyclones, scrubbers, settling chambers and electrostatic precipitators. Control of gaseous pollutants – absorption, adsorption, condensation, vapor incineration. Equipments for control of air pollution – Cyclones, Wet scrubbers, Electrostatic precipitators, fabric filters, absorption.	8
5.	**Air Quality Management : Policy and Institutional Framework** Ambient Air Protection Policy, Air Quality Norms, Regulation of Emissions from Stationary & Non-Stationary Sources. Public Informing and Participation in Decision Making Process, Planning and Implementation of Ambient Air Protection Measures. Strategies for Air Pollution Control - Control of air pollution by fuel selection and utilization, by process modification or equipment, by site selection and zoning.	8
6.	**Air Pollution Episodes:** Case Studies	2
7.	**Noise Pollution & Control** Introduction to noise and vibrations, physics of sound and hearing, Noise Pollution, sources and effects.	6

	Noise control at source: Source path receiver concept, control by design, control by redress Noise control in the transmission path: Accoustical separation, physical barriers, Isolators and Silencers Protecting the receiver: personal protection device	
8.	**Noise Monitoring and Impact Criteria** Noise measuring techniques, national standard for noise, noise monitoring methods, A-weighted Sound Level: The Basic Noise Unit; Maximum Sound Level (Lmax) During a Single Noise Event; Sound Exposure Level (SEL); Exposure from a Single Noise Event Hourly Equivalent Sound Level(Leq (h)); Day-Night Sound Level (Ldn): 24-Hour Exposure from All Events; A Noise-Exposure Analogy for Leq and Ldn Investigation and assessment of impact of noise, Considerations in Applying the Noise Impact Criteria; Mitigation Policy Consideration; Determining the Need for Noise Mitigation.	6
9.	**Radiation Pollution** Radioactivity – types and measurement. Detection of nuclear radiations – G. M. counter, scintillation counter, semi-conductor detector. Radiation hazards and safety – natural and manmade. Types of radiations. Internal and external radiation hazards, safe handling methods, personal dosimeter, reactor safety. Interaction of radiation with matter. Units of measurements, half-life period, radiation dose measurement. Biological effects and health hazards associated with radiation. Interaction of radiations with biological cells, somatic and genetic effects. Classification of radio-active wastes – gas, solid, liquid. Control measures – treatment and disposal of radio-active waste, generation of waste from various sources. ICRP recommendations. AERB classification, maximum permissible dose. Three miles and Chernobyl accidents.	10

EVSUT-123	ENVIRONMENTAL LEGISLATION, ETHICS AND POLICY (4 CREDITS)	Lectures
1.	Introduction to Law and Policy- basic concept of Law and Policy (Importance and difference)	4
2.	International Conferences impacting Indian legal system such as Stockholm conference, Rio conference, Rio+5, Rio+10.	8
3.	Environmental Policies in the Indian Constitution - Role of constitution in environment protection, Fundamental rights and duties, Article 48A, 51A (g), 58A, etc.	6
4.	Environmental Laws in India • Water Act, 1974 • Air Act, 1981 • Indian Forest Act, 1927/1982 • EPA, 1986 • The Wildlife Act, 1972 • The Biological Diversity Act, 2002 • Others	14
5.	Rules and Regulations (As amended) • Hazardous Waste Rules • Solid Waste Management Rule • Biomedical Waste Rules • Batteries Rules • E- waste rules • Construction and Demolition waste Rules • Concept of Eco sensitive zones, Coastal Regulation Zone • Others	14
6.	National Environmental Policy, Ethical dilemma, Issues of Sustainable Development	6
7.	International Environmental Laws and Policies • UNFCCC, Paris climate accord or Paris climate agreement 2015 • Kyoto Protocol • Convention on Biodiversity	10

	• International Solar Alliance • CITES • Ramsar Convention • Basel Convention • MARPOL • Cartagena Protocol on Bio-safety • AGENDA 21 • Others	

EVSUT-124	WATER & WASTE WATER TECHNOLOGY (4 CREDITS)	Lectures
1	Quantity of water - Water Requirements for domestic consumption. Population forecasting by the following method; Demographic method, Arithmetical progression method, Geometrical progression method, Logistic methods, Graphical projection method, Final prediction. Variation in quantity of water and waste water, Factors affecting rate of demand. Quality of water required for – Domestic, Institutional (Schools, Hostels, Hospitals), Fire fighting, Commercial (Shopping complex, Hotels, Restaurant), Industrial (Dairy, Sugar, Pulp and Paper, etc.). Specific requirement at pilgrimage place and recreation activities Quality parameters for water analysis, methods for analysis	6
2	Impact of future growth and development and change in quality of life on water requirements. Need of water quality standards for domestic & industrial purpose. Specifications for drinking water (physical, chemical & bacteriological) by Bureau of Indian Standards & World Health Organization. Packaged drinking water.	5
3	Water Treatment – Principle, Application & Designing of following Unit Operation in water treatment. a. Collection & pumping; b. Aeration; c. Flocculation; d. Sedimentation; e. Filtration; f. Disinfection ; g. water softening	10
4	Advanced treatment methods e.g. a. Demineralization; b. Ultra filtration; c. Reverse osmosis; d. Color & odor removal by activated carbon; e. Iron removal; f. Nitrification and denitrification Selection of appropriate unit operations for the treatment and flow chart of water treatment plant	6
5	Specifications of treated wastewater for disposal into surface water, on land & in marine waters after treatment. Self-purification of water bodies	4
6	Wastewater technology – (Physical, Chemical and Biological Treatment), different models of aerobic and anaerobic digestion by combination of attached & suspended growth Impact of Future growth & development & change in quality of life on sewage quality & quantity.	4

	Role of microorganisms, Kinds of Microorganisms, Pathogenic microbes, indicator microbes, enumeration of microbes, Coliform bacteria as indicator organisms, Tests for the coliform group (MPN Method), growth kinetics. Water borne diseases, Importance of public health perspectives, socioeconomic impacts, Types of waterborne diseases (Protozoan, Algal, Fungal, Bacterial, and Viral diseases), prophylactic measures	
7	Wastewater engineering - Primary, secondary and Tertiary treatment process. Principle and designing of following Unit Operations in waste water treatment: Collection system - Methods of collection, conservancy systems, collection system, water carriage system, sewerage system. Screen chamber, Grit chamber, Oil & grease removal, Aeration and sedimentation, Stabilization pond, Aerated lagoon, Activated sludge process, Trickling filter, Rotating biological contactors Anaerobic digestion processes, fluidized bed reactor, UASB Treatment and Disposal of sludge (composting, sludge cakes, sludge digestion, energy recovery) Special treatments like septic tanks, soak pits.	15
9	Industrial Wastewater-Selection of appropriate unit operations for the treatment and flow chart of wastewater treatment plant for a. Dairy; b. Pulp & Paper; c. Galvanizing, etc.	5

EVSUT-125	PRACTICALS RELATED TO EVSC- 121, 122, 123 & 124 (4 Credits)
	EVSUT-121 WATER AND SOIL POLLUTION: MANAGEMENT & MITIGATION 1. Determination of pH, Turbidity & Electrical Conductivity, Solids (TS, TDS, TSS). 2. Determination of Total Alkalinity and Total Hardness of water sample. 3. Determination of Chlorides and Residual Chlorine of water sample. 4. Determination of DO and BOD of given water sample. 5. Determination of COD in given water sample. 6. Determination of Nitrate and nitrites of a water sample. 7. Determination of Sulfates of given water sample. 8. Determination of Phosphates of given water sample. 9. Estimation of oil and grease from a water sample. **Soil Pollution and Control** 1. Determination of pH & Electrical Conductivity, Solids (TS, TDS, TSS). 2. Determination of Total Alkalinity and Total Hardness of soil sample. 3. Determination of Bulk density and water holding capacity of soil of given soil sample. 4. To estimate organic carbon of soil sample. 5. To estimate cation exchange capacity of soil. 6. To determine sodium adsorption ratio of soil. 7. Texture Analysis of given soil sample. 8. Estimation of TKN of given soil sample.
	EVSUT – 122 ENVIRONMENTAL POLLUTION II: AIR, NOISE AND RADIATION **Air Pollution:** 1. Determination SOX concentration in air. 2. Determination NOX concentration in air. 3. Determination PM Concentration in air. 4. Determination of heavy metals in collected air samples. 5. Estimation of Carbon dioxide from air sample. **Noise Pollution:** 1. Measurement of sounds by DB meter / SLM in silent, industrial, residential and commercial zones. 2. Determination of SPL, Lmax, TWA, Leq, Ldn, L10, L50, L90. 3. Determination of Noise dose.
	EVSUT – 123 ENVIRONMENTAL LEGISLATION, ETHICS AND POLICY

	2. Study of case studies and its interpretations - submission of detailed reports
	EVSUT – 124 WATER & WASTE WATER TECHNOLOGY 1. Field visit to river/lake for Sampling procedure, handling and preservation of samples 2. Visit to water treatment plants - Sampling procedure, handling and preservation of samples 3. Visit to wastewater/effluent treatment plants - Sampling procedure, handling and preservation of samples 4. Physico-chemical analysis of waste water to determine quality of sewage and effluent 5. MLSS, SVI study for waste water 6. Jar test for coagulation determination

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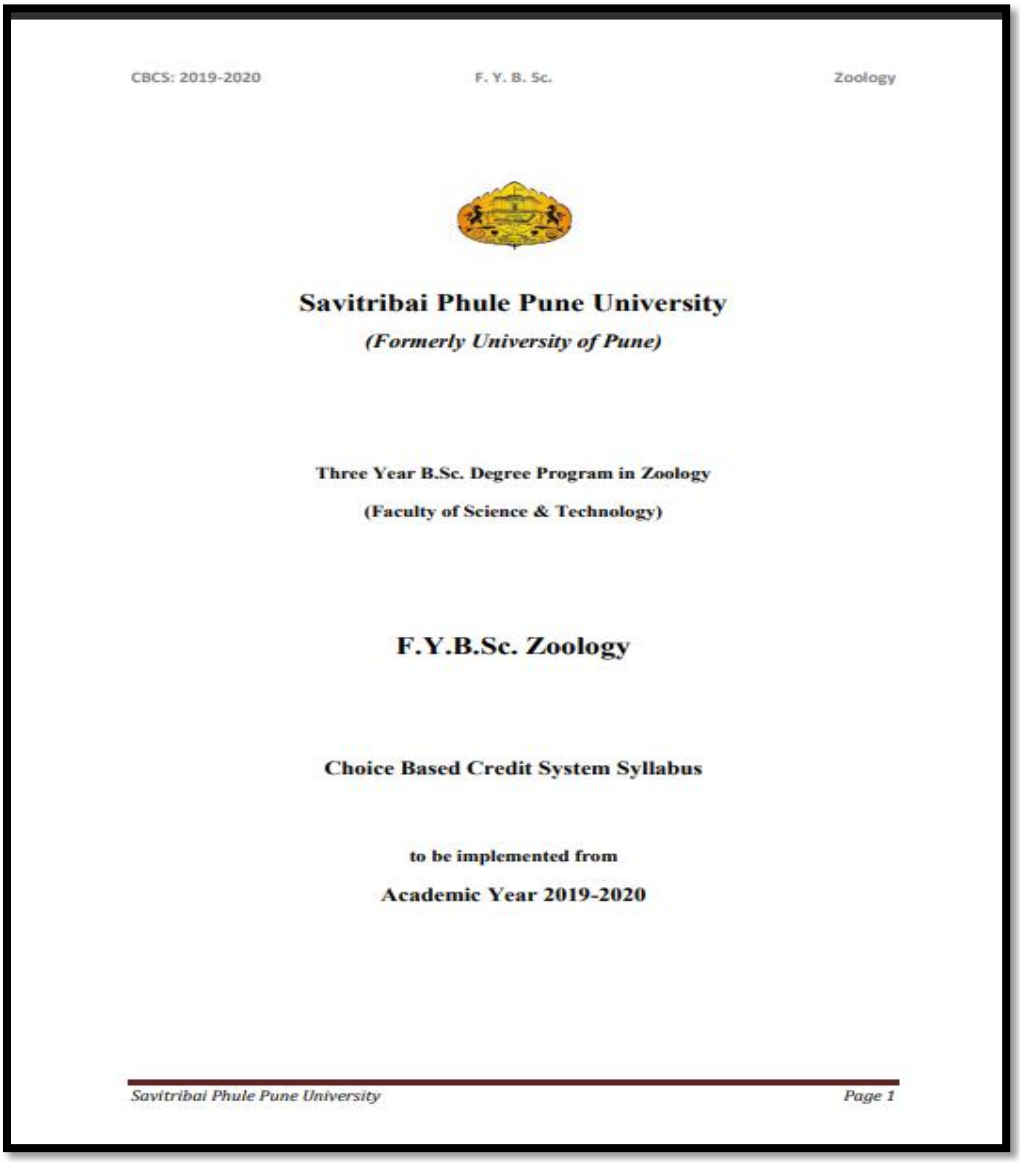
ZOOLOGY

FYB.Sc. Zoology

Sr/No.	Crosscutting issue	Program	subject	class	Name of the course	Content in the course:	outcome
1	**Environment and sustainability**	B.Sc.	Zoology	FY B.Sc.	Animal Ecology	UNIT : 1,2,3,4,5	Students will be able to understand, anticipate, analyses and evaluate natural resource issues and act on a lifestyle that conserves nature. The working in nature will help development of leadership skills to promote betterment of environment

- Students will be able to understand, anticipate, analyses and evaluate natural resource issues and act on a lifestyle that conserves * *Students will be able to understand, anticipate, analyses and evaluate natural resource issues and act on a lifestyle that conserves nature. The working in nature

to save environment will help development of leadership skills to promote betterment of environment.



CBCS: 2019-2020 F. Y. B. Sc. Zoology

Savitribai Phule Pune University

(Formerly University of Pune)

Three Year B.Sc. Degree Program in Zoology

(Faculty of Science & Technology)

F.Y.B.Sc. Zoology

Choice Based Credit System Syllabus

to be implemented from

Academic Year 2019-2020

Savitribai Phule Pune University *Page 1*

ZO 112: Animal Ecology **(2 Credits-30 Lectures)**

No.	Topic & Content	Number of lectures
1.	**Introduction to Ecology**	(02)
	1.1 Concepts of Ecology, Environment, Population, Community, Ecosystem, Biosphere, Autecology and synecology.	
2.	**Ecosystem**	(08)
	2.1 Types of ecosystems: Aquatic (Freshwater, estuarine, Marine and terrestrial (Forest, Grassland and Desert)	
	2.2 Structure and Composition of Ecosystem (Abiotic components and biotic components.	
	2.3 Food chain: Detritus and grazing food chains, Food web, Energy flow through the ecosystem, Ecological pyramids: Number, Biomass, and Energy.	
	2.4 concept of Eutrophication in lakes and rivers.	
3	**Population**	(08)
	3.1Characteristic of population: Density, Natality, Mortality, Fecundity tables, survivorship curves, age ratio, sex ratio, dispersal and dispersion.	
	3.2Exponential and logistic growth,	
	3.3 Population regulation – density-dependent and independent factors.	
	Population interactions, Gause's Principle with laboratory and field interactions,	
	3.4 Quadrate, line and belt transect methods.	
4.	**Community**	(07)
	4.1Community characteristics: species richness, dominance, diversity, abundance, vertical stratification, Eco tone and edge effect; Ecological succession with one example.	
5.	**Animal interactions**	(05)
	5.1Introduction to Animal interactions	
	5.2 Types of Animal interactions with at least to suitable examples of each	
	5.2.1-Competition: Interspecific and intraspecific	

TYB.Sc. Zoology

Sr/ No.	Crosscutting issue	Program	subject	class	Name of the course	Content in the course:	outcome
1	**Environment and sustainability**	B.Sc.	Zoology	TY B.Sc.	Environment impact assessment	UNIT : 1,2,3,4,5,6,7,8	Students will be able to understand the concept of environment in detail. They will be able to learn various ways to protect the environment and live a sustainable life.

Savitribai Phule Pune University
(Formerly University of Pune)

Three Year B. Sc. Degree Program in Zoology
(Faculty of Science & Technology)

T. Y. B. Sc. Zoology

Choice Based Credit System Syllabus

To be implemented from
Academic Year 2021 - 2022

Title & Contents	Number of lectures
1. Environment: 1.1 Definition. 1.2 Divisions. 1.3 Importance.	**2 L**
2. Pollution: 2.1 Definition and types. 2.2 Impact on wildlife, natural resources, development.	**3 L**
3. Sustainable development:	**2 L**

3.1 Definition and need.
3.2 Exploitation of natural resources.
3.3 Concept of carrying capacity.
3.4 Three pillars of Sustainability.
3.5 UN 17 Sustainable Development Goals (SDGs).

4. Overview of Environmental Protection acts: 4.1 The Air (Prevention and Control of Pollution) Act 1981. 4.2 The Water (Prevention and Control of Pollution) Act 1974. 4.3 The Environment Protection Act 1986. 4.4 The National Green Tribunal Act 2010. 4.5 Biological Diversity Act 2002.	**5 L**
5. Environmental Impact Assessment (EIA): 5.1 Definition, need and importance of EIA. 5.2 EIA notification 2006 - key elements, History and Evolution of EIA. 5.3 Categories of Industries / establishments requiring EIA, Types of EIA - strategic EIA, regional EIA, sectoral EIA, project level EIA and life cycle assessment. 5.4 Rapid and comprehensive EIA.	**5 L**
6. EIA Process: 6.1 Screening, Scoping and consideration of alternatives. 6.2 Baseline data collection, Impact analysis, Mitigation, Reporting, Public hearing. 6.3 Review of EIA. 6.4 Decision-making, monitoring clearance conditions.	**5 L**
7. Stakeholders in EIA process: 7.1 Project proponent, Environmental consultant.	**3 L**

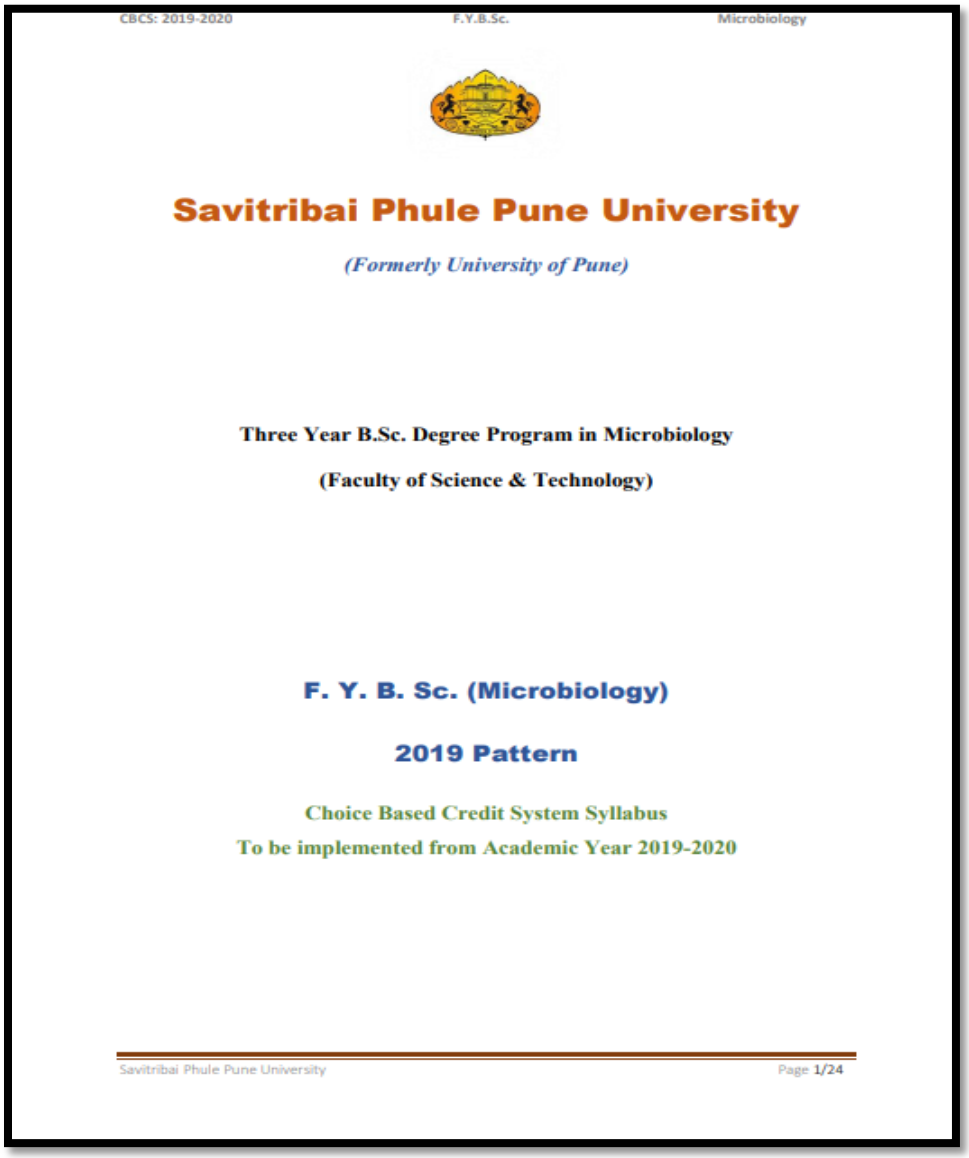
PDEA's
Annasaheb Magar Mahavidyalaya
Hadapsar Pune - 411028

MICRO-BIOLOGY

FYB.Sc. Micro-biology

Sr /No.	Crosscutting issue	Program	subject	class	Name of the course	Content in the course :	outcome
1	**Environment and sustainability**	B.Sc.	Micro - biology	FY B.Sc.	Introduction to Microbial World	UNIT : 3	Students will be able to understand different types of microorganism and their characteristic and how they affect environment.

- Students will be able to understand different types of microorganism and their characteristic and how they affect environment



CBCS: 2019-2020 F.Y.B.Sc. Microbiology

Savitribai Phule Pune University

(Formerly University of Pune)

Three Year B.Sc. Degree Program in Microbiology

(Faculty of Science & Technology)

F. Y. B. Sc. (Microbiology)

2019 Pattern

Choice Based Credit System Syllabus

To be implemented from Academic Year 2019-2020

Savitribai Phule Pune University Page 1/24

MB 111: Introduction to Microbial World

Credit	Topic	No. of Lectures (36)
Credit I	**1. Amazing world of Microbiology**	
	a. Development of microbiology as a discipline -Discovery of microscope and Microorganisms (Anton von Leeuwenhoek and Robert Hooke), Abiogenesis v/s biogenesis (Aristotle's notion about spontaneous generation, Francesco Redi's experiment, Louis Pasteur's & Tyndall's experiments)	4
	b. Golden Era of Microbiology	
	i. Contributions of - Louis Pasteur (Fermentation, Rabies, Pasteurization and Cholera vaccine-fowl cholera experiment) Robert Koch (Koch's Postulates, Germ theory of disease, Tuberculosis and Cholera-isolation and staining techniques of causative agent) Ferdinand Cohn (Endospore discovery)	4
	ii. Discovery of viruses (TMV and Bacteriophages), River's Postulates,Contribution of Joseph Lister (antiseptic surgery), Paul Ehrlich (Chemotherapy), Elie Metchnikoff (Phagocytosis), Edward Jenner (Vaccination) and Alexander Fleming (Penicillin) in establishment of fields of medical microbiology and immunology, Discovery of Streptomycin by Waksman	4
	iii. Contribution of Martinus W. Beijerinck (Enrichment culture technique, Rhizobium), Sergei N. Winogradsky (Nitrogen fixation and Chemo-lithotrophy) in the development of the field of soil microbiology	2
	c. Modern Era of Microbiology Carl Woese classification based on 16S r RNA Signification and Application of Human Microbiome, Nano-biotechnology and Space Microbiology	2
	d. Nobel laureates in Life Sciences of 21st Century (*Project Based Learning: Assignments should be given to student*)	2

Credit II	**2. Types of Microorganism and their differentiating characters**	
	a. Prokaryotes, Eukaryotes, three domain and five domain system of classification	**2**
	b. Bacteria (Eubacteria and Archaebacteria)	**1**
	c. Protozoa	**1**
	d. Fungi	**1**
	e. Algae	**1**
	f. Viruses, Viroids and Prions	**2**
	g. Actinomycetes	**1**
	3. Beneficial and Harmful effects of microorganisms:	
	a. Medical Microbiology (Enlist diseases caused by various microorganisms, vaccines and antibiotics)	**1**
	b. Environmental Microbiology (Eutrophication, red tide, Sewage treatment, bioremediation)	**2**
	c. Food and Dairy Microbiology (Food spoilage, food borne diseases, Probiotics and fermented food)	**1**
	d. Agriculture Microbiology (Plant diseases and Biofertilizers and Bio-control agents)	**1**
	e. Industrial Microbiology (Production of antibiotics, enzymes, solvents and contaminants-bacteria and phages)	**2**
	f. Immunology (Normal flora, Three lines of defence)	**2**

References:

1. Ahmed M. and Basumatary S. K. (2019). Applied Microbiology. MJP Publisher, Chennai, Tamil Nadu. India.

2. Beck R. W. (2000). A Chronology of Microbiology in Historical Context. United Kingdom: ASM Press.

3. Bender K. S., Buckley D. H., Stahl D. A., Sattley W. M. And Madigan M. T. (2017). Brock Biology of Microorganisms. E-Book, Global Edition. United Kingdom: Pearson Education.

4. Dubey H. C. (2004). A textbook of fungi, bacteria and Viruses. Vikas Publishing House Private Limited. New Delhi, India

5. Dubey R. C. and D. K. Maheshwary. (2012). A textbook of Microbiology. S Chand and Company. New Delhi, India

SYB.Sc. Micro-biology

Sr/No.	Crosscutting issue	Program	subject	class	Name of the course	Content in the course:	outcome
1	**Environment and sustainability**	B.Sc.	Micro-biology	SY B.Sc.	Introduction to Microbial World	UNIT : 3	Students will develop the understanding about bacterial physiology with reference to metabolism, respiration and fermentation and in what capacity it affect the environment.

Savitribai Phule Pune University

(Formerly University of Pune)

Three Year B.Sc. Degree Program in Microbiology

(Faculty of Science & Technology)

S. Y. B. Sc. (Microbiology)

Choice Based Credit System Syllabus

2019 Pattern

CBCS: 2019 Pattern S. Y. B. Sc. Microbiology

MB-232: Bacterial Physiology and Fermentation Technology

[2 Credits; 36 Lectures]

[1 credit=15 hrs x 60 mins = 900mins/50mins= 18 lectures]

Credit I	Bacterial Physiology	(18)
1	**Enzymes**	
	i. Introduction to Enzymes: Properties of enzymes, Nature of active site, Structure of active site, commonly occurring amino acids at active site. Ribozymes, coenzymes, apoenzymes, prosthetic group and cofactors.	2
	ii. Nomenclature and classification as per IUB (upto class level).	2
	iii. Models for catalysis– a) Lock and key b) Induced fit c) Transition state.	1
	iv. Effect of pH and temperature, substrate concentration and enzyme concentration, activators and inhibitors of enzyme	3
2	**Bacterial Physiology**	
	i. Definitions of Metabolism, catabolism, anabolism, respiration and fermentation	1
	ii. Metabolic pathways (with structures) a) Embden Meyerhof Parnas pathway (Glycolysis) b) Hexose monophosphate pathway c) Entner Doudoroff pathway d) Phosphoketolase pathway(Pentose and hexose) e) TCA cycle (with emphasis on amphibolism) and Glyoxylate by pass f) Gluconeogenesis and its significance	 2 2 1 1 2 1

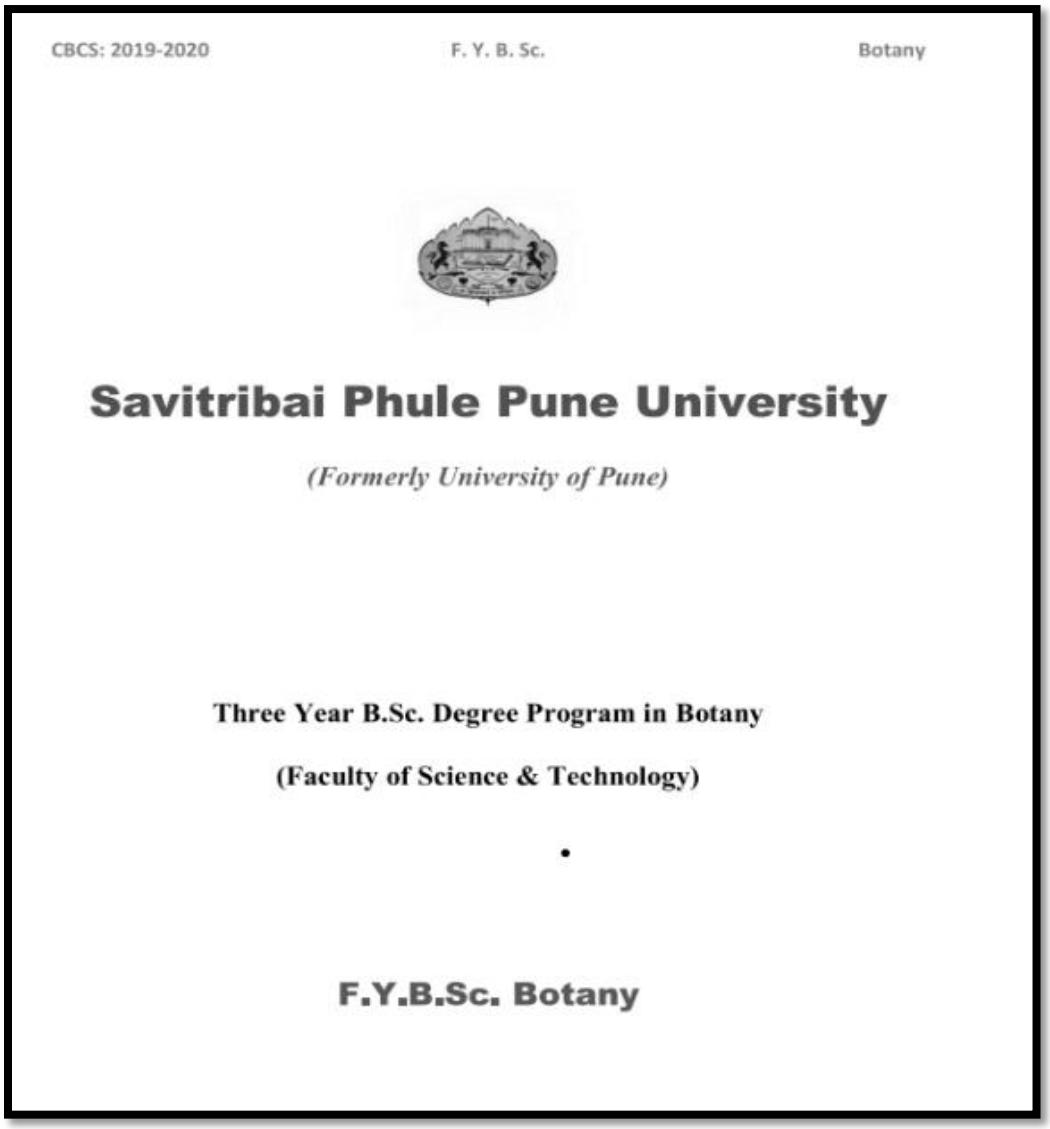
Credit II	Fermentation Technology	(18)
3	**Concept of fermentation technology** i. Microbial biomass- based fermentation (Biofertilizer, biopesticide and Probiotics) ii. Production of Primary metabolites (Organic acids, amino acids, vitamins and enzymes) iii. Production of Secondary metabolites (Antibiotics) iv. Production of recombinant products (insulin and growth hormones) v. Production of Fermented food products (Cheese, yoghurt) vi. Microbial biotransformation (Steroid transformation)	4
4	**Strains of industrially important microorganisms:** i. Desirable characteristics of industrial strain ii. Principles and methods of primary and secondary screening iii. Master, working and seed culture; development of inoculum iv. Preservation and maintenance of industrial strains.	5
5	**Design of a Fermenter (typical CSTR Continuous stirred Tank Reactor):** Different parts and their working	2
6	**Monitoring of different fermentation parameters** (Temperature, pH, aeration, agitation, foam)	2
7	**Types of fermentations: Batch, continuous and dual**	2
8	**Media for industrial fermentations:** Constituents of media (Carbon source, nitrogen source, amino acids, vitamins, minerals, water, buffers, antifoam agents, precursors, inhibitors and inducers)	2
9	**Contamination: Sources, precautions and consequences**	1

Botany

FYBSC BOTANY

Sr/No.	Crosscutting issue	Programme	Subject	class	Name of the course	Outcome
1	**Environment and sustainability**	BSc.	**Botany**	FYBSc	PlantMorphology &Anatomy PlantLife &Utilization-I Principles ofPlantSciences IndustrialBotany PlantLife &Utilization-II PlantBreeding &SeedTechnology	Students will develop the understanding about plants with reference to Environment and conservation. It also inculcate different concepts in students mind about environmentsustainability.

- Students will develop the understanding about plants with reference to Environment and conservation. It also inculcate different concepts in students mind about environment sustainability.



CBCS: 2019-2020 F. Y. B. Sc. Botany

Savitribai Phule Pune University

(Formerly University of Pune)

Three Year B.Sc. Degree Program in Botany

(Faculty of Science & Technology)

F.Y.B.Sc. Botany

SEMESTER-I: PAPER-II

BO-112: PLANT MORPHOLOGY AND ANATOMY (30 Lectures)

CREDIT-I **15 Lectures (15 hours)**

1. MORPHOLOGY: **2 L**

1.1: Introduction, definition, descriptive and interpretative morphology.
1.2: Importance in identification, nomenclature, classification, phylogeny and Plant breeding.

2. MORPHOLOGY OF REPRODUCTIVE PARTS:

2.1: INFLORESCENCE: **3 L**

2.1.1 Introduction and definition
2.1.2 Types:
a) Racemose -Raceme, Spike, Spadix, Corymb, Umbel, Catkin and Capitulum.
b) Cymose -Solitary, Monochasial- Helicoid and scorpiod; Dichasial and Polychasial.
c) Special types -Verticillaster, Cyathium and Hypanthodium.
2.1.3 Significance

2.2: FLOWER: **7 L**

2.2.1 Introduction and definition
2.2.2 Parts of a typical flower: Bract, Pedicel, Thalamus- forms, Perianth- Calyx and Corolla, Androecium and Gynoecium.
2.2.3 Symmetry: Actinomorphic and zygomorphic, Sexuality- Unisexual ands bisexual, Insertion of floral whorls on thalamus- Hypogyny, Epigyny and perigyny, Merous condition-Trimerous, tetrmerous and pentamerous.
2.2.4 Floral whorls:
a) **Calyx:** Nature- Polysepalous, Gamosepalous; Aestivation- types, Modifications of Calyx- Pappus, Petaloid and Spurred.
b) **Corolla:** Forms of Corolla-
i) Polypetalous- Cruciform and Papilionaceous.
ii) Gamopetalous- Infundibuliform, Bilabiate, Tubular and Campanulate.
iii) Aestivation- types and significance.
c) **Perianth:** Nature- Polytepalous, Gamotepalous.
d) **Androecium:** Structure of typical stamen, Variations- cohesion and adhesion.
e) **Gynoecium:** Structure of typical carpel, number, position, cohesion and adhesion; placentation- types and significance.

2.3: FRUITS: **3 L**

2.3.1 Introduction and definition
2.3.2 Types of fruits:
a) **Simple:** Indehiscent - Achene, Cypsela, Nut and Caryopsis.
Dehiscent - Legume, Follicle and Capsule,
b) **Fleshy:** Drupe, Berry, Hespiridium and Pepo.
c) **Aggregate:** Etaerio of Berries and Etaerio of Follicles.
d) **Multiple fruits:** Syconus and Sorosis.

CREDIT- II **15 Lectures (15 Hours)**

3. ANATOMY: **2 L**

3.1 Introduction and definition

3.2 Importance in Taxonomy, Physiology, Ecological interpretations, Pharmacongnosy and Wood identification.

4. TYPES OF TISSUES: **8 L**

Outline with brief description, simple and complex tissues.

4.1: **Meristmatic tissues:** Meristem, characters and types based on origin, position and plane of division, functions.

4.2: **Permanent tissues:** Simple tissues - parenchyma, collenchymas, chlorenchyma and sclerenchyma.

4.3: **Complex/Vascular tissues:** Components of xylem and phloem, types of vascular bundles and functions.

4.4: **Epidermal tissues:** Epidermis, structure of typical stomata, trichomes, motor cells; functions.

5. INTERNAL ORGANIZATION OF PRIMARY PLANT BODY: **5 L**

5.1: Internal structure of dicotyledon and monocotyledon root.

5.2: Internal structure of dicotyledon and monocotyledon stem.

5.3: Internal structure of dicotyledon and monocotyledon leaf.

REFERENCES:

1. Chandurkar, P.J. (1989). Plant Anatomy. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
2. Dutta, A.C. (2003). Botany for Degree students. Oxford University Press, New Delhi.
3. Eames, J. and Mc. Daniels (1994). An Introduction to Plant Anatomy. Tata McGraw Hill Publishing Comp., New Delhi.
4. Esau, K. (1993). Plant Anatomy. Wiley Eastern Ltd. New Delhi.
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7. Gangulee, Das and Dutta (2002). College Botany. Vol. I. New Central Book Agency, Kolkata.
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9. Naik, V.N. (1994). Taxonomy of Angiosperms. Tata McGraw Hill Publishing Comp., New Delhi.
10. Pandey, B.P. (2007). Plant Anatomy. S. Chand and Co. Ltd. New Delhi.
11. Pandey, B.P. (2009). A Text Book of Botany- Angiosperms. S. Chand and Co. Ltd. New Delhi.
12. Radford, Albert E. (1986). Fundamentals of Plant Systematics. Publ. Harper and Row, New York.
13. Saxena, A.K. and Sarabhai, R.P. (1968). A Text Book of Botany. Vol. III. Ratan Prakashan mandir, Agra.
14. Sharma, O.P. (1993). Plant Taxonomy. 2nd Edition, McGraw Hill Education, New Delhi.
15. Singh, Gurucharan (2005). Systematics- Theory and Practice. Oxford IBH.
16. Sutaria, R.N.A. Text Book of Systematic Botany.
17. Tayal, M.S. (2012). Plant Anatomy. Rastogi Publications.

SEMESTER-II: PAPER-I

BO-121: PLANT LIFE AND UTILIZATION-II (30 Lectures)

CREDIT-I **15 Lectures (15 hours)**

1. **INTRODUCTION:** Introduction to plant diversity- Pteridophytes, Gymnosperms and Angiosperms with reference to vascular plants. 3 L
2. **PTERIDOPHYTES:** General characters, Outline classification according to Sporne (1976) up to classes with reasons. Life cycle of *Nephrolepis* w.r.t. Habit, habitat, distribution, morphology, anatomy of stem and leaf, Reproduction – vegetative and sexual. 10 L
3. Utilization and economic importance of Pteridophytes. 2 L

CREDIT-II **15 Lectures (15 hours)**

1. **GYMNOSPERMS:** General characters, Outline classification according to Sporne (1977) up to classes with reasons. Life cycle of *Cycas* w.r.t. Habit, Habitat, Distribution, Morphology and Anatomy of Stem, leaf and reproductive organs- Male cone, Microsporophyll, microspores and megasporophyll, megaspore; structure of seed; Utilization and economic importance of gymnosperms. 8 L
2. **ANGIOSPERMS:** General characters, Outline of classification of Bentham and Hooker's system up to series, comparative account of monocotyledons and dicotyledons. 4L
3. Utilization and economic importance of Angiosperms: In food, fodder, fibers, horticulture and medicines. 3L

REFERENCES:

1. Bendre, Ashok and Kumar, Ashok (1993). A Text Book of Practical Botany, Rastogy Publications, Meerut.
2. Chamberlain, C.J. (1934). Gymnosperms- Structure and Evolution. Chicago.
3. Coulter, J.M. and Chamberlain, C.J. (1917). Morphology of Gymnosperms. Chicago.
4. Davis, P.H. and Heywood, V.H. (1963). Principles of Angiosperms taxonomy. Oliver and Boyd Publ. London.
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6. Eames, E.J. (1983). Morphology of Vascular Plants. Standard University Press.
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8. Naik, V.N. (1994). Taxonomy of Angiosperms. Tata McGraw Hill Publishing Comp., New Delhi.
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10. Rashid, A. (1999). An Introduction to Pteridophyta. Vikas Publishing House Pvt. Ltd. New Delhi.
11. Sharma, O.P. (1990). Text Book of Pteridophyta. McMillan India Ltd. Delhi.
12. Singh, V. and Jain, D.K. (2010). Taxonomy of Angiosperms. Rastogy Publications, Meerut.

SEMESTER-II: PAPER-II

BO-122: PRINCIPLES OF PLANT SCIENCE (30 Lectures)

CREDIT-1: PLANT PHYSIOLOGY AND CELL BIOLOGY

15 Lectures (15 Hours)

1. Introduction, definition and scope of plant physiology. 1 L
2. Diffusion – definition, importance of diffusion in plants, imbibition as a special type of diffusion. 1 L
3. Osmosis – definition, types of solutions (hypotonic, isotonic, hypertonic), endosmosis, exo-osmosis, osmotic pressure, turgor pressure, wall pressure, importance of osmosis in plants. 2 L
4. Plasmolysis – definition, mechanism and significance. 1 L
5. Plant growth - introduction, phases of growth, factors affecting growth, 2 L
6. Structure of plant cell, differences between prokaryotic and eukaryotic cell. 2 L
7. Plant cell wall – components of primary cell wall, structure and functions. 1 L
8. Ultrastructure and functions of chloroplast 2 L
9. Cell cycle in plants- importance of cell cycle in plants, divisional stages of mitosis and meiosis. 3 L

CREDIT-II: MOLECULAR BIOLOGY (15 Lectures) 15 Hours

1. Introduction and scope of molecular biology, central dogma of molecular biology. 2 L
2. Structure of DNA, nucleoside and nucleotide 2 L
3. Watson Crick model of DNA and its characteristic features, types of DNA (A, B and Z DNA). 3 L
4. Types of chromosomes. 2 L
5. Structure and types of RNA. 3 L
6. DNA replication- Types of replication (conservative, semi-conservative and dispersive), enzymes involved, leading and lagging strands, Okazaki fragments. 3 L

REFERENCES:

1. Buchanan, B.B, Gruissem, W. and Jones, R.L (2000). Biochemistry and Molecular Biology of Plants. American Society of Plant Physiologists Maryland, USA.
2. Cooper, G.M. and Hausman, R.E. (2007). The Cell: Molecular Approach 4th Edition, Sinauer Associates, USA.
3. David, Nelson and Cox, Michael (2007). Lehninger Principles of Biochemistry. W.H. Freeman and Company. New York.
4. Devlin, R.M. (1983). Fundamentals of Plant Physiology. Mc. Millan, New York.
5. Dutta, A.C. (2000). A Class Book of Botany. Oxford University Press, UK.
6. Hopkins, William G. (1995). Introduction to Plant Physiology. Publ. John Wiley and Sons, Inc.

SY B.Sc. Botany

Sr/No.	Crosscutting issue	Program me	Subject	class	Name of the course	Course Outcome
1	**Environment and sustainability**	BSc.	**Botany**	SYBSc	PlantBiotechnology TaxonomyofAngiosperms& PlantCommunity PlantPhysiology, Plantanatomy &Embryology	Students will develop the understanding about plant physiology, plant biotechnology, taxonomy , plant embryology with reference to metabolism, respiration which affect the environment.

CBCS: 2020-2021 S. Y. B. Sc. Botany

Savitribai Phule Pune University

(Formerly University of Pune)

Three Year B.Sc. Degree Program in Botany

(Faculty of Science & Technology)

S.Y.B.Sc Botany

S.Y.B.Sc. Botany CBCS Pattern
(Semester III, Paper I) 2020-2021
BO 231: Taxonomy of Angiosperms and Plant Ecology - 2 Credits (30 Lectures)

Sr. No.	Topic Details	No. of Lectures
	Credit-I	**15**
1.	**Introduction to Angiosperms Taxonomy** Definition, scope, objectives and importance of taxonomy Exploration, Description, Identification, Nomenclature and classification Concept of Systematics with brief historical background	02
2.	**Systems of classification** Comparative account of various systems of classification Artificial system- Carl Linnaeus Natural system- Bentham and Hooker Phylogenetic system- Engler and Prantl APG system- A brief review	05
3.	**Study of Plant Families** Study of following families with reference to systematic position (As per Bentham and Hooker's system of classification), salient features, floral formula, floral diagram and any five examples with their economic importance – Annonaceae, Brassicaceae, Myrtaceaee, Rubiaceae, Solanaceae, Apocynaceae, Nyctaginaceae and Amaryllidaceae	08
	Credit-II	**15**
4.	**Botanical Nomenclature** Concept of nomenclature, brief history, Binomial nomenclature International Code for Nomenclature of Algae, Fungi and Plants (ICN)- Principles, Rules and Recommendations; 'Type' specimen and its types (Holotype, Paratype, Isotype, Lectotype, Neotype). Concept of Typification. Ranks and endings of taxa names, Coining of Genus and Species names Single, double and multiple authority citations	05
5.	**Introduction to ecology** Definition, concept, scope, and interdisciplinary approach, autecology and synecology. Species diversity: definition, concept, scope, and types: Alpha, Beta and Gamma diversity. Methods of vegetation sampling: quadrat method, transect method, plot less method Genetic Diversity: definition, nature and origin of genetic variations Species Diversity: definition, origin of species diversity, diversity indices, species abundance Ecosystem Diversity: definition, major ecosystem types of the world, Hotspots in India – concept and basis of 'hotspot' identification.	06
6.	**Ecological grouping of the plants** Ecological grouping of the plants with reference to their significance of adaptive external and internal features: a) Hydrophytes, b) Mesophytes c) Xerophytes d) Halophytes with examples.	04

S.Y.B.Sc. Botany CBCS Pattern
(Semester III, Paper II) 2020-2021
BO 232: Plant Physiology - 2 Credits (30 Lectures)

Credit I:

1. Introduction to Plant Physiology **2L**
Scope and applications of plant physiology

2. Absorption of water **3L**
2.1 Role of water in plants
2.2 Mechanisms of water absorption with respect to crop plants
2.3 Factors affecting rate of water absorption

3. Ascent of sap **3L**
3.1 Introduction and definition.
3.2 Transpiration pull or cohesion-tension theory, evidences and objections
3.3 Factors affecting ascent of sap

4. Transpiration **7L**
4.1 Definition
4.2 Types of transpiration – cuticular, lenticular and stomatal
4.3 Structure of stomata
4.4 Mechanism of opening and closing of stomata –Steward's hypothesis, active K+ transport mechanism
4.5 Factors affecting the rate of transpiration
4.6 Significance of transpiration
4.7 Antitranspirants
4.8 Guttation
4.9 Exudation

Credit II:

5. Nitrogen metabolism **7L**
5.1 Introduction and role of nitrogen in plants
5.2 Nitrogen fixation by *Rhizobium* and BGA
5.2.1 Symbiotic nitrogen fixation, nitrogenase enzyme- structure and function
5.2.2 Non-symbiotic nitrogen fixation
5.3 Importance and production technique of BGA
5.4 Denitrification, ammonification and nitrification
5.5 Reductive amination and transamination

6. Seed dormancy and germination **4L**
6.1 Definition, types of seed dormancy and germination
6.2 Methods to break seed dormancy
6.3 Metabolic changes during seed germination
6.4 Role of phytohormones to improve seed germination
6.5 Vigor Index

7. Physiology of flowering **4L**
7.1 Photoperiodism – Concept, definition, short day plants, long day plants and day neutral plants.

SEMESTER IV

S.Y.B.Sc. Botany CBCS Pattern
(Semester IV, Paper I) 2020-2021
BO 241: Plant Anatomy and Embryology- 2 Credits (30 Lectures)

Credit-I Plant anatomy: (15 Lectures)

1. Introduction **2L**
- 1.1 Definition
- 1.2 Scope of plant anatomy

2. Epidermal tissue system **3L**
- 2.1 Structure, types and functions of epidermis
- 2.2 Structure, types and functions of Stomata
- 2.3 Epidermal outgrowths- non-glandular and glandular
- 2.4 Motor cells

3. Mechanical tissue system **3L**
- 3.1 Principles involved in distribution of mechanical tissues with one example each
  - a) Inflexibility,
  - b) Incompressibility,
  - c) Inextensibility and
  - d) Shearing stress
- 3.2 Vascular tissue system: Structure and function of xylem, phloem and cambium

4. Normal secondary growth **3L**
- 4.1 Introduction
- 4.2 Normal secondary growth in dicotyledonous stem
- 4.3 Development of annual rings, periderm, bark, tyloses and lenticel

5. Anomalous secondary growth **4L**
- 5.1 Introduction
- 5.2 Causes of anomalous secondary growth
- 5.3 Anomalous secondary growth in:
  - a) Dicotyledonous stem (*Bignonia*),
  - b) Dicotyledonous root (*Raphanus*),
  - c) Monocotyledonous stem (*Dracaena*)

Credit-II Plant Embryology (15 Lectures)

7. Introduction **1L**
- 7.1 Definition and scope of plant embryology

8. Microsporangium and male gametophyte **4L**
- 8.1 Structure of tetrasporangiate anther
- 8.2 Types of tapetum
- 8.3 Sporogenous tissue
- 8.4 Microsporogenesis: process and its types
- 8.5 Types of microspore tetrad
- 8.6 Male gametophyte: structure and development of male gametophyte

9 Megasporangium and female gametophyte **4L**

9.1 Structure
9.2 Types of ovules
9.3 Types of megaspore tetrads
9.4 Female gametophyte: structure of typical embryo sac
9.5 Types of embryo sacs – monosporic, bisporic and tetrasporic

10. Pollination and Fertilization: **3L**

10.1 Introduction and definition
10.2 Types of pollination
10.3 Germination of pollen grain
10.4 Entry of pollen tube- porogamy, mesogamy and chalazogamy
10.5 Double fertilization and its significance.

11. Endosperm and embryo **3L**

11.1 Endosperm: Types – nuclear, helobial and cellular.
11.2 Structure of Dicotyledonous and Monocotyledonous embryo.

References:

1. Plant Anatomy, Chandurkar P J, Plant Anatomy Oxford and IBH publication Co. New Delhi 1971
2. B P Pandey, Plant Anatomy. S Chand and Co. Ltd, New Delhi 1978
3. Greulach V A and Adams J E Plant- An introduction to Modern Biology, Toppen Co. Ltd, Tokyo,
4. Eams and Mc Daniel,An Introduction to Plant Anatomy, McGraw –Hill Book Co. Ltd and Kogakusha Co, Tokyo, Japan
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6. Esau, Plant Anatomy, Wiley Toppan Co. California, USA
7. Pijush Roy, Plant Anatomy. New Central Book Agency Ltd, Kolkata
8. Pandey S N and Ajanta Chadha, Plant Anatomy and Embryology, Vikas Publishing House, Pvt, Ltd, New Delhi
9. Bhojwani S S and Bhatnagar S P, An Embryology of Angiosperms
10. Maheshwari P, An introduction to Embryology of Angiosperm
11. Nair P K K Essentials of Palynology.

S.Y.B.Sc. Botany CBCS Pattern
(Semester IV, Paper II) 2020-2021
BO 242: Plant Biotechnology (2 Cr- 30 Lectures)

Credit I:

Chapter 1 Introduction to Plant Biotechnology 3L

1.1 History and definition
1.2 Scope and importance of plant biotechnology
1.3 Current status of biotechnology in India.

Chapter 2 Plant Tissue Culture 8L

2.1 Concept of plant tissue culture and cellular totipotency
2.2 Basic techniques: Types of culture, Media preparation, sterilization, inoculation, incubation, hardening
2.3Applications with reference to: Micropropagation, Somaclonal variation, Haploid production, Protoplast fusion & Somatic hybrids, Embryo rescue, Production of secondary metabolites.
2.4 Commercial Plant Tissue culture laboratories in Maharashtra and India.

Chapter 3 Single Cell Protein (SCP) 4L

3.1 Concept and definition
3.2 Importance of proteins in diet
3.3 Production of SCP from *Spirulina* and Yeast
3.4 Importance & acceptability of SCP

Credit II:

Chapter 4 Plant Genetic Engineering 5L

4.1 Introduction, concept
4.2 Tools of genetic engineering (restriction enzymes, ligases, plasmid vectors)
4.3 Gene cloning Technique
4.4 Applications of plant genetic engineering: insect pest resistance, abiotic stress tolerance, herbicide resistance

Chapter 5 Genomics, Proteomics and Bioinformatics 5L

5.1 Genomics- concept, types, methods used for whole genome sequencing
5.2 Proteomics-concept, types, methods used in proteome analysis
5.3 Bioinformatics-concept, database and its classification, data retrieval tools.

Chapter 6 Bioremediation 2L

6.1 Introduction and concept
6.2 Microbial remediation
6.3 Phytoremediation

Chapter 7 Biofuel technology 3L

7.1 Definition, Concept and types of Renewable and nonrenewable energy sources
7.2 Definition and concept of Biogas, Bioethanol, Biobutanol, Biodiesel & Biohydrogen

TY B.Sc. Botany

Sr/No.	Crosscutting issue	Programme	Subject	class	Name of the course	Outcome
1	**Environment and sustainability**	BSc.	**Botany**	TYBSc	Genetics&Evolution CryptogamicBotany Spermatophyta&Paleobotany ComputationalBotany Plant Pathology Medicinal&EconomicBotany Evolution and Population genetics Plant Ecology& Biodiversity PlantBreeding &SeedTechnology	Students gets the idea about important of every plant in the nature conservation. Evolution helps us to predict the environmental changes and the future prospects of conservation. Computational Botany make aware students about the specific computer based models for checking the environmental changes.

T.Y.B.Sc. Botany CBCS Pattern

(Semester V, Paper I) 2020-2021

BO 351: Cryptogamic Botany (Algae and Fungi)- 2 Credits (30 Lectures)

Sr. No.	Topic Details	No. of Lectures
	Credit-I Alagae	**15**
1.	Introduction: Cryptogams- meaning. Types- Lower Cryptogams, brief Review with examples	**01**
2.	Algae: General characters, distribution, Thallus organization, habit and Habitat reproduction and Classification (G.M.Smith 1955) up to classes.	**04**
3.	Study of life cycle of algae with reference to taxonomic position, Occurrence, Thallus structure, and reproduction of *Nostoc, Oedogonium Chara, Sargassum* and *Batrachospermum*.	**08**
4	Economic importance of algae- Role in industry, agriculture, fodder and medicine.	**02**
	Credit-II Fungi	**15**
5	Fungi: General characters, Habit and habitats, thallus organization, cell wall composition, nutrition and Classification. (Alexopoulos and Mims 1979) up to classes.	**03**
6.	Study of life cycle of fungi with reference to taxonomic position, thallus structure, and reproduction of *Mucor (Zygomycotina), Saccharomyces (Ascomycotina), Puccinia (Basidiomycotina), Penecillium and Cercospore (Deuteromycotina) [Two members of Deutero.]*	**08**
7.	Symbiotic Associations - Lichens, Mycorrhiza and their significance	**04**

Suggested readings:

1. Vashistha B. R. et al., Botany for degree students-Algae
2. Das, Datta and Gangulee-College Botany Vol. I
3. Sharma, O.P. –Algae
4. Kumar H.D. 1988. Introductory Phycology. Affiliated East-West Press Ltd New Delhi.
5. Vashishta B.R. et al., Botany for degree students- Fungi
6. Sharma, P.D.-The Fungi

T.Y.B.Sc. Botany CBCS Pattern
(Semester V, Paper III) 2020-2021
BO 353: Spermatophyta and Paleobotany - 2 Credits (30 Lectures)

Sr. No.	Topic Details	No. of Lectures
	Credit-I ANGIOSPERMS	**15**
1.	**Origin of angiosperms:** with reference to time, place and ancestry- 1) Pseudanthial theory 2) Transitional-Combinational Theory	02
2.	**Speciation & Endemism** Species concept (Biological, Taxonomic & Phylogenetic Species Concept), Speciation (Allopatric, Sympatric & Parapatric), Endemism and its types (Palaeoendemism, Holoendemism and Neoendemism)	04
3.	**Classification:** Outline, Merit and Demerits of Cronquist's System and APG IV system of classification. Study of following families with reference to systematic position (As per Bentham & Hooker), Diagnostic characters, floral formula, floral diagram and any five examples with their economic importance – Nymphaeaceae, Oleaceae, Amaranthaceae, Cannaceae	06
4	**Herbaria and Botanical Gardens** Functions of Herbarium, Important herbaria (World: Kew herbarium; India: Central National Herbarium, Kolkata). Botanic gardens of the world (Royal Botanic Garden, Kew) and India	03
	Credit-II GYMNOSPERMS and PALEOBOTANY	**15**

6	Introduction, general characters, economic importance and classification according to Chamberlain (1934).	02
7.	Study of life cycle of Pinus and Gnetum with reference to distribution, morphology, anatomy, reproduction, gametophyte, sporophyte, seed structure and alternation of generations.	10
8.	Fossil- Definition, process of fossil formation, types of fossils.-Impression, Compression, Petrifaction, Pith cast and Coal ball.	03

Suggested readings:

1. Cronquist, A. 1968. The Evolution and Classification of Flowering Plants. Thomas Nel and Sons, Ltd. London.
2. Lawrence, G.H.M 1951. Taxonomy of Vascular Plants.
3. Singh V. and D.K Jain, 1981 Taxonomy of Angiosperms. Rastogi Publication, Meerut.
4. Swingle D.B. 1946. A Text book of Systematic Botany. Mc Graw Hill Book Co. New York.
5. Takhtajan A. 1969. Flowering Plants; Origin and Disposal.
6. Pande B.P 1997. Taxonomy of Angiosperms. S.Chand.
7. Gurucharan Singh 2005- Plant systematics
8. Naik V.N. - Taxonomy of Angiosperms.
9. Shivrajan V.V. -Introduction to Principles plant taxonomy
10. V. V. Sivarajan, N. K. P. Robson 1991. Introduction to the Principles of Plant Taxonomy IInd Edi.
11. Sharma O.P. Plant Taxonomy Tata McGraw-Hill
12. Botanical Journal of the Linnean Society, 2009, 161, 105–121.
13. http://www.mobot.org/MOBOT/research/APweb/

6	Introduction, general characters, economic importance and classification according to Chamberlain (1934).	02
7.	Study of life cycle of Pinus and Gnetum with reference to distribution, morphology, anatomy, reproduction, gametophyte, sporophyte, seed structure and alternation of generations.	10
8.	Fossil- Definition, process of fossil formation, types of fossils.-Impression, Compression, Petrifaction, Pith cast and Coal ball.	03

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1. Cronquist, A. 1968. The Evolution and Classification of Flowering Plants. Thomas Nel and Sons, Ltd. London.
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3. Singh V. and D.K Jain, 1981 Taxonomy of Angiosperms. Rastogi Publication, Meerut.
4. Swingle D.B. 1946. A Text book of Systematic Botany. Mc Graw Hill Book Co. New York.
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12. Botanical Journal of the Linnean Society, 2009, 161, 105–121.
13. http://www.mobot.org/MOBOT/research/APweb/

T.Y.B.Sc. Botany CBCS Pattern
(Semester V, Paper IV) 2020-2021
BO 354: Plant Ecology - 2 Credits (30 Lectures)

Sr. No.	Topic Details	No. of Lectures
	Credit-I	**15**
1.	Introduction, interrelationship between the living world and the environment, levels of organization, components and dynamism of ecosystem, homeostasis, niche concept, concept of limiting factors	03
2.	**Biogeography:** Floristic realms, speciation and its types, biogeographic regions of India,Plant indicators	03

3.	**Population ecology:**Definition, characteristics, population growth form, r and k selection	03
4.	**Community ecology:** Introduction and Definition, community structure, physiognomy, Raunkiaer's life form classification, keystone species, edge and ecotone	04
5.	**Biogeochemical cycles:** The carbon cycle, Nitrogen cycle, Phosphorus cycle, and Hydrologic cycle	02
	Credit-II	15
6.	**Ecological Impact Assessment (EIA)** Introduction, Historical Review of EIA, Objectives of EIA, Stages of EIA process: Screening; Scoping; Baseline study; Impact prediction and assessment; Mitigation; Producing Environmental Impact Statement (EIS); EIS review; Decision making; Monitoring, Compliance and Enforcement; Benefits of EIA.	05
7.	**Environmental Audit** Meaning and concept, need, objectives, benefits, types, audit protocol, process, certification, personnel environmental audit	04
8.	**Remote Sensing** Definition, basic principles, process of ecological data acquisition and interpretation, global positioning system,application of remote sensing in ecology.	04
9.	**Ecological management:** Concepts, sustainable development, sustainability indicators	2

T.Y.B.Sc. Botany CBCS Pattern
(Semester V, Paper V) 2020-2021
BO 355: Cell and Molecular Biology - 2 Credits (30 Lectures)

Sr. No.	Topic Details	No. of Lectures
	Credit-I Cell Biology	15
1.	**Introduction to Cell Biology:** Definition, Brief history of Cell Biology, Units of measurement for cell, Interdisciplinary nature of Cell Biology	01
2	**Cell organelles:** Ultrastructure, components and functions of Cell wall and cell membranes, mitochondria and Chloroplast, endoplasmic Reticulum, Golgi apparatus, Lysosomes, Vacuoles, Peroxisomes & Glyoxysomes	06
3.	**Nucleus:** Morphology and ultrastructure of nucleus, nucleolus and nucleolar organizer Nuclear envelope – structure of nuclear pore complex, transport of molecules across nuclear envelope.	03
4.	Chromosomes: Euchromatin and heterochromatin Histones, Packing of DNA into chromosomes in eukaryotes, Karyotype and ideogram, Polytene chromosomes and lampbrush chromosomes.	03
5	**Cell signaling:** Introduction and definition, Signaling molecules and receptors, Calcium signaling pathway in plants	02
	Credit-II Molecular Biology	15
5	**Genetic material** DNA: historical perspective from 1953 to 2020, Griffith's and Avery's transformation experiments, Hershey-Chase bacteriophage experiment.	02

T.Y.B.Sc. Botany CBCS Pattern
(Semester V, Paper VI) 2020-2021
BO 356: Genetics – 2 Credits (30 Lectures)

Sr. No.	Topic Details	No. of Lectures
	Credit-I	**15**
1.	**Introduction to Genetics.** History, Definition, Concept, branches and applications of Genetics.	**01**
2	**Mendelism** Genetical terminology, Monohybrid cross, Law of dominance, Incomplete dominance, Law of segregation, Dihybrid cross, Dihybrid ratio, Law of	**04**

	independent assortment, Back cross and Test cross.	
3.	**Neo Mendelism (Gene Interaction)** Genetic interaction, Epistatic interactions –supplementary gene (recessive epistasis 9:3:4), Inhibitory genes (13:3), Masking genes (12:3:1), Non-Epistatic inter-allelic genetic interactions-Complementary genes (9:7), Duplicate genes (15:1)	03
4.	**Multiple alleles** Definition, Concept, Characters of multiple alleles, Examples of multiple alleles – Blood group in human and self-incompatibility in Nicotiana.	02
5	**Linkage, Recombination and Crossing Over** Linkage- Definition and Types, Crossing over: Definition and Types, Construction of a linkage map by two point test cross and three point test cross, Recombination: Concept, definition and types	04
6	**Mutation:** Concept, definition and types	01
	Credit-II	15
5	**Numerical alterations of chromosomes.:** Euploidy, Aneuploidy-Concept and Types, Aneuploidy in Plants and Human, Polyploidy in Plants & Animals, Induced Polyploidy, applications of Polyploidy	03
6.	**Structural alterations of chromosomes.:**Types, cytology and genetic effects of Deletion, Duplication Inversion and Translocation with examples.	04
7.	**Cytoplasmic & Quantitative Inheritance:** Concept of quantitative inheritance, Inheritance of quantitative trait in Maize (Cob length), Cytoplasmic inheritance Definition and concept, Chloroplast- Varigation in Four O'clock plants, Mitochondria- Petite mutants in yeast.	04
8	**Sex Linked Inheritance:** Concept of Sex chromosomes and autosomes, Inheritance of X- linked genes –Inheritance of colour blindness in humans, Inheritance of Y-linked (Holandric genes) in humans, Sex influenced genes, Sex-limited genes.	04

T.Y.B.Sc. Botany CBCS Pattern
(Semester VI, Paper III) 2020-2021
BO 363: Plant Pathology - 2 Credits (30 Lectures)

Sr. No.	Topic Details	No. of Lectures
	Credit-I	**15**
1.	**Fundamentals of Plant Pathology**: Introduction, Important terminology- Incitants, Host, Symptoms, Parasite, Pathogen, Inoculum, Penetration, Infection, Incubation, Disease. Economic importance of plant diseases, History of plant pathology, Introduction to Indian Agriculture Research Institute (IARI),International Crop Research Institute for Semi-Arid Tropics (ICRISAT), Contribution of Anton De Bary and Prof. B.B. Mundkur.	02
2	Disease Development: Concept of disease cycle, Inoculation, Prepenetration, Penetration, Infection, Dissemination. Epidemics-Forms,	02

Savitribai Phule Pune University *Page 20*

PDEA's

Annasaheb Magar Mahavidyalaya

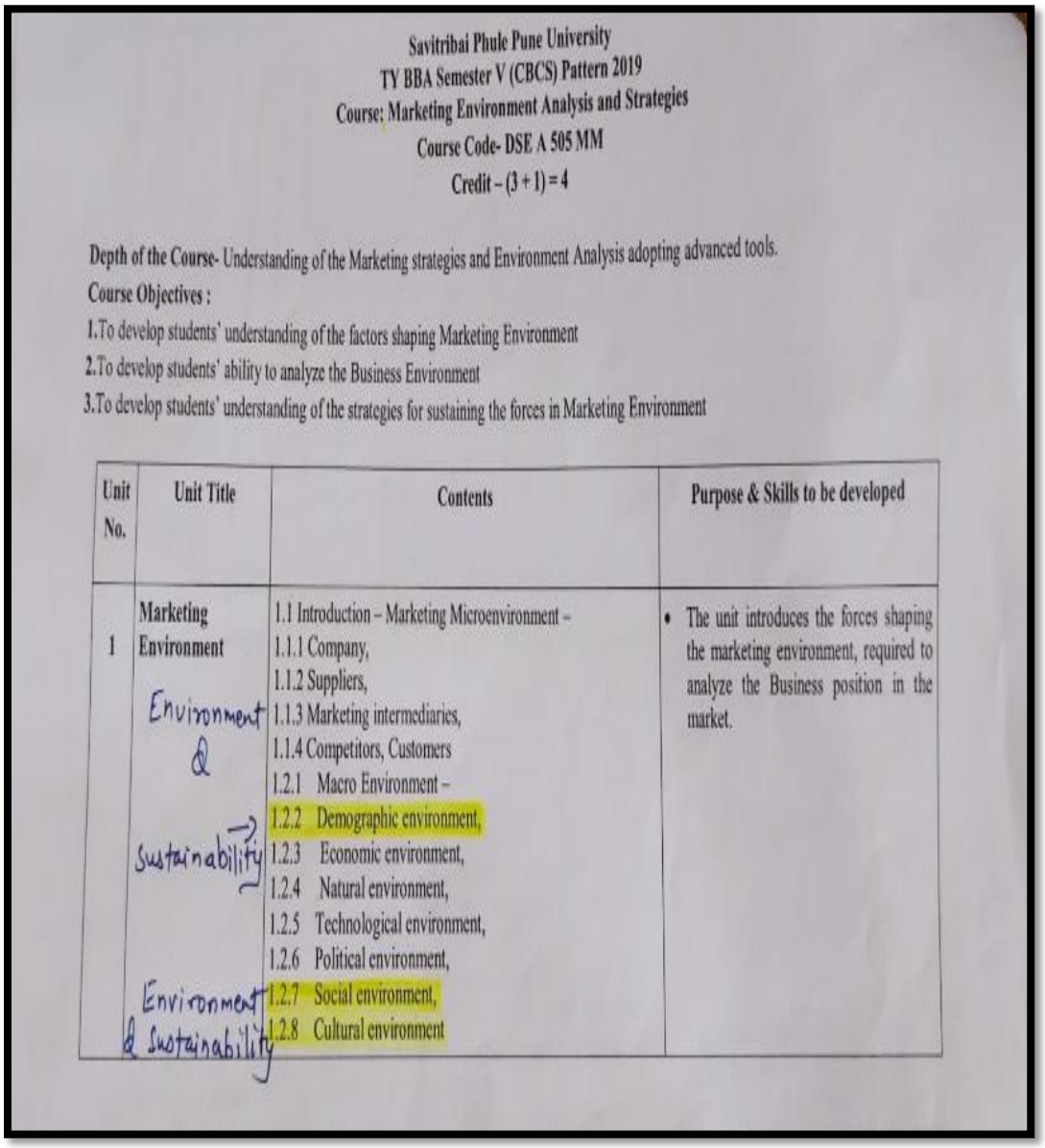
Hadapsar Pune - 411028

BBA

TYBBA

Sr/No.	Crosscutting issue	Programme	Subject	class	Name of the course	Outcome
1	**Environment and sustainability**	BBA	**Marketing environment analysis and strategies**	TYBBA	1.Marketing environment	The unit introduces the forces shaping the marketing environment, required to analyze the business position in the market
					3.Marketing research	The module reveals the relevance of marketing research for finalizing strategies

- Students learns Environment from marketing angle which is required to analyze the business position in the market.



Savitribai Phule Pune University
TY BBA Semester V (CBCS) Pattern 2019
Course: Marketing Environment Analysis and Strategies
Course Code- DSE A 505 MM
Credit – (3 + 1) = 4

Depth of the Course- Understanding of the Marketing strategies and Environment Analysis adopting advanced tools.

Course Objectives :

1.To develop students' understanding of the factors shaping Marketing Environment
2.To develop students' ability to analyze the Business Environment
3.To develop students' understanding of the strategies for sustaining the forces in Marketing Environment

Unit No.	Unit Title	Contents	Purpose & Skills to be developed
1	Marketing Environment Environment & Sustainability → Environment & Sustainability	1.1 Introduction – Marketing Microenvironment – 1.1.1 Company, 1.1.2 Suppliers, 1.1.3 Marketing intermediaries, 1.1.4 Competitors, Customers 1.2.1 Macro Environment – 1.2.2 Demographic environment, 1.2.3 Economic environment, 1.2.4 Natural environment, 1.2.5 Technological environment, 1.2.6 Political environment, 1.2.7 Social environment, 1.2.8 Cultural environment	• The unit introduces the forces shaping the marketing environment, required to analyze the Business position in the market.

2	Business Analysis	2.1 Business Analysis process, 2.2 Analysis Parameters - Industry Size, Segment Size, Category Size, Segment wise contribution, Growth Patterns, 2.3 Growth Drivers, Competition CSF, KPI, BCG matrix, Porter's 5 force analysis 2.4 Data Analytics – Role of Data Analytics in Business Analysis. Scope, and its importance concerning marketing strategies. 2.4.1 Types of Data Analytics. 2.4.2 Challenges of Business Data Analytics.	• The unit aims to help understand the Business Analysis process.
3	Marketing Research Environments & Sustainability	3.1 Need of Marketing research, 3.2 marketing research process, 3.3 Consumer Buying Behavior, Marketing environment affecting consumer-buying behaviour 3.4 Big Data Analytics – Concerning Consumer Psychologies	• The module reveals the relevance of Marketing Research for finalizing the marketing strategies.
4	Marketing Strategies	4.1 Introduction, 4.2 Product and Pricing Strategies, 4.3 Market Segmentation and Targeting Strategies, 4.4 Distribution Strategies, Communication Strategies. 4.5 Digital Marketing Strategies – Importance, and Challenges.	• The module focuses on the marketing strategies in the various business domains.

BCA(Science)

S.Y.B.C.A.(Science)- Environmental Studies

Sr.No	Crosscutting issue	Programme	Subject	Class	Name of the course	Contentin thecourse	Course Outcome
1	Environment and Sustainability	BCA	Environmental Studies	S.Y.BCA(Sci)	Environmental Studies	Multidisciplinary nature of environmental studies, Concept of sustainability Energy flow in an ecosystem , Deforestation, energy sources, biological diversity , Ecosystem	Understand key concepts from economic system Understand and evaluate the global scale of environmental problems Recognize the ecological basis for regional and global environmental issues

- Students understand key concepts from economic system
- Studentsunderstand and evaluate the global scale of environmental problems
- Students recognize the ecological basis for regional and global environmental issues

Syllabusfor

Ability EnhancementCompulsoryCourse(AECC–EnvironmentStudies)(2credit)forundergraduate(For All Faculties - Second Year - Semester III)

ItisasperUGCguidelinesandframing -

Unit 1 : Introduction to environmental studies

- Multidisciplinarynature ofenvironmentalstudies;
- Scopeandimportance;Conceptof sustainabilityandsustainabledevelopment.

(2 lectures)

Unit2:Ecosystems

- What is an ecosystem? Structure andfunctionofecosystem;Energyflowinanecosystem: food chains, food webs and ecological succession. Case studies of the following ecosystems :

a) Forestecosystem
b) Grasslandecosystem
c) Desertecosystem
d) Aquaticecosystems(ponds,streams,lakes,rivers, oceans, estuaries)

(8lectures)

Unit3:NaturalResources:Renewable andNon-renewableResources

- Landresourcesandlandusechange;Landdegradation,soilerosionanddesertification.

• Deforestation:Causesandimpactsdue tomining,dambuildingonenvironment,forests, biodiversity and tribal populations.
• Water:Useandover-exploitationofsurfaceandgroundwater,floods,droughtsconflictsover water (international & inter-state).
• Energyresources:Renewableandnonrenewableenergysources,useofalternateenergy sources, growing energy needs, case studies.

(10 lectures)

Unit4:BiodiversityandConservation

• Levelsofbiological diversity: genetic,species and ecosystemdiversity;Biogeographiczonesof India; Biodiversity patterns and global biodiversity hot spots
• Indiaasamega-biodiversitynation;EndangeredandendemicspeciesofIndia
• Threatstobiodiversity:Habitatloss,poaching ofwildlife,man-wildlifeconflicts,biological invasions; Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity.
• Ecosystemandbiodiversityservices:Ecological,economic,social,ethical,aesthetic and Informational value.

(10lectures)

References:

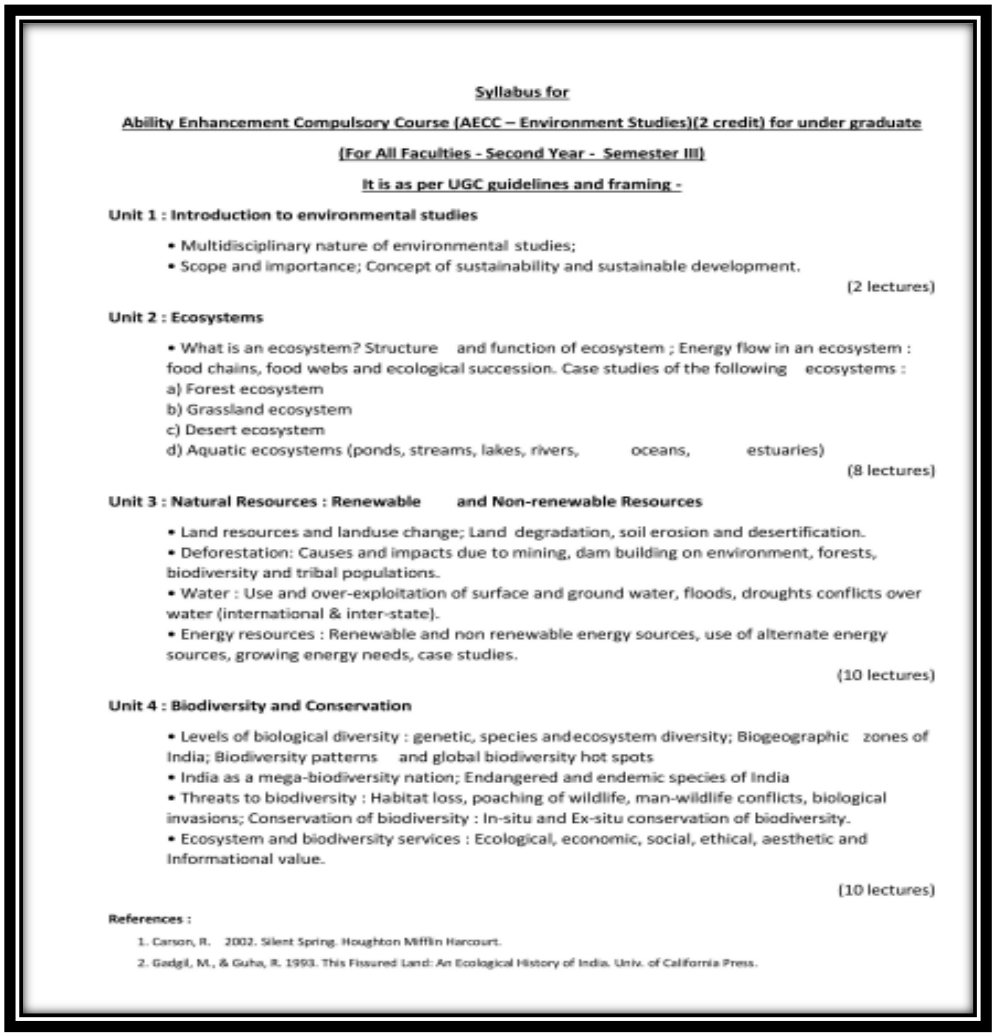
1. Carson,R.2002.Silent Spring.HoughtonMifflinHarcourt.
2. Gadgil,M.,&Guha,R.1993.ThisFissuredLand:AnEcologicalHistoryofIndia. Univ.ofCaliforniaPress.

S.Y.B.A., S.Y.B.COM, S.Y.B.SC Environmental Studies

All UG

Sr.No	Crosscutting issue	Programme	Subject	Class	Name of the course	Contentin thecourse	Course Outcome
1	Environment and Sustainability	B.Sc, B.A. and B.Com	Environmental Studies	S.Y.B.Sc , S.Y. B.A., S.Y. B.Com	Environmental Studies	Environmental studies, Ecosystem, , Natural resources, Biodiversity conservation, Environmental pollution, Environmental policies and practices, Human communities and the Environment	Understand key concepts from economic system Understand and evaluate the global scale of environmental problems Recognize the ecological basis for regional and global environmental issues

- Students understand key concepts from economic system
- Studentsunderstand and evaluate the global scale of environmental problems
- Students recognize the ecological basis for regional and global environmental issues



Syllabus for

Ability Enhancement Compulsory Course (AECC – Environment Studies)(2 credit) for under graduate

(For All Faculties - Second Year - Semester III)

It is as per UGC guidelines and framing -

Unit 1 : Introduction to environmental studies

- Multidisciplinary nature of environmental studies;
- Scope and importance; Concept of sustainability and sustainable development.

(2 lectures)

Unit 2 : Ecosystems

- What is an ecosystem? Structure and function of ecosystem ; Energy flow in an ecosystem : food chains, food webs and ecological succession. Case studies of the following ecosystems :

a) Forest ecosystem
b) Grassland ecosystem
c) Desert ecosystem
d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

(8 lectures)

Unit 3 : Natural Resources : Renewable and Non-renewable Resources

- Land resources and landuse 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 over-exploitation 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, case studies.

(10 lectures)

Unit 4 : Biodiversity and Conservation

- Levels of biological diversity : genetic, species andecosystem diversity; Biogeographic 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.
- Ecosystem and biodiversity services : Ecological, economic, social, ethical, aesthetic and Informational value.

(10 lectures)

References :

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.

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

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

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

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

7. McCully, P. 1996. Rivers no more: the environmental effects of dams (pp. 29-64). Zed Books.

8. McNeill, John R. 2000. Something New Under the Sun: An Environmental History of the Twentieth Century.

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

10. Pepper, I.L., Gerba, C.P. & Brusseau, M.L. 2011. Environmental and Pollution Science. Academic Press.

11. Rao, M.N. & Datta, A.K. 1987. Waste Water Treatment. Oxford and IBH Publishing Co. Pvt. Ltd.

12. Raven, P.H., Hassenzahl, D.M. & Berg, L.R. 2012. Environment. 8th edition. John Wiley & Sons.

13. Rosencranz, A., Divan, S., & Noble, M.L. 2001. Environmental law and policy in India. Tripathi 1992.

14. Sengupta, R. 2003. Ecology and economics : An approach to sustainable development. OUP.

15. Singh, J.S., Singh, S.P. and Gupta, S.R. 2014. Ecology, Environmental Science and Conservation. S. Chand Publishing, New Delhi.

16. Sodhi, N.S., Gibson, L. & Raven, P.H. (eds). 2013. Conservation Biology : Voices from the Tropics. John Wiley & Sons.

17. Thapar, V. 1998. Land of the Tiger: A Natural History of the Indian Subcontinent.

18. Warren, C. E. 1971. Biology and Water Pollution Control. WB Saunders.

19. Wilson, E. O. 2006. The Creation: An appeal to save life on earth. New York : Norton.

20. World Commission on Environment and Development. 1987. Our Common Future. Oxford University Press.

Syllabus for

Ability Enhancement Compulsory Course (AECC – Environment Studies)(2 credit) for under graduate

(For All Faculties - Second Year - Semester IV)

It is as per UGC guidelines and framing -

Unit 5 : Environmental Pollution

- Environmental pollution : types, causes, effects and controls; Air, water, soil and noise pollution
- Nuclear hazards and human health risks
- Solid waste management : Control measures of urban and industrial waste.
- Pollution case studies.

(10 lectures)

Unit 6 : Environmental Policies & Practices

- Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture
- Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution) Act;

Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act. International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD).

- Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian context.

(9 lectures)

Unit 7 : Human Communities and the Environment

- Human population growth: Impacts on environment, human health and welfare.
- Resettlement and rehabilitation of project affected persons; case studies.
- Disaster management : floods, earthquake, cyclones and landslides.
- Environmental movements : Chipko, Silent valley, Bishnois of Rajasthan.
- Environmental ethics: Role of Indian and other religions and cultures in environmental conservation.
- Environmental communication and public awareness, case studies (e.g. CNG vehicles in Delhi).

(6 lectures)

Unit 8 : Field work

- Visit to an area to document environmental assets: river/ forest/ flora/fauna, etc.

- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural.
- Study of common plants, insects, birds and basic principles of identification.
- Study of simple ecosystems-pond, river, Delhi Ridge, etc.

(Equal to 5 lectures)

References :

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.
3. Gleeson, B. and Low, N. (eds.) 1999. Global Ethics and Environment, London, Routledge.
4. Gleick, P. H. 1993. Water in Crisis. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.
5. Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll. Principles of Conservation Biology. Sunderland: Sinauer Associates, 2006.
6. Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from India's Himalaya dams. Science, 339 : 36-37.
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10. Pepper, I.L., Gerba, C.P. & Brusseau, M.L. 2011. Environmental and Pollution Science. Academic Press.
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13. Rosencranz, A., Divan, S., & Noble, M.L. 2001. Environmental law and policy in India. Tripathi 1992.
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Ph.D. in Environmental Sciences

Ph.D. in Environmental Science

Sr.No	Crosscutting issue	Programme	Subject	Class	Name of the course	Contentin thecourse	Course Outcome
1	Environmental Science	Ph.D.	Environmental Science	Ph.D.	Environmental Science	Environmental studies, Ecosystem, Ecology, Natural resources, Biodiversity conservation, Environmental pollution, Environmental policies and practices, Human communities and the Environment	Students do Ph.D. in different necessary topic towards conservation of Biota and also gives solution to Environmental problems

Approval letter for Ph.D. in Environmental Science

सावित्रीबाई फुले पुणे विद्यापीठ
(पूर्वीचे पुणे विद्यापीठ)

दूरध्वनी क्रमांक :
०२०-२५६२ ११८८
२५६२ ११५६
२५६२ ११५७
२५६२ ११९३

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शैक्षणिक विभाग
गणेशखिंड, पुणे-४११००७.

टेलिग्राफ : 'पुनिपुणे'
फॅक्स : ०२०-२५६९१२३३
वेबसाइट : www.unipune.ac.in
इ-मेल : affiliation@pun.unipune.ac.in

संदर्भ क्र.:CA/550 दि.:18/04/2022

मा.प्राचार्य/संचालक,
पुणे जिल्हा शिक्षण मंडळ अण्णासाहेब मगर महाविद्यालय
पत्ता: महादेव नगर हडपसर ता.: पुणे (महानगर पालिका हद्द)
जि: पुणे पिनकोड: 411028

विषय:- संशोधन केंद्राच्या नव्याने मान्यतेबाबत...
संदर्भ क्र :- १) भारतीय राजपत्र क्रं.२७८ दि. ५ जुलै २०१६ च्या संशोधन केंद्रा संदर्भात निर्गमित केलेली नियमावली.
२) सीए/३०९३ परिपत्रक क्र.१२२/२०१६ दि. ०३.०८.२०१६

महोदय,
उपरोक्त विषय व संदर्भाकीत परिपत्रकातील नियमांच्या अधीन राहून विद्यापीठ अधिकार मंडळाने घेतलेल्या निर्णयानुसार आपणास कळविण्यात येते की, आपल्या महाविद्यालयात खालील रकान्यात नमूद केलेल्या विषयांच्या पीएच.डी. संशोधन केंद्राच्या/संस्थेच्या अभ्यासक्रमास नव्याने मान्यता देण्यात येत आहे.
तथापि,संशोधन केंद्रांना खालील बाबींचे अनुपालन करणे आवश्यक आहे.
१)दर सहा महिन्याचा पदव्युतर संशोधन केंद्राचा प्रगती अहवाल (Progress Report) शैक्षणिक विभागास सादर करणे आवश्यक आहे.
२)खालील नमूद कालावधीसाठी संशोधन केंद्रामध्ये रकान्यात नमूद केलेल्या विषयांचे पीएच.डी. संशोधन मार्गदर्शक असणे आवश्यक आहे.

अनु.क्र.	अभ्यासक्रमाचा तपशील	विद्याशाखा	शैक्षणिक वर्ष	संलग्नीकरणाचा प्रकार
1	विज्ञान व तंत्रज्ञान - पीएच.डी. एन्वाइरन्मेंट सायन्स	विज्ञान	२०२२-२०२३,	नवीन अभ्यासक्रम

कळावे,

(स. द. डावखर)
उपकुलसचिव
संलग्नता कक्ष

Links of the courses which integrate the Environment and Sustainability into the curriculum.

SR/NO.	SUBJECT	CLASS	LINK
1	ECONOMICS	FYBA	http://collegecirculars.unipune.ac.in/sites/documents/Syllabus%202019/F.Y.B.A.%20Economics%20Syllabus_24.062019.pdf
		SYBA	http://collegecirculars.unipune.ac.in/sites/documents/Syllabus2020/S.Y.B.A.%20Economics%20Syllabus%20from%202020_06.072020.pdf
		TYBA	http://collegecirculars.unipune.ac.in/sites/documents/Syllabus2021/TYBA%20Economics%20Syllabus%202021-22(1_01.07.2021.pdf
2	PSYCHOLOGY	FYBA	http://collegecirculars.unipune.ac.in/sites/documents/Syllabus%202019/FYBA%20Psychology%202019_15.072019.pdf
		TYBA	http://collegecirculars.unipune.ac.in/sites/documents/Syllabus2021/TYBA%20Psychology%20Syllabus%202021-22-Revised_27012022.pdf
3	BVOC (Tourism)	FY,SY,TY	https://docs.google.com/document/d/1HpzPLmqYIkNUaoKNoTvnolMpxcL75lYj/edit?usp=drive_link&ouid=115551644254398988658&rtpof=true&sd=true
4	GEOGRAPHY	FYBA	http://collegecirculars.unipune.ac.in/sites/documents/Syllabus%202019/F.Y.B.A.%20(Geography)_08102022.pdf
		SYBA	http://collegecirculars.unipune.ac.in/sites/documents/Syllabus2020/S.Y.B.A.%20(Geography)_08102022.pdf
		TYBA	http://collegecirculars.unipune.ac.in/sites/documents/Syllabus2021/T.Y.B.A.%20(Geography)_08102022.pdf
5	POLITICAL SCIENCE	TYBA	http://collegecirculars.unipune.ac.in/sites/documents/Syllabus2021/TYBA%20Political%20Science%20and%20Public%20Administration%20Syllabus_02.07.2021.pdf
		MA PART I	http://collegecirculars.unipune.ac.in/sites/documents/Syllabus%202019/MA%20Part-

			I%20%20Political%20Science%20Syllabus%20(Sem%20I%20and%20II)_27.012021.pdf
		MA PART I	http://collegecirculars.unipune.ac.in/sites/documents/Syllabus2020/M.A.%20Political%20Science%20(Sem%20III%20-%20IV)%20Syllabus%202020-21_03.072020.pdf
6	ENVIRONMENTAL SCIENCE	M.Sc	https://acrobat.adobe.com/link/review?uri=urn:aaid:scds:US:14b9fb3d-b764-36c5-abdc-8469520b2031
7	ZOOLOGY	FYBSC	http://collegecirculars.unipune.ac.in/sites/documents/Syllabus%202019/F.Y.B.Sc.%20Zoology_24.062019.pdf
		SYBSC	http://collegecirculars.unipune.ac.in/sites/documents/Syllabus2020/S.Y.B.Sc.%20(Zoology)_17.062020.pdf
		TYBSC	http://collegecirculars.unipune.ac.in/sites/documents/Syllabus2021/T.Y.B.Sc.%20(Zoology)_02.07.2021.pdf
8	MICROBIOLOGY	FYMICRO	http://collegecirculars.unipune.ac.in/sites/documents/Syllabus%202019/F.%20Y.%20B.%20Sc.%20(Microbiology)_14.09.2021.pdf
		SYMICRO	http://collegecirculars.unipune.ac.in/sites/documents/Syllabus2020/S.%20Y.%20B.%20Sc.%20(Microbiology)14_09_2021.pdf
9	BOTANY	FYBSC	http://collegecirculars.unipune.ac.in/sites/documents/Syllabus%202019/F%20Y%20B%20Sc%20Botany%20(revised)_19.062020.pdf
		SYBSC	http://collegecirculars.unipune.ac.in/sites/documents/Syllabus2020/S%20Y%20B%20Sc%20Botany_15.062020.pdf
		TYBSC	http://collegecirculars.unipune.ac.in/sites/documents/Syllabus2021/T.Y.B.Sc.%20(Botany)_14.08.2021.pdf
10	BBA	TYBBA	http://collegecirculars.unipune.ac.in/sites/documents/Syllabus2022/BBA%20Equivalence%20CBCS%202019%20_2_25022022.pdf
11	BCA(SCI)	SYBCA	https://acrobat.adobe.com/link/review?uri=urn:aaid:scds:US:14b9fb3d-b764-36c5-abdc-8469520b2031
12	All UG	B.SC, B.A. and B.COM	https://www.ugc.gov.in/pdfnews/6980464_AECC_Envt.-Studies_UGC.pdf
13	Environmental Science	Ph.D.	https://pdeaamcollege.s3.us-east-2.amazonaws.com/NaacSSRCriaDoc/847_Approval%20Letter%20Ph.%20D.%20Environmental%20Science%20(2).pdf