

SCHOOL OF SCIENCES

(FORMERLY, SCHOOL OF ARCHITECTURE, SCIENCE AND TECHNOLOGY)

YASHWANTRAO CHAVAN MAHARASHTRA OPEN UNIVERSITY





SCHOOL OF SCIENCES, YCMOU, NASHIK – 422 222, MS, INDIA

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ABOUT THE PROGRAMME

PROGRAMME CODE: V100

PROGRAMME NAME: B.SC. (BOTANY, CHEMISTRY, ZOOLOGY)

This B.Sc. programme is uniquely designed to impart essential knowledge in all major areas of Botany, Chemistry and Zoology. This programme offers an exciting opportunity for specialization in Botany, Chemistry and Zoology to solve different real-life problems. The programme contents of total 06 semesters are a carefully selected blend of theory and practical which prepares students for specialist professional employment, research in academia, and various industries for broader applications. Learner centric curriculum is designed in adherence to acquire knowledge and skills with valuable experiences through hands-on activities, Practical and much more.

OBJECTIVES, OUTCOMES & SCOPE OF THE PROGRAMME

This programme is designed to achieve following objectives, outcomes and scope.

Objectives: The objectives of this programme are -

- Interdisciplinary Knowledge: The program intends to equip students with a broad understanding of botany, chemistry, and zoology, emphasizing the interconnectedness of these fields and how they contribute to the study of living organisms and the environment.
- Scientific Inquiry: The program aims to nurture students' curiosity and encourage them to engage in scientific inquiry, conducting research, and formulating hypotheses in the context of the natural sciences.
- Laboratory Skills: Students are expected to acquire practical laboratory skills, including experimental design, data collection, analysis, and interpretation, allowing them to conduct scientific investigations effectively.
- Critical Thinking: The program seeks to enhance students' critical thinking abilities, enabling them to evaluate scientific information, analyze problems, and propose evidence-based solutions.
- Communication Skills: Students will be encouraged to develop effective communication skills, both written and oral, enabling them to articulate scientific concepts and research findings clearly and concisely.
- Environmental Awareness: The program aims to foster an understanding of the ecological impact of human activities and the importance of sustainable practices in addressing environmental challenges.
- Professional Development: The program endeavors to prepare students for further education or careers in fields related to botany, chemistry, zoology, ecology, environmental science, or other scientific disciplines.

Program Outcomes:

After successful completion of this Programme, students will be able to -

- Demonstrate Knowledge: Exhibit a comprehensive understanding of fundamental concepts, theories, and principles in botany, chemistry, and zoology.
- Conduct Research: Apply scientific methods and conduct research in one or more of the three disciplines, independently or as part of a team.
- Lab Proficiency: Demonstrate proficiency in laboratory techniques, including using equipment, handling specimens, and conducting experiments safely and accurately.
- Critical Analysis: Analyze and evaluate scientific literature, research findings, and experimental data to draw meaningful conclusions.
- Interdisciplinary Approach: Integrate knowledge from botany, chemistry, and zoology to address complex scientific problems and explore interdisciplinary connections.
- Communication Skills: Communicate scientific concepts effectively through written reports, presentations, and discussions tailored to different audiences.
- Environmental Awareness: Recognize and articulate the importance of environmental conservation and sustainability, considering the impact of human activities on ecosystems.
- Ethical Practices: Understand and apply ethical guidelines in scientific research and maintain integrity in conducting experiments and reporting results.
- Career Readiness: Be prepared for further studies in specialized fields or pursue careers in research, academia, environmental conservation, healthcare, pharmaceuticals, or related industries.

Scope of the Programme: After successful completion of this Programme, students may get opportunities in various fields/sectors to work as –

- With this degree, students will be able to make their career in the field of Biology as a Mycologist, Taxonomist, Biology Content Developer etc.
- There are several areas, both in the private as well as in the public sector, where a graduate may start working.
- Teaching in colleges.
- Scientific officers in research institutions like CSIR ICAR and R&D private companies and industries
- Public services(KAS, KPS, IAS, IFS, IPS)
- Jobs in food, chemical industries and pharmaceutical companies
- Candidates find jobs as Animal Behaviourist, Conservationist, Wildlife Biologist, Zoo Curator, Wildlife Educator, Zoology faculty, Forensic experts, lab technicians, Veterinarians.
- Job opportunities in allied sectors [Engineering, Social sciences,

Political sciences, Humanities, Photography etc.]

- Educate about the environment
- Inculcation of research attitude
- Inculcation of entrepreneurship
- Develop understanding of complex relationships between humans and nature
- Create awareness about various environmental problems
- Perceive higher education and research in the same field

MODE OF EDUCATION

This Degree Programme will be offered in Open and Distance Learning (ODL) Mode as defined in "UGC Open and Distance Learning Programmes and Online Programmes Regulations,2020" published in the gazette notification by dated 4th Sept 2020 by the UGC as specified below.

"Open and Distance Learning Mode means a mode of providing flexible learning opportunities by overcoming separation of teacher and learner using a variety of media, including print, electronic, online and occasional interactive face-to-face meetings with the learners or Learner Support Services to deliver teaching-learning experiences, including practical or work experiences"

BASIC INFORMATION

- 1. **Mode of Education**: Open and Distance Learning (ODL)Mode
- 2. **Minimum Programme Duration**: 3 years after HSC (12th) or Equivalent pass with Biology
- 3. **Maximum Programme Duration:** 5 years from the date of admission to the UG programme, also referred as Valid Registration Period.
- 4. Learner Support Centers/ Study Centers: Univ. approved/ recognized Senior Science Colleges/Institutes
- 5. Medium of Instruction: English
- 6. **Attendance**: Minimum 80% attendance for all type of courses.
- 7. **Profile of Prospective Students**: In-Service Science Teachers from Schools / 12th pass students with Biology subject and Equivalent
- 8. **Teaching-Learning**: 16 working weeks per semester
- 9. Total Teaching-Learning Support: 660 Hours in each semester.
- 10. Total Courses: 07 courses (subjects) per Semesters
- 11. **Total Credits:** 132 Credits. As per UGC norms 1 Credit means 30 hours of study efforts required to gain learning of particular content of each credit.

12. **Semester Credits**: 22 Credits in each semester (16 credits for Theory and 06 credits for Practical/ Project Activity).

Semester	Theory Course each of 4 Credits	ourse each of reditsPractical Course each of 2 Credits	
01	4	3	22
02	4	3	22
03	4	3	22
04	4	3	22
05	4	3	22
06	4	3	22
Total	24	18	132

13. Total Courses and Credit Points:

- 14. **Passing**: Min 40% or better marks
- 15. **Continuous Assessment**: Continuous Assessment conducted for Continuous evaluation during teaching-learning for 20% Weightage.
- 16. **End Exam**: End Examination conducted for Summative evaluation of the student for 80% Weightage.
- 17. **Certification**: Min "P(Pass)" or better grade in all 42 courses (subjects) of total 132 credits at Semesters 01-06
- 18. **Curriculum Design**: Learner centric curriculum is designed to enable professional ability, employability and skill enhancement.
- 19. **Approval/Equivalence Status**: UGC and DEB recognized and approved [AY 2023 and onwards] with UGC/DEB letter F.No. 1-2/2021 (DEB-I), Dated: 02.08.2021, available at <u>https://www.ugc.ac.in/pdfnews/4204139 HEI-Recognition-list-02-08-2021.pdf</u>

Admission Eligibility	On yCertification EligibilityFees and Deposit / Year UF is payable for "2 Semesters in an 			Cear nesters in an niversity at the n
Candidates with	V100: Min 40% or better marks in total	Descri	ption	Amount in INR ₹
10+2(12th)42Science Pass00(with Biology)at S	12th) e Pass 3iology)42 courses (subjects) of total 132 credits at Semesters 01 to 06.Manda Tuition Fee	Mandatory Fees		608
		Tuition	USF	2,100
		Fee	LSCF	4,000
		End Exam Fees		2,920
		AAFA		9,628

ELIGIBILITY AND FEES

PROGRAMME STRUCTURE

V100-B.Sc.(BCZ) {2023 Pattern}:-"Botany", "Chemistry" and "Zoology" Total Semesters: 06, Total Credits: 132, Total Number of Courses: 24 Theory+18 Practical= 42							
Cat →Sem	AECC /	Botany		Chemistry		Zoology	
Ļ	SEC (04 Credits)	Theory (04 Credits)	Practical (02 Credits)	Theory (04 Credits)	Practical (02 Credits)	Theory (04 Credits)	Practical (02 Credits)
Sem–1 22CR	AEC111: English Communica tion (T)	BNY101: Plant Diversity (T)	BNY102: Plant Diversity (P)	CHE104: Basic Inorganic & Organic Chemistry (T)	CHE105: Basic Inorganic & Organic Chemistry (P)	ZGY101: Animal Diversity (T)	ZGY102: Animal Diversity (P)
Sem-2 22CR	AEC121: Environmen tal Science (T)	BNY106: Plant Ecology and Taxonomy (T)	BNY107: Plant Ecology and Taxonomy (P)	CHE106: Physical & Organic Chemistry-1 (T)	CHE107: Physical & Organic Chemistry-1 (P)	ZGY106: Anatomy & Development al Biology of Vertebrates (T)	ZGY107: Anatomy & Development al Biology of Vertebrates (P)
Sem-3 22CR	SEC311: IT & ELearning Skills (T)	BNY201: Diversity & Morphology of Angiosperms (T)	BNY202: Diversity & Morphology of Angiosperms (P)	CHE201: Physical & Organic Chemistry-2 (T)	CHE202: Physical & Organic Chemistry-2 (P)	ZGY201: Animal Physiology and Ecology (T)	ZGY201: Animal Physiology and Ecology (P)
Sem-4 22CR	SEC411: Research Methodolog y (T)	BNY206: Plant Systematic- Algae, Fungi & Bryophytes (T)	BNY207: Plant Systematic- Algae, Fungi & Bryophytes (P)	CHE206: Physical & Inorganic Chemistry (T)	CHE207: Physical & Inorganic Chemistry (P)	ZGY206: Genetics and Evolutionary Biology (T)	ZGY207: Genetics and Evolutionary Biology (P)
Sem-5 22CR	SEC511: Financial and Investment Skills (T)	BNY301: Cell Biology and Genetics (T)	BNY302: Cell Biology and Genetics (P)	CHE301: Molecular Modeling Chemistry (T)	CHE302: Molecular Modeling Chemistry (P)	ZGY301: Mammalian Histology (T)	ZGY302: Mammalian Histology (P)
Sem-6 22CR	SEC611: Personality and Career Skills (T)	BNY307: Analytical Techniques in Plant Sciences & Horticulture (T)	BNY308: Analytical Techniques in Plant Sciences & Horticulture (P)	CHE307: Green Chemistry (T)	CHE308: Green Chemistry (P)	ZGY307 : Pest Management & Parasitology (T)	ZGY308 : Pest Management & Parasitology (P)

TEACHING-LEARNING SCHEME:

Description	Total 24 Theory Courses in Programme
	Total 18 Practical Courses in Programme
Face-to-face Counseling Sessions	12 hrs each of 01 clock hour duration for each
for interaction, problem solving	Theory Course of 4 Credits
and conduction of practical	12 hrs each of 02 Clock hour duration for each
activities at Study Center	Practical/ Activity Course of 2 Credits
Delivery of Information	(1) 42 e-Books in SLM format: 30 Hours/for each
	(2) 52 Video lecture: 10 Hours already developed by the
	University for AEC111, AEC211, SEC411 Courses
Self-Study, Learning Evaluation	Solving Problems, Self-Tests, SAQs and Exploring more Details
and Feedback	on Text-Book: 30 Hours
Total Study Hours	(24 x 120 = 2880 Hours + 18 x 60 = 1080 Hours) = 3960 Hours
(Including F-2-F Counselling)	

SEMESTERS AND COURSES

SN	Code	Name	CA	EE	ТМ	Туре	CR	Min%
		Semester 01					1	
01	AEC111	English Communication	20	80	100	Т	4	40%
02	BNY101	Plant diversity	20	80	100	Т	4	40%
03	BNY102	Plant diversity	10	40	50	Р	2	40%
04	CHE104	Basic Inorganic & Organic Chemistry	20	80	100	Т	4	40%
05	CHE105	Basic Inorganic & Organic Chemistry	10	40	50	Р	2	40%
06	ZGY101	Animal Diversity	20	80	100	Т	4	40%
07	ZGY102	Animal Diversity	10	40	50	Р	2	40%
	Semester 02							
08	AEC211	Environmental Science	20	80	100	Т	4	40%
09	BNY106	Plant Ecology and Taxonomy	20	80	100	Т	4	40%
10	BNY107	Plant Ecology and Taxonomy	10	40	50	Р	2	40%
11	CHE106	Physical & Organic Chemistry – 1	20	80	100	Т	4	40%
12	CHE107	Physical & Organic Chemistry - 1	10	40	50	Р	2	40%
13	ZGY106	Anatomy and Developmental Biology of Vertebrates	20	80	100	Т	4	40%
14	ZGY107	Anatomy and Developmental Biology of Vertebrates	10	40	50	Р	2	40%
		Semester 03						
15	SEC311	IT and ELearning Skills	20	80	100	Т	4	40%
16	BNY201	Diversity & Morphology of Angiosperms	20	80	100	Т	4	40%
17	BNY202	Diversity & Morphology of Angiosperms	10	40	50	Р	2	40%

18	CHE201	Physical & Organic Chemistry - 2	20	80	100	Т	4	40%
19	CHE202	Physical & Organic Chemistry – 2	10	40	50	Р	2	40%
20	ZGY201	Animal Physiology and Ecology	20	80	100	Т	4	40%
21	ZGY202	Animal Physiology and Ecology	10	40	50	Р	2	40%
		Semester 04						
22	SEC411	Research Methodology	20	80	100	Т	4	40%
23	BNY206	Plant Systematics-Algae, Fungi & Bryophytes	20	80	100	Т	4	40%
24	BNY207	Plant Systematics-Algae, Fungi & Bryophytes	10	40	50	Р	2	40%
25	CHE206	Physical & Inorganic Chemistry	20	80	100	Т	4	40%
26	CHE207	Physical & Inorganic Chemistry	10	40	50	Р	2	40%
27	ZGY206	Genetics and Evolutionary Biology	20	80	100	Т	4	40%
28	ZGY207	Genetics and Evolutionary Biology	10	40	50	Р	2	40%
		Semester 05			_		_	
29	SEC511	Financial and Investment Skills	20	80	100	Т	4	40%
30	BNY 301	Cell Biology and Genetics	20	80	100	Т	4	40%
31	BNY302	Cell Biology and Genetics	10	40	50	Р	2	40%
32	CHE301	Molecular Modeling Chemistry	20	80	100	Т	4	40%
33	CHE302	Molecular Modeling Chemistry	10	40	50	Р	2	40%
34	ZGY301	Mammalian Histology	20	80	100	Т	4	40%
35	ZGY302	Mammalian Histology	10	40	50	Р	2	40%
		Semester 06						
36	SEC611	Personality and Career Skills	20	80	100	Т	4	40%
37	BNY307	Analytical Techniques in Plant Sciences & Horticulture	20	80	100	Т	4	40%
38	BNY308	Analytical Techniques in Plant Sciences & Horticulture	10	40	50	Р	2	40%
39	CHE307	Green Chemistry	20	80	100	Т	4	40%
40	CHE308	Green Chemistry	10	40	50	Р	2	40%
41	ZGY307	Pest Management & Parasitology	20	80	100	Т	4	40%
42	ZGY308	Pest Management & Parasitology	10	40	50	Р	2	40%

GRADING SYSTEM

- 1. "Absolute Grading": the marks are converted to grades based on pre-determined class intervals.
- 2. "**Letter Grade**": It is an index of the performance of students in a said programme. Grades are denoted by letters O, A+, A, B+, B, C, P and F.
- 3. "**Grade Point**": It is a numerical weight allotted to each letter grade on a 10-point scale. Grade Point shall be "o (Zero)" for Letter Grade "Ab" and "F". The marks scored by the examinee shall be converted into grade points by dividing the marks scored in the aggregate and dividing the resulting number by maximum marks, multiplying the result by ten, retaining the integer part (ignore the fractional part). Thus if a person has secured 56 marks out of 100 marks in aggregate for a course, we get (56/100) x10 which is 5.6.Ignoring the fraction, we get 5 as the grade point.

Marks Obtained out of 100	Grade Point	Semester GPA / Programme CGPA Semester/ Programme	% of Marks	Alpha-Sign / Letter Grade Result
90 –100	10	9.00 - 10.00	90.0 - 100	O (Outstanding)
80 - 89.99	9	8.00 - < 9.00	80.0 - < 90.0	A+ (Excellent)
70 - 79.99	8	7.00 - < 8.00	70.0 - < 80.0	A (Very Good)
60 - 69.99	7	6.00 - < 7.00	60.0 - < 70.0	B+ (Good)
55 - 59.99	6	5.50 - < 6.00	55.0 - < 60.0	B (Above Average)
50 - 54.99	5	5.00 - < 5.50	50.0 - < 55.0	C (Average)
40 - 49.99	4	4.00 - < 5.00	40.0 - < 50.0	P (Pass)
0 - 39.99	0	Below 4.00	Below 40	F (Fail)
		Ab (Absent)	-	Absent

- 4. "**Credit Point**": It is the product of grade point and number of credits for a course.
- 5. "Semester Grade Point Average (SGPA)": It is a measure of performance of work done in a semester. It is ratio of total credit points secured by a student in various courses registered in a semester and the total course credits taken during that semester. It shall be expressed upto two decimal places.
- 6. **"Cumulative Grade Point Average (CGPA)**": It is a measure of overall cumulative performance of a student overall semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places.
- 7. **"Transcript or Grade Card or Certificate**": Based on the grades earned, a grade certificate shall be issued to all the registered students after every semester. The grade certificate will display the course details (code, title, number of credits, grade secured) along with SGPA of that semester and CGPA earned till that semester.

EVALUATION PATTERN

- 1. Separate and independent passing @ 40% in EE and (CAT+EE) shall be essential for Theory and Practical component of each course. "CA, EE and Total marks" shall be separately reported for each course in the transcript or mark-statement.
- 2. **Only 1 attempt** for CAT and EE for **each** course shall be allowed in **each** semester.
- 3. Only best of past performance shall be reported in transcript to mark statement.

4. Total student evaluation for

- a. **Each** semester shall be for **550** marks.
- b. **Each** year shall be for **1100** marks
- c. **Each** regular UG degree shall be for **3300** marks

Course Type →	Theory	Р	ractical	
Evaluation Type ↓				
Continuous Assessment	"Continuous Assessment Test	"Continuous As	sessment Tes	st (CAT)"of
Test (CAT) with following	(CAT)" of total 20 marks and	total <mark>10</mark> marks	and 02 "Sł	nort Answer
all features:	04 "Short Answer Questions	Questions (SAQs)" each of 05 1	marks (<mark>2 out</mark>
Close-Book, With	(SAQs)" each of 05 marks (4	of 3 SAQs on <u>a</u>	ll 04 Credits), during 20
Supervision (02) At specified	out of 5 SAQs on <u>all 04</u>	Minutes. (20%)		
Date, Time and Exam Center	Credits), during 45 Minutes.			
(03) During May or Nov	(20%)			
End Examination (EE)	In first 2 Weeks of Dec or	In last 2 Weeks of	f Dec or Jun of	each year, <mark>at</mark>
with following all features:	Jun of each year, "End	and by respec	tive Study C	Center "End
Close-Book, With	Examination (EE)"of total	Examination (EI	E)"of total <mark>40</mark> M	Iarks (<mark>80%</mark>)
Supervision(02) At specified	80 Marks and 16 "Short			
Date, Time and Exam Center	Answer Questions (SAQs)"			
(03) During Jun or Dec	each of 05 marks (4 out of			
	5 SAQs on <u>each_</u> Credit),			
	during 180 Minutes.(80%)			
			By Internal Examiner	By External Examiner
		Activity Journal	Out of Max 10 Marks	Out of Max 10Marks
		Activity	Out of Max	Out of Max
		Completion	05 Marks	05 Marks
		Viva-Voce	Out of Max 05 Marks	Out of Max 05 Marks
		Total Marks	Out of Max 20Marks	Out of Max 20Marks

SUCCESSFUL COMPLETION OF COURSE OR PROGRAMME

- "Successful Completion of the Course" means either course is exempted or student gets minimum specified or better grade, either in end examination of that course or by credit transfer. A student obtaining grade "F" shall be considered failed and will be required to reappear in the examination. The student obtained minimum "P" (Pass) letter grade required for successful completion of the each course.
- 2. "Successful Completion of the Programme "means–all courses at all semesters are successfully completed and the student obtained "P" (Pass) letter grade for all courses at all semesters along with minimum specified SGPA and CGPA.

SEMESTER 01

AEC111: ENGLISH COMMUNICATION

PROGRAMME INFORMATION

SN	Description	Details
		Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222,
1	University	Maharashtra, India
		Website: <u>http://www.ycmou.ac.in</u>
2	2 School School of Sciences	
3	Discipline	Science
4	Level	UG
5	Course Used in	V92: B.Sc (Physics, Chemistry, Mathematics) &
		V100: B.Sc (Botany, Chemistry, Zoology)

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Type
01	AEC111	English Communication	4	12	120	20	80	100	Т

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of this	The objectives of this course are–
course, student should have	 Communicate effectively
successfully completed:	 Recall and Describe the basic theories of communication
✤ 10+2 (12 th) Science Pass (with)	 Identify the four basic modes of communication
Biology)	 Define some ways communication is used
	 Identify some potential barriers to successful communication
	 Acquire and develop your telephone skills required in the business world
	 Use your cell phone in a professional manner
	 Make use of voicemail
	 Explain the terms screening, holding, and transferring phone calls

UN	Detailed S	Syllabus	of the U	U nit							Credit
	Introduct Communic	t ion : T ation	heories	of	Communicat	tion,	Types	and	modes	of	
01-01	⁰¹ Language of Communication : Personal, Barriers and Strategies, Intra Personal, Inter Personal and Group Communication										
	Speaking	Skills:	Monol	ogue,	Dialogue,	Grou	p Dis	cussion	, Effec	tive	
	Communic	ation / M	lis- Collin	nume	ation						

01-02	Understanding the Basis of Verbal Communication : Organizing Your Messages, Using Vocal Elements Effectively, Understanding Nonverbal Language, Developing Credibility, Giving and Receiving Feedback, Overcoming Barriers to Communication, Communicating Ethically, Understanding Cross-Cultural Issues	Credit 01
01-03	Working with Customers : Understanding Customer Service Basics, Communicating Empathetically, Asking Question to Understand Problems, Denying Request, Coping with Angry Customers	
01-04	Developing Professional Telephone Skills : Exploring Professional Telephone Communication, Placing Telephone Calls, Receiving Telephone Calls, Using Voice Mail, Leaving Professional Messages, Taking Calls for Other People, Screening, Holding, and Transferring Calls, Developing Cell Phone Etiquette	
01-05	Improving Informal Communication : Communicating Informally, Listening Actively, Speaking Persuasively, Negotiating Effectively, Managing Conflict, Participating in Meeting, Dealing with Office Politics, Making Proper Introductions	
00.01		
02-01	Reading and Understanding : Close Reading, Comprehension, Summary Paraphrasing, Analysis and Interpretation, Translation(from Indian language to English and vice-versa) Literary/Knowledge Texts Writing Skills : Documenting, Report Writing, Making notes, Letter Writing	
02-02	Uncovering the Secrets of Clear writing : Clarifying Written Communication, Writing Solid Sentences, Developing Effective Paragraphs, Mastering Punctuation	Credit
02-03	Communicating with E-Mail and Memos : Understanding E-Mail Message and Memos, Composing the Main Elements of Message, Creating Professional E-Mail Message, Constructing Professional Memos, Writing Request Messages, Writing Response Messages, Writing Bad- News Messages, Technology Tools	02
02-04	Developing Reports and Proposals : Understanding Reports and Proposals, Planning a Report or Proposals, Writing Proposals	
02-05	Writing for Employment : Writing Effective Cover Letters, Planning Resumes, Writing Chronological Resumes, Writing Functional Resumes, Requesting Letters of Reference, Sending Follow-Up Messages, Accepting or Rejecting Job Offers	
	Identifiers and Defining Problems. Understanding Ducklam Colving	
03-01	Analyzing Problems, Determining Causes, Simplifying Complex Problems, Identifying and Managing Risks, Avoiding Problem-Solving Traps	
03-02	Solving the Problem : Gathering and Analyzing Data, Developing Alternatives, Evaluating Options, Implementing the Solution, Monitoring and Managing the Solution, Using Adaptive Techniques, Developing Ethical Solution	Credit 03
03-03	Thinking Critically : Understanding Critical Thinking, Assessing the Credibility of an Argument, Becoming a Critical Thinker	
03-04	Group Decision Making and Problem Solving : Understanding Group Dynamics, Evolving From a Group to a Team, Using Divergent Thinking, Using Convergent Thinking, Avoiding Common Group Traps, Working with Large Group.	

04-01	Working in Groups and Teams : Understanding the Role of Team in Organizations, Defining the types of Groups and Teams, Recognizing Differences Between Groups and Teams, Ensuring Team Success, Working with Distributed Teams	
04-02	Exploring Team Roles and Processes : Recognizing the Need for Team Leadership, Selecting Team Member, Choosing the Optional Team Size, Defining Common Team Roles, Establishing Team Rules, Clarifying Team Objectives, Making Collective Decisions.	Credit 04
04-03	Building and Developing Teams : Understanding the Benefits of Working in Teams, Fostering Relationships, Overcoming Resistance, Using Team-Building Activities, Dealing with Difficult Team Member, Benefits of professional networking	
04-04	Presenting yourself Professionally : Meeting Business Casual Standards, Maintaining a Professional Wardrobe, Practicing good Grooming and Hygiene, Improving Your Speech.	
04-05	Developing Your Interpersonal Skills: Networking Professionally, Showing Basic Office Courtesies, Recovering from difficult interpersonal situations, Displaying Optimism and Enthusiasm, Developing Diplomacy Skills, Interacting with others, Respecting social protocols	

LEARNING RESOURCE DETAILS

LR Code	TitleEditionISBNAuthorYearPublish			
YCMOU SLM	eBooks	·		
AEC111-T01	English Communication -Michelle Jacobson	2016 978-8195063505 YCMOU, Nashik		
Reference Boo	oks			
AEC111-RB1	Soft Skills for Everyone – Jeff Butterfield	2010	978-81-315-1467-2 CENGAGE	

COURSE OUTCOMES

After successful completion of this course, student should be able to -

- Communicate effectively in spoken English, including pronunciation, fluency, and clarity.
- Develop strong listening skills to understand spoken English, including different accents and dialects.
- Create and deliver effective presentations, including the use of visual aids and public speaking techniques.
- Write professional documents (e.g., resumes, cover letters), participate in job interviews, and communicate effectively in workplace settings.

BNY101: PLANT DIVERSITY

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222, Maharashtra, India Website: <u>http://www.ycmou.ac.in</u>
2	School	School of Sciences
3	Discipline	Science
4	Level	UG
5	Course Used in	V100: B.Sc (Botany, Chemistry, Zoology)

PROGRAMME INFORMATION

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Туре
01	BNY101	Plant Diversity	4	12	120	20	80	100	Т

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of this course, student should have successfully completed: ✤ 10+2(12 th) Science Pass (with Biology)	 The objectives of this course are- Impart knowledge about the structure and morphology of plants. Explore the evolutionary history of plants Examine the ecological roles of plants in different ecosystems Explore specific examples of plant diversity from different regions, ecosystems, or historical periods to illustrate key concepts and themes.

UN	Detailed Syllabus of the Unit	Credit
	Viruses	
	• Discovery	
01-01	Ultra structure, replication and life cycle	
	DNA Virus with examples	
	RNA virus with examples	
	Important viral diseases of crops	
	Bacteria	
01-02	• Discovery	Credit
	General Characteristics and ultra structure of cell	01
	Grow the kinetics	
	Reproductive strategies	
	Mechanisms of horizontal gene transfer	
	Important bacterial diseases of crops	

	Algae	
01-03	General Characteristics	
	Range of habitat and thallus organization	
	Reproduction and alteration of generation	
	Heterocyst and symbiotic association	
	Economic importance of algae	
	Life-Cycles of Algae	-
01-04	Nostoc	
	Chlamvdomonas	
	• Oedogonium	
	Vaucheria	
	• Sargassum	
	Polysiphonia	
	I of other and the second s	
02-01	Fungi	
	• General, vegetative and reproductive characteristics	
	Cell wall composition	
	Range of habitat	
	Reproduction, life cycle and classification	
02-02	True Fungi	
	General Characteristics	Credit
	 Range of habitat and its significance 	
	• Life Cycle Of Rhizonus (Zygomycota) Penicillium Alternation	02
	(Ascomycota), Puccinia, Agaricus (Basidiomycota)	
02-03	Lichens-Symbiotic Associations	-
0	General characteristics	
	• E.g. crustose, foliose, fruticose	
	Habitat diversity	
	Reproduction, life cycle and importance	
02-04	Mycorrhiza	-
	• Introduction and definition	
	Ectomycorrhiza and endomycorrhiza with examples	
	Economical significance	
	Rmonhytas	
03-01	bryophytes	
	General Characteristics	
	Habitat diversity Adoptations to Lond Habit and	
	 Adaptations to Land Habit and Classification-(Un To Family) 	Credit
	Range Of Thallus Organization	Credit
	Life cycle with examples	03
03-02	Morphology, Anatomy And Reproduction of Bryophytes	
	 Morphological characteristics and anatomical peculiarities 	
	E.g. Marchantia and Funaria	
	Reproductive mechanism and alternation of generation	
	Economic importance of bryophytes with special reference to sphagnum	-
03-03	Pteridophytes	
	General characteristics, habitat and classification Concept of early land plants (Cooksenia and Phymia)	
	• Concept of carry fand plants(CookSonia and Knynia)	

	 Classification (Up To Family) Economical Importance of Pteridophytes 	
03-04	Morphology, Anatomy And Reproduction of Pteridophytes	
03 04	Morphological characteristics and anatomical peculiarities	
	• E.g. Selaginella, Equisetum and Pteris (developmental details not to be	
	included)	
	 Heterospory and seed habit 	
	Stellar evolution	
04-01	Gymnosperms	
04 01	General Characteristics and distribution	
	• Classification-(Up To Family).	
	Economical Importance	
04-02	Morphology, Anatomy And Reproduction of Gymnosperms	
04 02	Morphology, Anatomy and Reproduction of Cycas	Credit
	• Morphology, Anatomy and Reproduction of Pinus. (Developmental	04
	Details Not To Be Included).	
04-03	Morphology of Angiosperms – 1	
04 00	General Characteristics,	
	Classification-Classification (Up To Family),	
	Morphology Of Root, Stem, Leaf, Inflorescence, Flower, Fruit	
04-04	Morphology of Angiosperms – 2	
	Anatomy of Angiosperms	
	Anatomy of Root, Shoot, Leaf, Secondary Growth and its significance	
	Secondary Growth and its significance Anotomical differences between diast and monosot	
	Anatomical differences between dicot and monocot	
	(developmental details not to be included)	

LEARNING RESOURCE DETAILS

LR Code	Title Author	Edition Year	ISBN Publisher
YCMOU SLM	eBooks		
BNY101-T01			
Reference Bo	oks	1	I
BNY101-RB01	Introductory Phycology - Kumar,H.D.	1999 2nd edition	Affiliated East-West. Press Pvt. Ltd. Delhi.
BNY101-RB02	Microbiology: An Introduction - Tortora, G.J., Funke, B.R., Case, C.L.	2010 10th edition	Pearson Benjamin Cummings, U.S.A.
BNY101-RB03	Text book of Fungi & Their Allie - Sethi, I.K. and Walia, S.K.	2011	MacMillan Publishers Pvt. Ltd., Delhi.
BNY101-RB04	Introductory Mycology - Alexopoulos, C.J., Mims, C.W., Blackwell, M.	1996 4th edition	John Wiley and Sons (Asia), Singapore.
BNY101-RB05	Biology - Raven, P.H.,Johnson,G.B.,Losos,J.B.,Singer,S.R.	2005	Tata McGraw Hill, Delhi, India.
BNY101-RB06	Pteridophyta - Vashishta, P.C., Sinha, A.K., Kumar, A.,	2010	S. Chand. Delhi, India
BNY101-RB07	Gymnosperms - Bhatnagar, S.P. and Moitra, A.		New Age International (P) Ltd Publishers, New

		1996	Delhi, India.
BNY101-RB08	An introduction to Embryophyta. Vol. I. Bryophyta. - Parihar, N.S.	1991	Central Book Depot, Allahabad.

COURSE OUTCOMES

After successful completion of this course, student should be able to -

- Develop the ability to identify common plant species and understand the key features used in plant identification.
- Effectively communicate their understanding of plant diversity through written reports, presentations, and discussions.
- Acquire the foundational skills required for conducting research in plant biology or related fields.
- Recognize the importance of plant conservation and ethical considerations related to plant use and biodiversity.

BNY102: PLANT DIVERSITY

SN	Description	Details		
		Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222,		
1	University	Maharashtra, India		
		Website: <u>http://www.ycmou.ac.in</u>		
2	School	School of Sciences		
3	Discipline	Science		
4	Level	UG		
5	Course Used in	V100: B.Sc (Botany, Chemistry, Zoology)		

PROGRAMME INFORMATION

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Туре
01	BNY102	Plant Diversity	2	6	120	10	40	50	Р

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of this course, student should have successfully completed: • 10+2(12 th) Science Pass (with Biology)	 The objectives of this course are- Teach students the structure and morphology of plants. Explore the evolutionary history of plants Examine the ecological roles of plants in different ecosystems Explore specific examples of plant diversity from different regions, ecosystems, or historical periods to illustrate key concepts and themes.

UN	Detailed Syllabus of the Unit	Credit
01-01	EMs/Models of viruses – T-Phage and TMV, Line drawing/Photograph of Lytic and Lysogenic Cycle.	
01-02	Types of Bacteria from temporary/permanent slides/photographs; EM bacterium; Binary Fission; Conjugation; Structure of root nodule.	O1
01-03	Gram staining	
01-04	Study of vegetative and reproductive structures of Nostoc, Chlamydomonas (electron micrographs), Oedogonium, Vaucheria, Sargassum and Polysiphonia through temporary preparations and permanent slides.(*Sargassum-Specimen and permanent slides)	
01-05	Rhizopusand Penicillium: Asexual stage from temporary mounts and sexual structures through permanent slides.	
01-06	Alternaria: Specimens, Photographs and tease mounts.	
01-07	Puccinia: Herbarium specimens of Black Stem Rust of Wheat and infected Barberry leaves; section/tease mounts of spores on Wheat and permanent slides of both the hosts.	
01-08	Agaricus: Specimens of button stage and full grown mushroom; Sectioning of gills of	

	Agaricus.	
02-01	Lichens: Study of growth forms of lichens (Crustose, Foliose and Fruticose) ,Mycorrhiza: Ecto Mycorrhiza and Endo Mycorrhiza (Photographs)	Credit
02-02	Marchantia- Morphology of thallus, w.m. rhizoids and scales, v.s. thallus through gemmacup, w.m. gemmae (all temporary slides), v.s. antheridiophore, archegoniophore, l.s. sporophyte (all permanent slides).	02
02-03	Funaria-Morphology, w.m.leaf, rhizoids, operculum, peristome, annulus, spores (temporary slides); permanent slides showing antheridial and archegonial heads, l.s. capsule and protonema.	
02-04	Selaginella- Morphology, w.m. leaf with ligule, t.s. stem, w.m. strobilus, w.m. microsporophyll and megasporophyll (temporary slides), l.s. strobilus (permanent slide).	
02-05	Equisetum-Morphology, t.s.internode, l.s.strobilus, t.s.strobilus, w.m.sporangiophore, w.m. spores (wet and dry), (temporary slides); t.s rhizome (permanent slide).	
02-06	Pteris-Morphology, t.s.rachis, v.s.sporophyll, w.m.sporangium, w.m.spores (temporary slides), t.s.rhizome, w.m.prothallus with sex organs and youngs porophyte (permanent slide).	
02-07	Cycas-Morphology (coralloid roots, bulbil, leaf), t.s. coralloid root, t.s. rachis, v.s. leaflet,v. s. microsporophyll, w. m. spores (temporary slides), l.s. ovule, t.s. root (permanent slide).	
02-08	Pinus-Morphology (long and dwarf shoots, w.m. dwarf shoot, male and female),w.m.dwarfshoot,t.s.needle,t.s.stem,,l.s./t.s.malecone,w.m.microsporophyll,w.m. microspores (temporary slides), l.s.female cone, t.l.s. & r.l.s. stem (permanent slide).	
02-09	Study of Vegetative Morphology of Angiosperms:-root (type & modification), stem	
	study of reproductive morphology of angiosperms:- inflorescence (cymose, racemose,	
	special), nower (types, parts of nower), fruit (types), study of anatomy of primary structure in:- dicot: root, stem & leaf eg. Sunflower, monocot: root, stem & leaf eg.	
	Maize),study of anatomy of secondary structure in dicot stem e.g. Moringa	

LEARNING RESOURCE DETAILS

LR Code	Title Author	Edition Year	ISBN Publisher
YCMOU SLM	eBooks	1	
BNY102-P01			
BNY101-T01			
Reference Boo	bks		
BNY102-RB01	Introductory Phycology - Kumar,H.D.	1999 2nd edition	Affiliated East-West. Press Pvt. Ltd. Delhi.
BNY102-RB02	Microbiology: An Introduction - Tortora, G.J., Funke, B.R., Case, C.L.	2010 10th edition	Pearson Benjamin Cummings, U.S.A.
BNY102-RB03	Text book of Fungi & Their Allie - Sethi, I.K. and Walia, S.K.	2011	MacMillan Publishers Pvt. Ltd., Delhi.
BNY102-RB04	Introductory Mycology - Alexopoulos, C.J., Mims, C.W., Blackwell, M.	1996 4th edition	John Wiley and Sons (Asia), Singapore.
BNY102-RB05	Biology		Tata McGraw Hill, Delhi,

V100: B.Sc. (BCZ) Syllabus 2023 Pattern

	- Raven, P.H.,Johnson,G.B.,Losos,J.B.,Singer,S.R.	2005	India.
BNY102-RB06	Pteridophyta - Vashishta, P.C., Sinha, A.K., Kumar, A.,	2010	S. Chand. Delhi, India
BNY102-RB07	Gymnosperms - Bhatnagar, S.P. and Moitra, A.	1996	New Age International (P) Ltd Publishers, New Delhi, India.
BNY102-RB08	An introduction to Embryophyta. Vol. I. Bryophyta. - Parihar, N.S.	1991	Central Book Depot, Allahabad.

COURSE OUTCOMES

After successful completion of this course, student should be able to -

- Develop the ability to identify common plant species and understand the key features used in plant identification.
- Effectively communicate their understanding of plant diversity through written reports, presentations, and discussions.
- Acquire the foundational skills required for conducting research in plant biology or related fields.
- Recognize the importance of plant conservation and ethical considerations related to plant use and biodiversity.

CHE104: BASIC INORGANIC & ORGANIC CHEMISTRY

SN	Description	Details
		Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222,
1 Uni	University	Maharashtra, India
		Website: <u>http://www.ycmou.ac.in</u>
2	School	School of Sciences
3	Discipline	Science
4	Level	UG
_	Course Used in	V92: B.Sc (Physics, Chemistry, Mathematics) &
5	Course Oseu III	V100: B.Sc (Botany, Chemistry, Zoology)

PROGRAMME INFORMATION

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Type
01	CHE104	Basic Inorganic & Organic Chemistry	4	12	120	20	80	100	Т

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
Presumed Knowledge For successful completion of this course, student should have successfully completed:	 Learning Objectives The objectives of this course are- Describe subatomic particles Explain Thomson's atomic model, Rutherford's atomic model Define atomic number, ionic bond and atomic mass number Distinguish between isotopes and isobars Explore structure of ionic compound from the radius ratio Explain lattice energy, salvation energy
	 List general characteristics of ionic compound Explore inductive effect, electrometric effect, mesomeric effect, hyper conjugation

UN	Detailed Syllabus of the Unit	Credit
01-01	Atomic Structure : Review of: Bohr's theory and its limitations, dual behavior of matter and radiation, deBroglie's relation, Heisenberg Uncertainty principle. Hydrogen atom spectra. Need of a new approach to Atomic structure.	Credit 01
01-02	Quantum mechanics : What is Quantum mechanics? Time independent Schrodinger equation and meaning of various terms in it. Significance of ψ and ψ 2, Schrödinger equation for hydrogen atom. Radial and angular parts of the hydogenic wave functions (atomic orbital's) and their variations for 1s,2s,2p,3s,3p and 3dorbitals (Only graphical representation). Radial and angular nodes and their significance. Radial distribution functions and the concept of the most probable distance with special reference to 1s and 2s atomic	

	orbital's. Significance of quantum numbers, orbital angular momentum and quantum numbers ml and ms. Shapes of s,p and d atomic orbital's, nodal planes.	
	Discovery of spin, spin quantum number (s) and magnetic spin quantum number (ms).	
01-03	Electronic configurations of the atoms : Rules for filling electrons in various orbitals, Electronic configurations of the atoms. Stability of half-filled and completely filled orbital's, concept of exchange energy. Relative energies of atomic orbital, Anomalous electronic configurations.	
02-01	Ionic Bonding : General characteristics of ionic bonding. Energy considerations in ionic bonding, lattice energy and salvation energy and their importance in the context of stability and solubility of ionic compounds. Statement of Born-Landé equation for calculation of lattice energy, Born-Haber cycle and its applications, polarizing power and polarizability. Fajan's rules, ionic character in covalent compounds, bond moment, dipole moment and percentage ionic character.	Credit 02
02-02	Covalent bonding : VB Approach: Shapes of some inorganic molecules and ions on the basis of VSEPR and hybridization with suitable examples of linear, trigonal planar, square planar, tetrahedral, trigonal bipyramidal and octahedral arrangements.	
02-03	Resonance and resonating structures : Concept of resonance and resonating structures in various inorganic and organic compounds.	
02-04	MO Approach : Rules for the LCAO method, bonding and antibonding MOs and their characteristics for s-s, s-p and p-p combinations of atomic orbitals, non-bonding combination of orbitals, MO treatment of homonuclear diatomic molecules of 1st and 2nd periods (including idea of s-p mixing) and heteronuclear diatomic molecules such as CO, NO and NO ⁺ . Comparison of VB and MO approaches.	
		a 11:
03-01	Physical Effects, Electronic Displacements : Inductive Effect, Electrometric Effect, Resonance and Hyper conjugation. Cleavage of Bonds: Homolysis and Heterolysis.	O3
03-02	Structure, shape and reactivity of organic molecules : Nucleophiles and electrophiles.	
03-03	Reactive Intermediates: Carbonations, Carbanions and free radicals.	
03-04	Strength of organic acids and bases : Comparative study with emphasis on factors affecting pK values. Aromaticity: Benzenoids and Hückel's rule.	
03-05	Stereochemistry : Conformations with respect to ethane, butane and cyclohexane. Interconversion of Wedge Formula, Newman, Sawhorse and Fischer representations. Concept of chirality (upto two carbon atoms).Configuration: Geometrical and Optical isomerism; Enantiomerism, Diastereomerism and Meso compounds). Threo and erythro; D and L; cis-trans nomenclature; CIP Rules: R/S (for upto 2chiral carbon atoms) and E/Z Nomenclature (for upto two C=C systems).	
	Alight at a Hadro contrary. Free stiened second second should be the fully of the f	
04-01	(preparations & reactions) to be studied in context to their structure.	

04-02	Alkanes: (Upto 5 Carbons). Preparation: Catalytic hydrogenation, Wurtz	
	reaction, Kolbe's synthesis, from Grignard reagent. Reactions: Free radical	
	Substitution: Halogenation.	Credit
04-03	Alkenes: (Upto 5 Carbons) Preparation: Elimination reactions: Dehydration of	04
	alkenes and dehydrohalogenation of alkyl halides (Saytzeff's rule); cis alkenes	
	(Partial catalytic hydrogenation) and trans alkenes (Birch reduction).	
	Reactions:cis addition(alk.KMnO4) and trans-addition (bromine), Addition of	
	HX(Markownikoff's andanti-Markownikoff's addition), Hydration, Ozonolysis,	
	oxymecuration-demercuration, Hydroboration-oxidation.	
04-04	Alkynes: (Upto 5 Carbons) Preparation: Acetylene from CaC2 and conversion	
	into higher alkynes; by dehalogenation of tetra halides and dehydrohalogenation	
	of vicinal-dihalides.	
04-05	Reactions: formation of metal acetylides, addition of bromine and alkaline	
	KMnO4, ozonolysis and oxidation with hot alk. KMnO4.	

LEARNING RESOURCE DETAILS

LR Code	Title Author	Edition Year	ISBN Publisher
YCMOU SLM	eBooks		
CHE104-T01	https://goo.gl/ytrJWe	2016	YCMOU
Reference Boo	ks		
CHE104-RB01	Chemistry for Degree Students (B.Sc. SemI, CBCS) – R L Madan	2016	9789352533039 S Chand
CHE104-RB02	Chemistry@ <u>https://goo.gl/29PGRb</u>	2017	1-947172-09-3 OpenStax
CHE104-RB03	Chemistry: Atoms First @ <u>https://goo.gl/e58NiX</u>	2017	1-947172-18-2 Open Stax
CHE104-RB04	Organic Chemistry with a Biological Emphasis @ https://goo.gl/2W5m8E	2016	BC Campus
CHE104-RB05	Analytical Chemistry @ <u>https://goo.gl/BPaxaz</u>	2010	BC Campus
CHE104-RB06	Introductory Chemistry @ <u>https://goo.gl/WrDfrM</u>	2011	BC Campus
CHE104-RB07	Concept Development Studies in Chemistry @ https://goo.gl/LbQigG	2007	BC Campus
CHE104-RB08	PhET Simulations @ <u>https://goo.gl/rcFu5P</u>	2016	YCMOU

COURSE OUTCOMES

After successful completion of this course, student should be able to –

- Basic Inorganic & Organic Chemistry
- Acquire practical laboratory skills, including the ability to perform experiments, use

laboratory equipment, and analyze experimental data.

- Perform basic quantitative analyses, including stoichiometric calculations and concentration determinations.
- Effectively communicate experimental procedures, results, and conclusions through written lab reports and oral presentations.
- Recognize the relevance of chemistry in everyday life, industry, and other scientific disciplines.

CHE105: BASIC INORGANIC & ORGANIC CHEMISTRY

SN	Description	Details
		Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222,
1	University	Maharashtra, India
		Website: <u>http://www.ycmou.ac.in</u>
2	School	School of Sciences
3	Discipline	Science
4	Level	UG
-	Course Used in	V92: B.Sc (Physics, Chemistry, Mathematics) &
5		V100: B.Sc (Botany, Chemistry, Zoology)

PROGRAMME INFORMATION

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Type
01	CHE105	Basic Inorganic & Organic Chemistry	2	6	120	10	40	50	Р

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of	The objectives of this course are–
this course, student should	Describe subatomic particles
have successfully completed:	• Explain Thomson's atomic model, Rutherford's atomic
 ✤ 10+2(12th) Science Pass (with Biology) 	 model Define atomic number, ionic bond and atomic mass number Distinguish between isotopes and isobars Explore structure of ionic compound from the radius ratio Explain lattice energy, salvation energy List general characteristics of ionic compound Explore inductive effect, electrometric effect, mesomeric effect,
	hyper conjugation

UN	Detailed Syllabus of the Unit	Credit	
01-01	Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture.		
01-02	2 Estimation of oxalic acid by titrating it with KMnO4.		
01-03	23 Estimation of water of crystallization in Mohr's salt by titrating with KMnO4.		
01-04	Estimation of Fe(II)ions by titrating it with K2Cr2O7 using internal indicator.		
01-05	Estimation of Cu(II)ions iodometrically usingNa2S2O3.		
02-01	Detection of extra elements (N,S,Cl,Br,I)inorganic compounds (containing upto two extra elements)	Credit	
02-02	Separation of mixtures by Chromatography: Measure the Rf value in each case	02	

(combination of two compounds to be given)

(a) Identify and separate the components of a given mixture of two amino acids (glycine, aspartic acid, glutamic acid, tyrosine or any other amino acid) by paper chromatography

(b) Identify and separate the sugars present in the given mixture by paper chromatography.

LEARNING RESOURCE DETAILS

LR Code	Title Author	Edition Year	ISBN Publisher
YCMOU SLM	eBooks		
CHE105-P01	https://goo.gl/ytrJWe	2016	- YCMOU
CHE104-T01	https://goo.gl/ytrJWe	2016	- YCMOU
Reference Boo	ks		
CHE105-RB01	Chemistry for Degree Students (B.Sc. SemI, CBCS) – R L Madan	2016	9789352533039 S Chand
CHE105-RB02	Chemistry@ <u>https://goo.gl/29PGRb</u>	2017	1-947172-09-3 OpenStax
CHE105-RB03	Chemistry: Atoms First @ <u>https://goo.gl/e58NiX</u>	2017	1-947172-18-2 Open Stax
CHE105-RB04	Organic Chemistry with a Biological Emphasis @ https://goo.gl/2W5m8E	2016	BC Campus
CHE105-RB05	Analytical Chemistry @ <u>https://goo.gl/BPaxaz</u>	2010	BC Campus
CHE105-RB06	Introductory Chemistry @ <u>https://goo.gl/WrDfrM</u>	2011	BC Campus
CHE105-RB07	Concept Development Studies in Chemistry @ https://goo.gl/LbQigG	2007	BC Campus
CHE105-RB08	PhET Simulations @ <u>https://goo.gl/rcFu5P</u>	2016	YCMOU

COURSE OUTCOMES

After successful completion of this course, student should be able to –

- Basic Inorganic & Organic Chemistry
- Acquire practical laboratory skills, including the ability to perform experiments, use laboratory equipment, and analyze experimental data.
- Perform basic quantitative analyses, including stoichiometric calculations and concentration determinations.
- Effectively communicate experimental procedures, results, and conclusions through written lab reports and oral presentations.
- Recognize the relevance of chemistry in everyday life, industry, and other scientific disciplines.

ZGY101: ANIMAL DIVERSITY

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222, Maharashtra India
	Chiveisity	Website: <u>http://www.ycmou.ac.in</u>
2	School	School of Sciences
3	Discipline	Science
4	Level	UG
5	Course Used in	V100: B.Sc (Botany, Chemistry, Zoology)

PROGRAMME INFORMATION

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Туре
01	ZGY101	Animal Diversity	4	12	120	20	80	100	Т

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of this course, student should have successfully completed: • 10+2(12 th) Science Pass (with Biology)	 The objectives of this course are- To implement strict restrictions on export of rare animals To understand the Animal diversity around us. To understand the underlying principles of classification of animals. To classify invertebrates and to be able to understand the possible group of the invertebrate observed in nature.

UN	Detailed Syllabus of the Unit	Credit
01-01	Principles of Animal Classification: Taxonomy: Numerical taxonomy,	
	Evolutionary taxonomy, Classical taxonomy and experimental or neo taxonomy	Credit 01
	(biochemical taxonomy and Cytotaxonomy), Significance of Taxonomy	
	Systematics: Linnaean system of classification (Six level classification), Concept	
	of Species, Biological & Evolutionary, Binomial Nomenclature, Five kingdom	
	system	
01-02	General Features of kingdom Animalia: General characters and Grades of	f
	organization, Symmetry	
01-03	Subkingdom-Protista: Phylum-Protozoa: General characters and classification	l l
	up to classes with two examples (names only).	
	Class Rhizopoda (e.g :Entamoeba histolytica, Arcella),	
	Class Mastigophora (e.g: Euglena viridis, Trypanosoma gambiense),	
	Class Ciliata (e.g Paramoecium caudatum, Opalina ranarum),	
	Class Sporozoa (e.g Plasmodium vivax, Toxoplasma gondii)	
	Locomotory Organelles and locomotion in Protozoa	
01-04	Subkingdom Parazoa: Phylum- Porifera: General characters and classification	L
	up to classes with examples; Canal system in sponges, Skeleton in sponges: types	5
	of Spicules, Regeneration in sponges, Economic importance of Phylum Porifera	

02-01 Subkingdom-Metazoa: Phylum-Cnidaria: General characters and classification up to classes with examples; Polymorphism, Corals and Coral reefs, or end the examples; Parasitic adaptations, Life history of <i>Taeniasolium</i> , Economic importance of Platyhelminthes: O2 02-02 Phylum-Platyhelminthes: General characters and classification up to classes, examples; Parasitic adaptations, Life history of <i>Ascaris lumbricoides</i> , Economic importance of class Nematoda O2 02-03 Phylum-Annelida: General characters and classification up to classes with examples; Metamerism in Annelida, Economic importance of Annelida with reference to earthworms as friends of farmers and their role in vermicomposting O2 03-01 Phylum-Arthropoda: General characters and classification up to classes with examples; Mouth parts in insects, Vision in Arthropoda, Metamorphosis in Insects, Economic importance of Arthropoda, Useful Insects, Harmful Insects O3 03-02 Phylum Mollusca: General characters and classification up to classes with examples; Torsion in gastropods, Economic importance of Mollusca. O3 03-03 Phylum Echinodermata: General characters and classification up to classes with examples; Vorgentata, up to elasses, introduction to Group – Protochordata, Salient features of sub-phylum's with two example each (Hemichordata, Urochordata, and Cephalochordata) O4 03-04 Phylum-Chordata: Fundamental characters and classification up to superclass-Pisces, General features and Classification up to superclass-Pisces, General features and Class							
classification up to classes with examples; Polymorphism, Corals and Coral reets. Credit 02 02-02 Phylum-Platyhelminthes: General characters and classification up to classes with examples; Parasitic adaptations, Life history of <i>Taeniasolium</i> , Economic importance of Platyhelminthes. 02-03 02-02 Phylum-Aschelminthes: General characters and classification up to classes. Parasitic adaptations in helminthes, Life history of <i>Ascaris lumbricoides</i> , Economic importance of class Nematoda 02-04 02-04 Phylum-Annelida: General characters and classification up to classes with examples; Metamerism in Annelida, Economic importance of Annelida with reference to earthworms as friends of farmers and their role in vermicomposting Credit 03-01 Phylum-Arthropoda: General characters and classification up to classes with examples; Mouth parts in insects, Vision in Arthropoda, Metamorphosis in Insects, Economic importance of Anthropoda, Useful Insects, Harmful insects 03 03-02 Phylum Bollusca: General characters and classification up to classes with examples; Water-vascular system in Star fish, Economic importance of Echinodermata 03 03-03 Phylum-Chordata: Fundamental characters and Classification up to superclass-Pisces, General features and Classification up to superclass-Pisces, General features and Classification up to superclass-Pisces, General features and Classification up to orders; Piges of Scales in Fishes. Credit 03-04 Phylum-Chordata, and Cephalochordata) 04 04 04-04 04	02-01	Subkingdom-Metazoa: Phylum-Cnidaria: General characters and	- 11				
02-02 Phylum-Platyhelminthes: General characters and classification up to classes with examples; Parasitic adaptations, Life history of <i>Taeniasolium</i> , Economic importance of Platyhelminthes 02-03 Phylum-Aschelminthes: General characters and classification up to classes, Economic importance of class Nematoda 02-04 Phylum-Annelida: General characters and classification up to classes with examples; Metamerism in Annelida, Economic importance of Annelida with reference to earthworms as friends of farmers and their role in vermicomposting 03-01 Phylum-Arthropoda: General characters and classification up to classes with examples; Mouth parts in insects, Vision in Arthropoda, Metamorphosis in Insects, Economic importance of Anthropoda, Useful Insects, Harmful insects Credit 03-02 Phylum-Chordata: General characters and classification up to classes with examples; Torsion in gastropods, Economic importance of Mollusca. Credit 03-03 Phylum Chordata: Fundamental characters and Classification up to classes with examples; Water-vascular system in Star fish, Economic importance of Echinodermata General characters and Classification of Phylum Chordata up to classes, Introduction to Group – Protochordata, Salient features of sub-phylum's with two example each (Hemichordata, Urochordata, and Cephalochordata) 04-01 04-02 Introduction to Subphylum – Vertebrata: General characters of sections with two examples Agnath and Gnathostomata, classification up to superclass-Pisces, General features and Classification up to orders; Piyes of Scales in Fishes, Types of Fins in Fishes. Economic Importance of Fishes 04-04 <td></td> <td colspan="3">classification up to classes with examples; Polymorphism, Corals and Coral reefs,</td>		classification up to classes with examples; Polymorphism, Corals and Coral reefs,					
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02-03 Phylum-Aschelminthes: General characters and classification up to classes, Economic importance of class Nematoda 02-04 Phylum-Aschelminthes: General characters and classification up to classes with examples; Metamerism in Annelida, Economic importance of Annelida with reference to earthworms as friends of farmers and their role in vermicomposting 03-01 Phylum-Arthropoda: General characters and classification up to classes with examples; Mouth parts in insects, Vision in Arthropoda, Metamorphosis in Insects, Economic importance of Arthropoda, Useful Insects, Harmful insects Credit 03-02 Phylum Chinodermata: General characters and classification up to classes with examples; Torsion in gastropods, Economic importance of Mollusca. Credit 03-03 Phylum Echinodermata: General characters and classification up to classes with examples; Water-vascular system in Star fish, Economic importance of Echinodermata General characters and Classification up to classes with examples; Water-vascular system in Star fish, Economic importance of Echinodermata 03-04 Phylum Chordata: Fundamental characters and Classification of Phylum Chordata up to classes, Introduction to Group – Protochordata, Salient features of sub-phylum's with two example each (Hemichordata, Urochordata, and Cephalochordata) Credit 04-01 Introduction to subphylum – Vertebrata: General characters of sections with two examples Agnatha and Gnathostomata, classification up to superclass-Pisces, General features and Classification up to orders; Piyee of Scales in Fishes, Types of F	02-02	² Phylum-Platyhelminthes: General characters and classification up to classes					
02-03 Phylum-Aschelminthes: General characters and classification up to classes, Parasitic adaptations in helminthes, Life history of Ascaris lumbricoides, Economic importance of class Nematoda 02-04 Phylum-Annelida: General characters and classification up to classes with examples; Metamerism in Annelida, Economic importance of Annelida with reference to earthworms as friends of farmers and their role in vermicomposting 03-01 Phylum-Arthropoda: General characters and classification up to classes with examples; Mouth parts in insects, Vision in Arthropoda, Metamorphosis in Insects, Economic importance of Arthropoda, Useful Insects, Harmful insects Credit 03-02 Phylum Mollusca: General characters and classification up to classes with examples; Torsion in gastropods, Economic importance of Mollusca. Credit 03-03 Phylum Chordata: General characters and Classification up to classes with examples; Water-vascular system in Star fish, Economic importance of Echinodermata General characters and Classification of Phylum Chordata up to classes, Introduction to Group – Protochordata, Salient features of sub-phylum's with two example each (Hemichordata, Urochordata, and Cephalochordata) Introduction to subphylum – Vertebrata: General characters of sections with two examples Agnath and Gnathostomata, classification up to superclass- Pisces, General features and Classification up to orders; Parental care in amphibia 04 04-04 Introduction to Subperclass- Tetrapoda: Introduction to Class – Amphibia, General features and Classification up to orders; Poisonous and non- poisonous snakes, Biting mechanism in snakes 04 04-04		importance of Platyhelminthes					
02-03 Phytum-Ascreenminutes: General characters and classification up to classes, Economic importance of class Nematoda 02-04 Phylum-Annelida: General characters and classification up to classes with examples; Metamerism in Annelida, Economic importance of Annelida with reference to earthworms as friends of farmers and their role in vermicomposting 03-01 Phylum-Arthropoda: General characters and classification up to classes with examples; Mouth parts in insects, Vision in Arthropoda, Metamorphosis in Insects, Economic importance of Arthropoda, Useful Insects, Harmful insects 03 03-02 Phylum Mollusca: General characters and classification up to classes with examples; Torsion in gastropods, Economic importance of Mollusca. 03 03-03 Phylum Echinodermata: General characters and classification up to classes with examples; Water-vascular system in Star fish, Economic importance of Echinodermata 03 03-04 Phylum-Chordata: Fundamental characters and Classification of Phylum Chordata, up to classes, Introduction to Group – Protochordata, Salient features of sub-phylum's with two example each (Hemichordata, Urochordata, and Cephalochordata) 04 04-01 Introduction to Supprylum – Vertebrata: General characters of sections with two examples Agnatha and Gnathostomata, classification up to superclass-Pisces, General features and Classification up to orders; Prise of Scales in Fishes, Types of Fins in Fishes. Economic Importance of Fishes Credit 04-02 Introduction to Superclass- Tetrapoda: Introduction to Class – Amphibia, General features and Classification up to orders; F	00.00	Deviver A achelminthese Constant characters and classification up to classes					
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02-04 Phylum-Annelida: General characters and classification up to classes with vamples; Metamerism in Annelida, Economic importance of Annelida with vamples; Metamerism in Annelida, Economic importance of Annelida with vamples; Mouth parts in insects, Vision in Arthropoda, Metamorphosis in Insects, Economic importance of Arthropoda, Useful Insects, Harmful insects Credit 03-01 Phylum-Arthropoda: General characters and classification up to classes with examples; Mouth parts in insects, Vision in Arthropoda, Metamorphosis in Insects, Economic importance of Arthropoda, Useful Insects, Harmful insects Credit 03-02 Phylum Mollusca: General characters and classification up to classes with examples; Torsion in gastropods, Economic importance of Mollusca. 03 03-03 Phylum Echinodermata: General characters and classification up to classes with examples; Water-vascular system in Star fish, Economic importance of Echinodermata Official up to classes, Introduction to Group – Protochordata, Salient features of sub-phylum's with two example each (Hemichordata, Urochordata, and Cephalochordata) O 04-01 Introduction to subphylum – Vertebrata: General characters of sections with two examples Agnatha and Gnathostomata, classification up to superclass-Pisces, General features and Classification up to orders; Poisonous and nonpoisonous snakes, Biting mechanism in snakes O4 04-02 Introduction to Superclass- Tetrapoda: Introduction to Class – Amphibia, General features and Classification up to orders; Poisonous and nonpoisonous snakes, Biting mechanism in snakes O4 04-04 Class Reptiles: General f		Factoria importance of class Nematods					
02:04 Flytum-Americal: General characters and classification up to classes with examples; Metamerism in Annelida, Economic importance of Annelida with reference to earthworms as friends of farmers and their role in vermicomposting 03:01 Phylum-Arthropoda: General characters and classification up to classes with examples; Mouth parts in insects, Vision in Arthropoda, Metamorphosis in Insects, Economic importance of Arthropoda, Useful Insects, Harmful insects Credit 03:02 Phylum Mollusca: General characters and classification up to classes with examples; Torsion in gastropods, Economic importance of Mollusca. 03 03:03 Phylum Echinodermata: General characters and classification up to classes with examples; Water-vascular system in Star fish, Economic importance of Echinodermata 03 03:04 Phylum-Chordata: Fundamental characters and Classification of Phylum Chordata up to classes, Introduction to Group – Protochordata, Salient features of sub-phylum's with two example each (Hemichordata, Urochordata, and Cephalochordata) Introduction to subphylum – Vertebrata: General characters of sections with two examples Agnatha and Gnathostomata, classification up to superclass-Pisces, General features and Classification up to orders; Types of Scales in Fishes, Types of Fins in Fishes. Economic Importance of Fishes Credit 04-01 Introduction to Supprelass- Tetrapoda: Introduction to Class – Amphibia, General features and Classification up to orders; Poisonous and nonpoisonous snakes, Biting mechanism in snakes 04 04-04 Class Aves: General features and Classification up to orders; Flight adaptations in birds,	02.04	Phylum Annelide: Concered characters and classification up to classes with					
03-01 Phylum-Arthropoda: General characters and classification up to classes with examples; Mouth parts in insects, Vision in Arthropoda, Metamorphosis in Insects, Economic importance of Arthropoda, Useful Insects, Harmful insects O3 03-02 Phylum Mollusca: General characters and classification up to classes with examples; Torsion in gastropods, Economic importance of Mollusca. O3 03-03 Phylum Echinodermata: General characters and classification up to classes with examples; Water-vascular system in Star fish, Economic importance of Echinodermata Credit 03-03 Phylum-Chordata: Fundamental characters and Classification of Phylum Chordata: Fundamental characters and Classification of Phylum Chordata up to classes, Introduction to Group – Protochordata, Salient features of sub-phylum's with two example each (Hemichordata, Urochordata, and Cephalochordata) Credit 04-01 Introduction to subphylum – Vertebrata: General characters of sections with two examples agnatha and Gnathostomata, classification up to superclass-Pisces, General features and Classification up to orders; Types of Scales in Fishes, Types of Fins in Fishes. Economic Importance of Fishes Credit 04-03 Class Aves: General features and Classification up to orders; Poisonous and nonpoisonous snakes, Biting mechanism in snakes 04 04-03 Class Aves: General features and Classification up to orders; Flight adaptations in birds, Migration in Birds Class Mammals: General features and Classification up to orders; Egg laying and placental mammals, aquatic	02-04	examples: Metamerism in Appelida, Economic importance of Appelida with					
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and placental mammals, aquatic mammals		Class Mammals: General features and Classification up to orders; Egg laying					
		and placental mammals, aquatic mammals					

LEARNING RESOURCE DETAILS

LR Code	Title Author	Edition Year	ISBN Publisher				
YCMOU SLM eBooks							
ZGY101-T01							
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Reference Books							
ZGY101-RB1	Invertebrate Zoology - Ruppert and Barnes, R.D.	2006 VIII Edition.	Holt Saunders International Edition.				
ZGY101-RB2	The Invertebrates: A New Synthesis - Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding D.W. and Spicer, J.I.	2002 III Edition	Blackwell Science				
ZGY101-RB3	The Life of Vertebrates - Young, J. Z.	2004III Edition	Oxford university press				
ZGY101-RB4	Vertebrate life - Pough H.	VIII Edition	Pearson International				
ZGY101-RB5	Evolution - Hall B.K. and Hallgrimsson B Strickberger's	2008.IV Edition	Jones and Bartlett Publishers Inc				

COURSE OUTCOMES

After successful completion of this course, student should be able to -

- Demonstrate a solid understanding of the diversity of animal life
- Develop the ability to identify common animals
- Apply critical thinking skills to analyze and compare animal adaptations, behaviors, and evolutionary patterns.
- Recognize ethical considerations related to animal research, conservation, and humane treatment.
- Apply knowledge of animal diversity to solve real-world ecological and conservation problems.

ZGY102: ANIMAL DIVERSITY

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222, Maharashtra, India
	University	Website: <u>http://www.ycmou.ac.in</u>
2	School	School of Sciences
3	Discipline	Science
4	Level	UG
5	Course Used in	V100: B.Sc (Botany, Chemistry, Zoology)

PROGRAMME INFORMATION

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Туре
01	ZGY102	Animal Diversity	2	6	120	10	40	50	Р

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of this course, student should have successfully completed: 10+2(12 th) Science Pass (with Biology)	 The objectives of this course are- To implement strict restrictions on export of rare animals To understand the Animal diversity around us. To understand the underlying principles of classification of animals. To classify invertebrates and to be able to understand the possible group of the invertebrate observed in nature.

UN	Detailed Syllabus of the Unit	Credit
01-01	Study of whole mount of Amoeba, Euglena, Plasmodium, Paramecium	
01-02	Study of museum specimen from Phylum Porifera Sycon, Hyalonema, and Euplectella	
01-03	Study of museum specimen from Phylum Cnidaria Obelia, Physalia, Aurelia, Tubipora, Metridium	
01-04	Study of museum specimen from Phylum Platyhelminthes Planaria, Taeniasolium, Fasciola hepatica	
01-05	Study of museum specimen from Phylum Nematoda-Male and female Ascaris lumbricoides	Credit
01-06	Study of museum specimen from Phylum Annelida, Aphrodite, Nereis, Pheretima, Hirudinaria	O1
01-07	Study of museum specimen from Phylum Arthropoda Palaemon, Cancer, Limulus, Palamnaeus, Scolopendra, Julus, Periplaneta, Apis	
01-08	Study of museum specimen from Phylum Mollusca, Chiton, Dentalium, Pila, Unio, Loligo, Sepia, Octopus	
01-09	Study of museum specimen from Phylum Echinodermata Ophiura, Echinus, Cucumaria, and Antedon	

02-01	Study of museum specimen/slides from phylum Protochordate-Balanoglossus, Herdmania and Amphioxius	
02-02	Study of museum specimen from phylum Agnatha, Petromyzon, Myxine	
02-03	Study of museum specimen from Superclass Pisces Scoliodon, Sphyrna, Pristis, Torpedo, Labeo, Exocoetus, Anguilla, Hippocampus, Tetradon	
02-04	Study of museum specimen from phylum Amphibia Ichthyophis/Ureotyphlus, Salamandra, Bufo, Hyla	
02-05	Study of museum specimen from phylum Reptiles–Naja, Draco, Chelone, Hemidactylus, Chamaeleon, Vipera, Gavialis	
02-06	Study of museum specimen from phylum Aves-six common birds from different orders	Credit
02-07	Study of museum specimen from phylum Mammals-Bat, Funambulus, Loris, Sorex	02
02-08	Study of the following permanent slides: T.S. and L.S. of Sycon, Study of life history stages of Taenia, T.S. of Male and female Ascaris	
02-09	Key for Identification of poisonous and non-poisonous snakes, An "animal album" containing photographs, cut outs, with appropriate write up about the above mentioned taxa. Different taxa/ topics may be given to different sets of students for this purpose.	

L P. Codo	Title Author	Edition	ISBN
LKCoue		Year	Publisher
YCMOU SLM	eBooks		
ZGY102-P01			
ZGY101-T01			
Reference Boo	oks		
	Invertebrate Zoology	2006	Holt Saunders
ZGY102-RB1	- Ruppert and Barnes, R.D.	VIII	International
		Edition.	Edition.
	The Invertebrates: A New Synthesis	2002	
ZGY102-RB2	- Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W.	III	Blackwell Science
	and Spicer, J.I.	Edition	
ZGY102-RB3	The Life of Vertebrates	2004III	Oxford university
	- Young, J. Z.	Edition	press
ZGY102-RB4	Vertebrate life	VIII	Pearson
	- Pough H.	Edition	International
ZGY102-RB5	Evolution	2008.IV	Jones and Bartlett
	- Hall B.K. and Hallgrimsson B Strickberger's	Edition	Publishers Inc

COURSE OUTCOMES

After successful completion of this course, student should be able to –

- Demonstrate a solid understanding of the diversity of animal life
- Develop the ability to identify common animals

- Apply critical thinking skills to analyze and compare animal adaptations, behaviors, and evolutionary patterns.
- Recognize ethical considerations related to animal research, conservation, and humane treatment.
- Apply knowledge of animal diversity to solve real-world ecological and conservation problems.

SEMESTER 02

AEC121: ENVIRONMENTAL SCIENCE

PROGRAMME INFORMATION

SN	Description	Details
		Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222,
1	University	Maharashtra, India
		Website: <u>http://www.ycmou.ac.in</u>
2	School	School of Sciences
3	Discipline	Science
4	Level	UG
5	Course Used in	V92: B.Sc (Physics, Chemistry, Mathematics) &
		V100: B.Sc (Botany, Chemistry, Zoology)

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Type
02	AEC121	Environmental Science	4	12	120	20	80	100	Т

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion	The objectives of this course are-
 of this course, student should have successfully completed: 10+2(12th) Science Pass (with Biology) 	 Onderstand core concepts and methods from ecological and physical sciences and their application in environmental problem-solving Explain multidisciplinary nature of environmental science. Identify causes, impact and control measures of soil, air, water, and thermal pollution.

UN	Detailed Syllabus of the Unit	Credit
01-01	The Multidisciplinary Nature Of Environmental Studies: Definition, Scope	
	And Importance – Definition, Scope, Importance, Need For Public Awareness –	Credit 01
	role of institutions of environment studies, People in Environment	
01-02	Natural Resources: Introduction, definition, types of natural resources with	
	examples, Renewable And Non-Renewable Resources-Natural resources and	
	associated problems, Non-renewable resources, Renewable resources, Forest	
	Resources: Use and over- exploitation, deforestation. Timber extraction, mining,	
	dams and their effects on forests and tribal people, Water Resources: Use and	
	over-utilization of surface and ground water, floods, drought, dams-benefits and	
	problems. Mineral Resources: Use and exploitation, environmental effects of	
	extracting and using mineral resources. Food Resources: World food problems,	
	Changes in land use by agriculture and grazing, Effects of modern agriculture,	
	Fertilizer/pesticide problems, Water logging and salinity. Energy Resources:	

01-03	 Increasing energy needs, Renewable/ nonrenewable, Use of Alternate energy sources. Land resources: Land as a resource, land degradation, man-induced land-slides, soil erosion and desertification. Role of an individual in conservation of natural resources, equitable use of resources for sustainable lifestyles Ecosystems: definition, composition biotic and abiotic factors, Concept of an ecosystem, population ecology, community ecology, food chain, food web, Ecosystem degradation, Resource utilization, Structure and functions of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, Food webs and Ecological 	
	pyramids, The food chains, The food webs, The ecological pyramids, Introduction, Types, Forest ecosystem, Grass land ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, lakes, streams, rivers, estuaries, oceans)	
01-04	Biogeochemical cycles:- definition, types, water cycle, Carbon cycle, Oxygen cycle, Nitrogen cycle, energy cycle, Integration of cycles in nature,	
02-01	Biodiversity and Its Conservation : Introduction, Definition, types of biodiversity, Bio geographic Classification Of India, Value Of Biodiversity: Consumptive, Productive Use, Social, Ethical, Aesthetic And Option Values, Consumptive value, Productive value, Social value, Ethical value, Aesthetic value, Option value, Biodiversity At Global, National And Local Levels, India As A Mega Diversity Nation, Hotspots Of Biodiversity, Threats To Biodiversity: Habitat Loss, Poaching Of Wildlife, Man-Wildlife Conflicts, Endangered And Endemic Species Of India, Common Plant species, Common Animal species, Conservation Of Biodiversity: In-Situ And Ex-Situ, In-situ conservation, Ex-situ conservation	Credit 02
02-02	Environmental Pollution : Definition, Causes, Effects And Control Measures of, Air Pollution, Water Pollution, Soil Pollution, Marine Pollution, Noise Pollution, Thermal Pollution,	
02-03	Natural hazards :- Nuclear hazards, Solid Waste Management: Causes, Effects And Control Measures, Urban And Industrial Waste, Role Of Individuals In Pollution Prevention, Pollution Case Studies, Disaster Management: Floods, Earthquakes, Cyclones, Landslides	
03-01	Social Issues and Environment: various social issues related to environment and their conservation, Urban Problems Related To Energy, Water Conservation, Rain Water Harvesting, Watershed Management, Water conservation, Rain water harvesting, Water shed management, Resettlement And Rehabilitation Of People; Its Problems And Concerns. Conflict between man and environment, Case Studies, Environmental Ethics: Issues And Possible Solutions, Resource consumption patterns and the need for their equitable utilization, Equity– Disparity in the Northern and Southern countries, Urban– rural equity issues, The need for Gender Equity, Preserving resources for future generations, The	Credit 03
	rights of animals, The ethical basis of environment education and awareness, The conservation ethic and traditional value systems of India, sustainable solutions strategies over environmental issues.	
03-02	Environmental issues: Climate Change, concept of global warming and its impact on environment, Acid Rain and its causes, Ozone Layer Depletion, Nuclear Accidents, Wasteland Reclamation, Consumerism And Waste Products,	

		_
03-03	Environmental act -Environment Protection Act (1986), Air (Prevention And Control Of Pollution) Act (1981), Water (Prevention And Control of Pollution) Act (1974), Wildlife Protection Act (1972), Forest Conservation Act (1980), Environment Impact Assessment (EIA), Citizens actions and action groups, Public Awareness.	
04-01	Human Population and The Environment : demography, key features of population, age pyramid, Global population growth, Population Explosion– impacts on environment, Family Welfare Program, Urbanization, Environmental And Human Health, Environmental health, Climate and health, Infectious diseases, Water-related diseases, Risks due to chemicals in food, Cancer and environment,	Credit 04
04-02	Human Rights and The Environment:- Human Rights, Equity, Nutrition, health and human rights, Intellectual Property Rights and Community Biodiversity Registers, Value Education, Environmental Values, Valuing Nature, Valuing cultures, Social justice, Human heritage, Equitable use of Resources, Common Property Resources, Ecological degradation, HIV/AIDS, Women And Child Welfare, Role Of Information Technology In Environment And Human Health	
04-03	Field Work : Visit To A Local Area To Document Environmental Assets, River/Forest/ Grasslands/ Hill/ Mountain, Visit To A Local Polluted Site, Study Of Common Plants, Insects, Birds, Study of Simple Ecosystems	

LR Code	Title Author	Edition Year	ISBN Publisher				
YCMOU SLM	YCMOU SLM eBooks						
AEC211-T01	https://goo.gl/ytrJWe	2016	- YCMOU				
Reference Books							
AEC211-RB01	Environmental Studies @ <u>https://goo.gl/YQQV6y</u> Erach Bharucha	2004	UGC				

COURSE OUTCOMES

After successful completion of this course, student should be able to –

- Develop a solid understanding of key environmental concepts, issues, and challenges.
- Recognize the interdisciplinary nature of environmental studies by integrating knowledge from various fields, such as biology, chemistry, sociology, and economics.
- Develop the ability to advocate for environmental causes and promote sustainable practices within their communities and beyond.
- Foster a sense of environmental citizenship, encouraging students to actively contribute to a more sustainable and environmentally conscious society.

BNY106: PLANT ECOLOGY & TAXONOMY

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222, Maharashtra, India Website: <u>http://www.ycmou.ac.in</u>
2	School	School of Sciences
3	Discipline	Science
4	Level	UG
5	Course Used in	V100: B.Sc (Botany, Chemistry, Zoology)

PROGRAMME INFORMATION

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Туре
02	BNY106	Plant Ecology & Taxonomy	4	12	120	20	80	100	Т

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of	The objectives of this course are–
this course, student should	Explain the physiological processes of plants
have successfully completed:	Teach students how to conduct vegetation surveys
 ↔ 10+2(12th) Science Pass (with Biology) 	• Develop practical skills in observing and studying plants in their natural habitats
	Discuss ethical considerations related to plant research

UN	Detailed Syllabus of the Unit				
01-01	Plant Ecology				
	• Definition, scope, and branches of Ecology,	Credit 01			
	Ecological factor and their role in plant ecology	credit of			
	Ecological Adaptations				
01-02	 Adaptive features of Hydrophytes, Xerophytes and Halophytes (morphological, anatomical and physiological adaptations). 				
	Ecosystem:				
01-03	Ecosystem: Structure, its biotic and abiotic components				
	• Food chain and food web,				
	• Ecological pyramids,				
	• Energy flow				
	Biogeochemical cycles.				
	Ecological Succession-				
01-04	Definition, types, Causes of Succession				
	Mechanism of succession				

02-01	Plant Taxonomy	Credit					
	• Definition, branches of taxonomy	02					
	• Identification,						
	Classification,						
	Nomenclature.						
02-02	e Herbarium						
	Definition, preparation of herbarium						
	Importance of Herbaria						
	Botanical Gardens Of The World And India;	-					
02-03	Documentation						
	Flora, Keys: Single Access And Multi-Access						
	Taxonomic Evidences From Palynology, Cytology, Phyto chemistry And Molecular Data						
02-04	Taxonomic Hierarchy						
	Ranks, Categories And Taxonomic Groups						
	Angiosperm Systematics						
03-01	• Angiosperms: Origin And Evolution (Pteridospermean And Bennititalean Theory),						
03-02	otanical Nomenclature						
	Principles, Rules, Taxonomic Ranks, Type Concept,						
	Valid Publication,						
	Herbarium: Concept and Significance, Royal Botanical Garden, Kolkata						
03-03	Systems Of Classification I						
	Bentham And Hooker's System,						
03-04	Systems Of Classification II						
	Engler And Prantle's System						
04-01	Systematic Studies & Economic Importance Of Following Families						
	Dicotyledons (Polypetalae) : Malvaceae, Brassicaceae, Leguminosae, Apiaceae	Credit					
04-02	Dicotyledons (Gamopetalae) :	04					
	Asteraceae, Asclepiadaceae, Apocynaceae, Solanaceae, Verbenaceae, Lamiaceae	04					
04-03	Dicotyledons (Monoclamydeae):						
	Euphorbiaceae						
04-04	Monocotyledons:						
	Poaceae, Liliaceae						

LR Code	Title Author	Edition Year	ISBN Publisher			
YCMOU SLM eBooks						
BNY106-T01						
Reference Books						

BNY106-RB01	Concepts Of Ecology.2 – Kormondy, E .J.	1996 4th edition	Prentice Hall, U.S.A.
BNY106-RB02	Ecology and Environment.	2010	Rastogi Publications,
	– Sharma, P.D.	8th edition	Meerut, India.
BNY106-RB03	Plant Systematics. - Simpson, M.G.	2006	Elsevier Academic Press, San Diego, CA, U.S.A.
BNY106-RB04	Plant Systematics: Theory and Practice.	3rd edition.	Oxford & IBH Pvt.
	– Singh, G.	2012	Ltd., New Delhi.

COURSE OUTCOMES

After successful completion of this course, student should be able to -

- Develop the ability to identify common plant species and understand the key features used in plant identification.
- Apply critical thinking skills to analyze and compare plant adaptations, ecological roles, and evolutionary patterns.
- Recognize ethical considerations related to plant research, conservation, and sustainable use.
- Acquire foundational research skills required for conducting studies in plant ecology or related fields.

BNY107: PLANT ECOLOGY & TAXONOMY

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222, Maharashtra, India Website: <u>http://www.ycmou.ac.in</u>
2	School	School of Sciences
3	Discipline	Science
4	Level	UG
5	Course Used in	V100: B.Sc (Botany, Chemistry, Zoology)

PROGRAMME INFORMATION

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Туре
02	BNY107	Plant Ecology & Taxonomy	2	6	120	10	40	50	Р

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of	The objectives of this course are–
this course, student should	Explain the physiological processes of plants
have successfully completed:	Teach students how to conduct vegetation surveys
 ↔ 10+2(12th) Science Pass (with Biology) 	• Develop practical skills in observing and studying plants in their natural habitats
	Discuss ethical considerations related to plant research

UN	Detailed Syllabus of the Unit	Credit
01-01	Study of instruments used to measure microclimatic variables: Soil thermometer,	
	maximum and minimum thermometer, anemometer, psychrometer/hygrometer, rain	Credit
	gauge and lux meter of any wild plant with herbarium label (to be submitted in the	Creuit
	record book).	01
01-02	Determination of pH, and analysis of two soil samples for carbonates, chlorides, nitrates,	
	sulphates, organic matter and base deficiency by rapid field test.	
01-03	Comparison of bulk density, porosity and rate of infiltration of water in soil of three	
	habitats.	
	a) Study of morphological adaptations of hydrophytes and xerophytes (four each). b) Study of biotic interactions of the following: Stem parasite (<i>Cuscuta</i>), Root parasite (Orobanche),	
	Epiphytes, Predation (Insectivorous plants)	
01-04	Study of instruments used to measure microclimatic variables: Soil thermometer,	
	maximum and minimum thermometer, anemometer, psychrometer/hygrometer, rain	
	gauge and lux meter of any wild plant with herbarium label (to be submitted in the	
	record book).	

02-01	Determination of minimal quadrat size for the study of herbaceous vegetation in the	
	college campus by species area curve method. (species to be listed)	Credit
	Quantitative analysis of herbaceous vegetation in the college campus for frequency and	02
	comparison with Raunkiaer's frequency distribution law	
02-02	Study of vegetative and floral characters of the following families (Description, V.S.	
	flower, section of ovary, floral diagram/s, floral formula/e and systematic position	
	according to Bentham & Hooker's system of classification):Brassicaceae -Brassica,	
	Alyssum / Iberis;	
02-03	Asteraceae -Sonchus/Launaea, Vernonia/Ageratum, Eclipta/Tridax; Solanaceae -	
	Solanumnigrum, Withania; Lamiaceae -Salvia, Oscimum; Liliaceae - Asphodelus /	
	Lilium / Allium.	
02-04	Mounting of a properly dried and pressed specimen	

LR Code	Title Author	Edition	ISBN
		Year	Publisher
YCMOU SLM e	Books		
BNY107-P01			
BNY106-T01			
Reference Book	KS		
BNY107-RB01	Concepts Of Ecology.2 – Kormondy, E .J.	1996 4th edition	Prentice Hall, U.S.A.
BNY107-RB02	Ecology and Environment. – Sharma, P.D.	2010 8th edition	Rastogi Publications, Meerut, India.
BNY107-RB03	Plant Systematics. - Simpson, M.G.	2006	Elsevier Academic Press, San Diego, CA, U.S.A.
BNY107-RB04	Plant Systematics: Theory and Practice. – Singh, G.	3rd edition. 2012	Oxford & IBH Pvt. Ltd., New Delhi.

COURSE OUTCOMES

After successful completion of this course, student should be able to –

- Develop the ability to identify common plant species and understand the key features used in plant identification.
- Apply critical thinking skills to analyze and compare plant adaptations, ecological roles, and evolutionary patterns.
- Recognize ethical considerations related to plant research, conservation, and sustainable use.
- Acquire foundational research skills required for conducting studies in plant ecology or related fields.

CHE106: PHYSICAL & ORGANIC CHEMISTRY - I

SN	Description Details	
1		Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222,
	University	Maharashtra, India
		Website: <u>http://www.ycmou.ac.in</u>
2	School	School of Sciences
3	Discipline	Science
4	Level	UG
5	Course Used in	V92: B.Sc (Physics, Chemistry, Mathematics) &
	Course osed III	V100: B.Sc (Botany, Chemistry, Zoology)

PROGRAMME INFORMATION

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Type
02	CHE106	Physical & Organic Chemistry - I	4	12	120	20	80	100	Т

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives	
For successful completion of	The objectives of this course are–	
this course, student should	 Define thermodynamics 	
have successfully completed:	 Explore the basic concepts in thermodynamics 	
✤ 10+2(12 th) Science Pass	 Illustrate the laws of thermodynamics 	
(with Biology)	 Explain internal energy, work done 	
	 Define enthalpy 	
	✤ Explain mechanism of electrophilic substitution reaction in	
	benzene	
	 Explore the nitration of benzene 	
	 Discuss the halogenations of benzene 	
	 Distinguish Friedel crafts alkylation and acylation 	

UN	Detailed Syllabus of the Unit	Credit
01-01	Chemical Energetics : ReviewofthermodynamicsandtheLawsofThermodynamics.Importantprinciplesand definitions of thermo chemistry. Concept of standard state and standard enthalpies of formations, integral and differential enthalpies of solution and dilution. Calculation of bond energy, bond dissociation energy and resonance energy from thermo chemical data. Variation of enthalpy of is action with temperature–Kirchhoff's equation. Statement of Third Law of thermodynamics and calculation of absolute entropies of substances.	Credit 01
01-02	Chemical Equilibrium: Free energy change in a chemical reaction. Thermodynamic derivation of the law of Chemical equilibrium. Distinction between ΔG and Δ Go, Le Chatelier's principle. Relationships between Kp, Kc and Kx for reactions involving ideal gases.	

02-01	Ionic Equilibria: Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, common ion effect. Salt hydrolysis-calculation of hydrolysis constant, degree of hydrolysis and pH for different salts. Buffer solutions. Solubility and solubility product of sparingly soluble salts–applications of solubility product principle.	Credit 02
03-01	Organic Chemistry: Functional group approach for the following reactions (preparations & reactions) to be studied in context to their structure. Aromatic hydrocarbons: Preparation (Case benzene) :from phenol by decarboxylation, from acetylene, from benzene sulphonic acid. Reactions: (Case benzene): Electrophilic substitution: nitration, halogenation and sulphonation Friedel- Craft's reaction (alkylation and acylation) (upto 4 carbons on benzene)	O3
	Side chain oxidation of alkyl benzenes (upto4 carbons on benzene).	
03-02	Alkyl and Aryl Halides:	
03-02	Alkyl Halides (Upto 5 Carbons) Types of Nucleophilic Substitution (SN1, SN2 and SNi) reactions. Preparation: from alkenes and alcohols. Reactions: hydrolysis, nitrite & nitro formation, nitrile & isonitrile formation. Williamson's ether synthesis: Elimination vs substitution.	
03-03	Aryl Halides Preparation:	
	(Chloro, bromo and iodo-benzene case): from phenol, Sandmeyer & Gattermann reactions. Reactions (Chloro benzene): Aromatic nucleophilic substitution (replacement by–OH group) and effect of nitro substituent. Benzyne Mechanism: KNH2/NH3(orNaNH2/NH3). Reactivity and Relative strength of C-Halogen bond in alkyl, allyl, benzyl, vinyl and aryl halides.	
04-01	Alcohols: Preparation: Preparation of 10, 20 and 30 alcohols: using Grignard reagent, Ester hydrolysis, Reduction of aldehydes, ketones ,carboxylic acid and esters. Reactions: With sodium, HX (Lucas test), esterification, oxidation (with PCC, alk.KMnO4, acidic dichromate, conc.HNO3).Oppeneauer oxidation Diols: (Upto 6 Carbons) oxidation of diols. Pinacol-Pinacolone rearrangement.	Credit 04
04-02	Phenols:	
	(Phenol case) Preparation: Cumene hydro peroxide method, from diazonium salts. Reactions: Electrophilic substitution: Nitration, halogenation and Sulphonation . Reimer-Tiemann Reaction, Gattermann-Koch Reaction, Houben– Hoesch Condensation, Schotten – Baumann Reaction.	
04-03	Ethers (aliphatic and aromatic):	
	Cleavage of ethers with HI.	
04-04	Aldehydes and ketones (aliphatic and aromatic):	
	(Formaldehye, acetaldehyde, acetone and benzaldehyde) Preparation: from acid chlorides and from nitriles. Reactions–Reaction with HCN, ROH, NaHSO3, NH2- Gderivatives. Iodoform test. Aldol Condensation, Cannizzaro's reaction, Wittig reaction, Benzoin condensation. Clemensen reduction and Wolff Kishner reduction. Meerwein-Pondorff Verley reduction.	

I R Code	Title	Edition	ISBN					
LIX COUC	Author	Year	Publisher					
YCMOU SLM	YCMOU SLM eBooks							
CHE106-T01	https://goo.gl/ytrJWe	2016	- YCMOU					
Reference Boo	bks							
CHE106-RB01	Chemistry for Degree Students (B.Sc. SemII, CBCS) R L Madan	2016	9789352533046 S Chand					
CHE106-RB02	Chemistry @ https://goo.gl/29PGRb	2017	1-947172-09-3 OpenStax					
CHE106-RB03	Chemistry: Atoms First @ https://goo.gl/e58NiX	2017	1-947172-18-2 OpenStax					
CHE106-RB04	Organic Chemistry with a Biological Emphasis @ https://goo.gl/2W5m8E	2016	BCCampus					
CHE106-RB05	Analytical Chemistry @ https://goo.gl/BPaxaz	2010	BCCampus					
CHE106-RB06	Introductory Chemistry @ https://goo.gl/WrDfrM	2011	BCCampus					
CHE106-RB07	Concept Development Studies in Chemistry @ https://goo.gl/LbQigG	2007	BCCampus					
CHE106-RB08	PhET Simulations @ https://goo.gl/rcFu5P	2016	- YCMOU					

COURSE OUTCOMES

After successful completion of this course, student should be able to -

- Apply mathematical and conceptual approaches to solve problems related to thermodynamics, kinetics, quantum mechanics, and chemical equilibrium.
- Acquire the ability to perform calculations involving thermodynamic parameters, reaction rates, and electrochemical processes.
- Explain the mechanisms of organic reactions and predict reaction outcomes based on mechanistic understanding.
- Acquire practical skills in designing and conducting organic synthesis reactions.

CHE107: PHYSICAL & ORGANIC CHEMISTRY - I

SN	Description	Details
1		Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222,
	University	Maharashtra, India
		Website: <u>http://www.ycmou.ac.in</u>
2	School	School of Sciences
3	Discipline	Science
4	Level	UG
5	Course Used in	V92: B.Sc (Physics, Chemistry, Mathematics) &
	Course Osed III	V100: B.Sc (Botany, Chemistry, Zoology)

PROGRAMME INFORMATION

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Type
02	CHE107	Physical & Organic Chemistry - I	2	6	120	10	40	50	Р

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of this course, student should	The objectives of this course are– • Describe subatomic particles
have successfully completed:	 Explain Thomson's atomic model, Rutherford's atomic model
(with Biology)	• Define atomic number, ionic bond and atomic mass number
	 Distinguish between isotopes and isobars
	• Explore structure of ionic compound from the radius ratio
	Explain lattice energy, salvation energy
	List general characteristics of ionic compound
	• Explore inductive effect, electrometric effect, mesomeric effect, hyper conjugation

UN	Detailed Syllabus of the Unit	Credit
01-01	Determination of heat capacity of calorimeter for different volumes.	
01-02	Determination of enthalpy of neutralization of hydrochloric acid with sodium hydroxide.	Credit
01-03	Determination of enthalpy of ionization of acetic acid.	01
01-04	Determination of integral enthalpy of solution of salts (KNO3, NH4Cl).	
01-05	Determination of enthalpy of hydration of copper sulphate.	
01-06	Study of the solubility of benzoic acid in water and determination of ΔH .	
02-01	Ionic equilibria - pH measurements	

	a) Measurement of pH of different solutions like aerated drinks, fruit juices, shampoos	Credit						
	electrode) using pH-meter.							
	b) Preparation of buffer solutions: (i) Sodium acetate-acetic acid (ii)Ammonium							
	chloride- ammonium hydroxide							
	c) Measurement of the pH of buffer solutions and comparison of the values with theoretical values.							
02-02	² Purification of organic compounds by crystallization (from water and alcohol) and distillation.							
02-03	3 Criteria of Purity: Determination of melting and boiling points.							
02-04	Preparations: Mechanism of various reactions involved to be discussed. Recrystallisation, determination of melting point and calculation of quantitative yields to be done.							
	(a) Bromination of Phenol/Aniline							
	(b) Benzoylation of amines/phenols							
	(c) Oximeand 2,4-dinitrophenyl hydrazone of aldehyde/ketone							

LR Code	Title	Edition	ISBN
LICOUC	Author	Year	Publisher
YCMOU SLM	eBooks		
CHE107-P01		2016	YCMOU
CHE106-T01	https://goo.gl/ytrJWe	2016	YCMOU
Reference Boo	oks	1	I
CHE107-RB01	Chemistry for Degree Students (B.Sc. SemII, CBCS) R L Madan	2016	9789352533046 S Chand
CHE107-RB02	Chemistry @ https://goo.gl/29PGRb	2017	1-947172-09-3 OpenStax
CHE107-RB03	Chemistry: Atoms First @ https://goo.gl/e58NiX	2017	1-947172-18-2 OpenStax
CHE107-RB04	Organic Chemistry with a Biological Emphasis @ https://goo.gl/2W5m8E	2016	BCCampus
CHE107-RB05	Analytical Chemistry @ https://goo.gl/BPaxaz	2010	BCCampus
CHE107-RB06	Introductory Chemistry @ https://goo.gl/WrDfrM	2011	BCCampus
CHE107-RB07	Concept Development Studies in Chemistry @ https://goo.gl/LbQigG	2007	BCCampus
CHE107-RB08	PhET Simulations @ https://goo.gl/rcFu5P	2016	YCMOU

COURSE OUTCOMES

After successful completion of this course, student should be able to -

- Apply mathematical and conceptual approaches to solve problems related to thermodynamics, kinetics, quantum mechanics, and chemical equilibrium.
- Acquire the ability to perform calculations involving thermodynamic parameters, reaction rates, and electrochemical processes.
- Explain the mechanisms of organic reactions and predict reaction outcomes based on mechanistic understanding.
- Acquire practical skills in designing and conducting organic synthesis reactions.

ZGY106: ANATOMY & DEVELOPMENTAL BIOLOGY OF VERTEBRATES

PROGRAMME INFORMATION

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222, Maharashtra, India Website: <u>http://www.ycmou.ac.in</u>
2	School	School of Sciences
3	Discipline	Science
4	Level	UG
5	Course Used in	V100: B.Sc (Botany, Chemistry, Zoology)

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Type
02	ZGY106	Anatomy & Developmental Biology of Vertebrates	4	12	120	20	80	100	Т

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of	The objectives of this course are–
this course, student should have successfully completed:	 Explore the functional significance of anatomical features in vertebrates
 ✤ 10+2(12th) Science Pass (with Biology) 	 Examine the embryological development of vertebrates Investigate how vertebrates have adapted to various ecological niches Study the anatomical structures and systems of vertebrates

UN	Detailed Syllabus of the Unit Credi	it			
01-01	Integumentary System: Integument and its function, Derivatives of				
	integument w.r.t. glands and digital tips Credit	01			
01-02	Skeletal System: Bones and cartilage, Bones of fore limb and hind limbs, skull,				
	Characteristics of skull of reptiles, Aves and mammals; Vertebral column of				
	Pisces, reptiles, Aves and mammals Evolution of visceral arches				
01-03	Digestive System: Brief account of alimentary canal (Buccal cavity-teeth,				
	tongue; pharynx, oesophagus, stomach, Intestine- Large and small) and digestive				
	glands (Oral glands, Liver, Pancreas)				
01-04	Respiratory System: Brief account of Gills (External and internal), lungs, air				
	sacs and swim bladder, Accessary respiratory organs				
02-01	Circulatory System: Blood and its function, Evolution of heart in vertebrates, Embryonic arteries and modification of aortic arches, Embryonic veins and modification of veins	it			

02-02	Urinogenital System: Succession of kidney, Evolution of urinogenital ducts (Elashmobranchs, Amphibia, Reptilia, Aves and mammals)	02						
02-03	Nervous System: Comparative account of brainin pisces, amphibian, reptiles aves, and mammals, Sense Organs: Types of receptors							
02-04	Endocrine system: Pituitary, Thyroid, Parathyroid, Pancreas, Adrenal gland, Ovary and Testis, Endocrine organs in vertebrates-Elashmobranchs, Amphibia, Reptilia, Aves and mammals							
03-01	Early Embryonic Development: Gametogenesis w.r.t. mammals: Spermatogenesis; Structure and function of sperm; Oogenesis, Types of Eggs; Egg membrane; vitellogenesis in birds							
03-02	 Fertilization: external (amphibians), internal (mammals), Changes in gametes, blocks to polyspermy 							
03-03	Early development of frog and humans: Planes and patterns of cleavage, Types of blastula, fate map, Early development of frog and humans up to formation of gastrula)							
03-04	Types of morphogenetic movements : Fate of germ layers; Neurulation in frog embryo							
04-01	Late Embryonic Development: Implantation of embryo in humans, Formation of human placenta and functions, other types of placenta on the basis of histology	Cradit						
04-02	Metamorphic events in frog life cycle and its hormonal regulation	04						
04-03	Control of Development: Fundamental processes in development (brief idea) – Gene activation, determination, induction	Ĩ						
04-04	Fundamental processes in development (brief idea) : Differentiation, morphogenesis, intercellular communication, cell movements and cell death							

LR Code	LR Code Title Author		ISBN Publisher	
YCMOU SLM eB	ooks			
ZGY106-T01				
Reference Books				
ZGY106-RB1	Vertebrates' Comparative Anatomy, Function and Evolution – Kardong, K.V.	2005 IV Edition.	McGraw- Hill Higher Education.	
ZGY106-RB2	Comparative Anatomy of the Vertebrates - Kent, G.C. and Carr R.K.	2000 IX Edition	The McGraw- Hill Companies	
ZGY106-RB3	Analysis of Vertebrate Structure - Hilderbrand, M and Gaslow G.E.		John Wiley and Sons	

ZGY106-RB4	Biology of Vertebrates - Walter, H.E. and Sayles, L.P		Khosla Publishing House
ZGY106-RB5	Developmental Biology - Gilbert, S. F.	2006 VIII Edition	Sinauer Associates, Inc., Publishers, Sunderland, USA.
ZGY106-RB6	An introduction to Embryology - Balinsky, B.I.	2008	International Thomson Computer Press
ZGY106-RB7	Foundations of Embryology - Carlson, Bruce M Pattens	1996	McGraw Hill, Inc.

COURSE OUTCOMES

After successful completion of this course, student should be able to -

- Analyze and compare the anatomy of different vertebrate species to identify common patterns and unique adaptations.
- Explain the functional significance of anatomical features and how they relate to the ecological and physiological characteristics of vertebrates.
- Apply an evolutionary perspective to interpret the similarities and differences in vertebrate anatomy and development.
- Recognize how the study of vertebrate anatomy and development intersects with other scientific disciplines, such as evolutionary biology, ecology, and physiology.

ZGY107: ANATOMY & DEVELOPMENTAL BIOLOGY OF Vertebrates

PROGRAMME INFORMATION

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222, Maharashtra, India Website: <u>http://www.ycmou.ac.in</u>
2	School	School of Sciences
3	Discipline	Science
4	Level	UG
5	Course Used in	V100: B.Sc (Botany, Chemistry, Zoology)

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Type
02	ZGY107	Comparative Anatomy & Developmental Biology of Vertebrates	2	6	120	10	40	50	Р

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of this course, student should have successfully completed: • 10+2(12 th) Science Pass (with Biology)	 The objectives of this course are- Explore the functional significance of anatomical features in vertebrates Examine the embryological development of vertebrates Investigate how vertebrates have adapted to various ecological niches
	 Study the anatomical structures and systems of vertebrates

UN	Detailed Syllabus of the Unit	Credit
01-01	Study of Disarticulated skeleton of fowl and rabbit	
01-02	Study of Carapace and plastron of Reptiles	Credit
01-03	Study of Mammalian skulls: One herbivorous and one carnivorous animal	01
01-04	Study of Integumentary derivatives of Aves and Mammals	-
01-05	Study of Scales and Fins in Fishes	
01-06	Comparative study of Brain in Vertebrates	
01-07	Comparative study of Heart in Vertebrates	
01-08	Comparative study of Skin in Vertebrates	

02-01	Study of developmental stages of Frog	
02-02	Study of different types of eggs in Vertebrates	
02-03	Study of different types of Cleavage in Vertebrates	Credit
02-04	Study of the different types of placenta in Mammals	02
02-05	Study of different types of embryos in Amphibia, Reptilia, Aves and Mammalia	
02-06	Study of extra embryonic membranes in Mammals	
02-07	Study of Chick embryo (Whole Mounts)	
02-08	Study of Chick embryo (Transverse Section)	

LR Code	ode Edition Title Author Year		ISBN Publisher	
YCMOU SLM eB	ooks			
ZGY107-P01				
ZGY106-T01				
	Reference Books			
ZGY107-RB1	Vertebrates' Comparative Anatomy, Function and Evolution – Kardong, K.V.	2005 IV Edition.	McGraw- Hill Higher Education.	
ZGY107-RB2	Comparative Anatomy of the Vertebrates - Kent, G.C. and Carr R.K.	2000 IX Edition	The McGraw- Hill Companies	
ZGY107-RB3	Analysis of Vertebrate Structure - Hilderbrand, M and Gaslow G.E.		John Wiley and Sons	
ZGY107-RB4	Biology of Vertebrates - Walter, H.E. and Sayles, L.P		Khosla Publishing House	
ZGY107-RB5	Developmental Biology - Gilbert, S. F.	2006 VIII Edition	Sinauer Associates, Inc., Publishers, Sunderland, USA.	
ZGY107-RB6	An introduction to Embryology - Balinsky, B.I.	2008	International Thomson Computer Press	
ZGY107-RB7	Foundations of Embryology - Carlson, Bruce M Pattens	1996	McGraw Hill, Inc.	

COURSE OUTCOMES

After successful completion of this course, student should be able to –

• Analyze and compare the anatomy of different vertebrate species to identify common patterns and unique adaptations.

- Explain the functional significance of anatomical features and how they relate to the ecological and physiological characteristics of vertebrates.
- Apply an evolutionary perspective to interpret the similarities and differences in vertebrate anatomy and development.
- Recognize how the study of vertebrate anatomy and development intersects with other scientific disciplines, such as evolutionary biology, ecology, and physiology.

SEMESTER 03 SEC311: IT & E-LEARNING SKILLS

PROGRAMME INFORMATION

SN	Description	Details			
		Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222,			
1	University	Maharashtra, India			
		Website: <u>http://www.ycmou.ac.in</u>			
2	School School of Sciences				
3	Discipline	Science			
4	Level	UG			
_	Course Used in	V92: B.Sc (Physics, Chemistry, Mathematics) &			
5		V100: B.Sc (Botany, Chemistry, Zoology)			

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Туре
03	SEC311	IT & E-Learning Skills	4	12	120	20	80	100	Т

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives				
For successful completion of this course,	The objectives of this course are–				
student should have successfully completed:	 Use computer at basic level 				
✤ 10+2(12 th) Science Pass (with Biology)	 Use various software at basic level Use E-Learning for effective learning 				

UN	Detailed Syllabus of the Unit	Credit
01-01	Block Diagram of a Computer, Functions of the Different Units: Input unit, Output unit, Memory unit, CPU (ALU+CU)	Credit 01
01-02	Input & Output Devices. Input Devices: a) Keyboard, b)Point and draw devices Mouse ,trackball, light pen, c) Data scanning devices Image scanner, OCR, OMR, Barcode reader, card reader d)Voice Recognition Devices Output Devices: Monitor, Projectors, Printers	
01-03	Memory: Cache Memory, Primary Memory: I) RAM a) How data is stored in a RAM b) DRAM and S RAM II) ROM a)ROMBIOS/Firmware b) Types of ROM	
01-04	Secondary Memories: I) Hard disk- a) Structure of a hard disk, how data is stored in a hard disk, concept of Tracks, sectors, clusters, cylinders b) Formatting of hard disk. II) CD/DVD [data storage mechanism]	
02-01	Functions of Operating System. Types of Operating System - MS Windows, Linux, and Macintosh.	

02-02	Utility Programs: Antivirus, CD/DVD burner, VLC media player, Adobe Reader Web browser, Mozilla Firefox, Google Chrome, Internet Explorer / Edge					
02-03	Word-processing					
02-04	Presentation					
02-05	Spreadsheet					
03-01	E-Learning definition, scope, trends, attributes & opportunities					
03-02	Pedagogical designs for e-learning	Credit				
03-03	Assessment, feedback, and e-moderation					
03-04	Online learning management systems					
04-01	Digital learning objects					
04-02	Online learning course development models	Credit				
04-03	Management and implementation of e-learning	04				
04-04	Evaluating the impacts of e-learning					

LR Code	Title Author	Edition Year	ISBN Publisher
YCMOU SL	M eBooks		
SEC111-T01	https://goo.gl/ytrJWe	2016	- YCMOU
Reference Bo	<u>.</u>		
SEC311-R01	ELearning: A Guidebook of Principles, Procedures and Practices @ <u>http://cemca.org.in/ckfinder/userfiles/files/e-</u> <u>learning_guidebook.pdf</u> Som Naidu	2 nd 2006	81-88770-04-3 CEMCA

COURSE OUTCOMES

After successful completion of this course, student should be able to –

- Evaluate and critically analyze online information and media sources, distinguishing between credible and unreliable content.
- Create and manipulate multimedia content for educational presentations and projects.
- Apply e-learning pedagogy and instructional design principles to design and deliver effective online educational content.
- Adapt to evolving technology and educational trends, demonstrating the ability to continue learning and staying up-to-date with IT and e-learning advancements.
- Exhibit responsible and ethical behavior in online learning environments, respecting copyright, privacy, and digital etiquette.

BNY201: DIVERSITY & MORPHOLOGY OF ANGIOSPERMS

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222, Maharashtra, India
1		Website: <u>http://www.ycmou.ac.in</u>
2	School	School of Sciences
3	Discipline	Science
4	Level	UG
5	Course Used in	V100: B.Sc (Botany, Chemistry, Zoology)

PROGRAMME INFORMATION

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Type
03	BNY201	Diversity & Morphology of Angiosperms	4	12	120	20	80	100	Т

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives		
For successful completion of this course, student should have successfully completed:	 The objectives of this course are- To know the scope and importance of plant anatomy and embryology To distinguish between meristematic tissue and permanent tissue To study structure of micro and mega sporangium To study pollination, fertilization, Endosperm and Embryogeny and to give the exposure of techniques in embryology 		

UN	Detailed Syllabus of the Unit		
01-01	Introduction of Diversity of Angiosperm: Diversity of Angiosperm w.r.t.		
	form, structure and function. Distinguishing features of the group.	a 11.	
01-02	Evolutionary status of Angiosperms: Alternation of generations.	Credit 01	
01-03	Taxonomy: Definition and aims of Taxonomy, Taxonomy and systematic. Functions of Taxonomy: i) Identification ii) Nomenclature iii) Classification.		
01-04	Classification of Angiosperms: Ranks of Classification, Binomial Nomenclature.		
02-01	Systems of Classification: i) Artificial ii) Natural iii) Phylogenetic.	Credit	
02-02	 Bentham & Hooker's system of classification upto series i) History, ii) Outline upto series giving reasons iii) Merits iv) Demerits. 		

02-03	 Study of families of Angiosperms: (w.r.t Systematic position, general morphological characters, salient features and economic importance) i) Annonaceae ii) Malvaceae iii) Rutaceae iv) Meliaceae v) Mimosaceae vi) Caesalpiniaceae vii) Papilionaceae (Fabaceae) viii) Myrtaceae ix) Rubiaceae x) Sapotaceae xi)Apocynaceae xii) Solanaceae xiii) Labiatae (Lamiaceae) xiv)Euphorbiaceae xv)Liliaceae xvi) Commelinaceae. Herbarium: Definition, Functions, Techniques: i) Collection ii) Drying iii) Poisoning iv) Mounting v) Labeling vi) Deposition. 	
03-01	Morphology Of Angiosperms: Introduction, Ground plan of a plant body, functions of different organs, Seedling morphology: structure of dicotyledonous and monocotyledonous seeds, Epigeal and hypogeal germination.	Credit
03-02	Root: Definition, characteristics, functions of root, types of root, Types of modifications for storage, support and breathing: a) Storage: Conical, Fusifrom, Napiform, Tuber. b) Support: Prop, Floating, Epiphytic, Parasitic. c) Breathing roots: Pneumatophores.	03
03-03	Stem: Definition, characteristics and functions of stem. Types: Creepers, Climbers, Lianas, Erect. Modifications: a) Underground: Rhizome, Tuber, Bulbs (Tunicated and Scaly), Corm b) Subaerial: Runner, Sucker, and Offset, Stolon c) Aerial: Phylloclade, Cladode, Thorn, Stem-tendril, Bulbil.	
03-04	Leaf: Definition, parts of a typical leaf, functions of leaf, Phyllotaxy: a) Alternate b) Opposite c) Whorled, Stipules: Free-lateral, adnate, interpetiolar, intrapetiolar, orchreate, foliaceous, spiny, tendrillar, Types of Leaf: simple and compound leaf, Venation: Types of venation, Modifications of lamina: Leaf spines, leaf tendrils, fleshy leaf, insectivorous plant- pitcher, bladder-wort, venus fly-trap.	
04-01	Inflorescence: Definition a) Racemose and their types, b) Cymose and their types, c) Special types: Cyathium, Hypanthodium, Verticillaster, Significance of inflorescence.	Credit
04-02	Flower: Definition, Parts of typical flower, Hypogyny, Epigyny, Perigyny, Bract, Bracteole, Modifications.	04
04-03	Calyx: Modifications of calyx- acrescent, macrescent, petalloid calyx, pappus, leafy (foliaceous) calyx Corolla: Polypetalous and gamopetalous types, Perianth, Aestivation: Types of aestivation, Androecium: Cohesion and Adhesion, Gynoecium: Placentation types.	
04-04	Fruit: Definition, Types: A) Simple: (a) Dehiscent (b) Indehiscent i) Fleshy ii) Dry (c) Schizocarpic B) Aggregate fruits C) Composite fruits: (a) Sorosis (b) Syconus.	

LR Code	Title Author	Edition Year	ISBN Publisher	
YCMOU SLM e	Books			
BNY201-T01				
Reference Book	CS CS			
BNY201- RB01	Embryology of Angiosperms - Bhojwani, S.S. & Bhatnagar, S.P.	2011 5th edi.	Vikas Publication House Pvt. Ltd.New Delhi.	

BNY201-	Plant Anatomy		The Benjamin/
RB02	- Mauseth, J.D.	1988	Cummings Publisher, USA.

COURSE OUTCOMES

After successful completion of this course, student should be able to –

- Demonstrate a comprehensive understanding of the diversity of angiosperms, including their classification and evolutionary relationships.
- Analyze how angiosperms have adapted to different environments and niches and identify their unique ecological roles.
- Interpret the evolutionary history of angiosperms and their relationships with other plant groups.
- Apply fieldwork techniques for the identification and study of angiosperms in their natural habitats.

BNY202: DIVERSITY & MORPHOLOGY OF ANGIOSPERMS

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222, Maharashtra, India Website: <u>http://www.ycmou.ac.in</u>
2	School	School of Sciences
3	Discipline	Science
4	Level	UG
5	Course Used in	V100: B.Sc (Botany, Chemistry, Zoology)

PROGRAMME INFORMATION

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Туре
03	BNY202	Diversity & Morphology of Angiosperms	2	6	120	10	40	50	Р

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives		
For successful completion of this course, student should have successfully completed:	 The objectives of this course are- To know the scope and importance of plant anatomy and embryology To distinguish between meristematic tissue and permanent tissue To study structure of micro and mega sporangium To study pollination, fertilization, Endosperm and Embryogeny and to give the exposure of techniques in embryology 		

UN	Detailed Syllabus of the Unit	Credit
01-01	Study of Root and stem modifications as per syllabus.	
01-02	Study of leaf morphology i) Parts of typical leaf ii) Types of leaf: Simple and compound	Credit
	iii) Phyllotaxy : A) Alternate B) Opposite: a) Superposed b) Decussate C) Whorled	01
01-03	Study of inflorescence: i) Racemose types ii) Cymose types iii) Special types.	
01-04	Study of flower morphology: i) Calyx: Modifications and aestivation ii) Corolla: Forms of corolla and aestivation iii) Androecium: Adhesion and cohesion iv) Gynoecium: Types of placentation (Permanent Slides)	
01-05	Study of fruit morphology: i) Simple ii) Aggregate iii) Composite	
01-06	To find concentration of isotonic solution by plasmolysis method	
01-07	To find rate of photosynthesis under a) Light intensity b) Light quality	
01-08	To find rate of transpiration under a) Wind b) Light	
01-09	Demonstration: a) Imbibition pressure b) Osmosis- Thistle funnel c) Osmosis- Curling	

	experiment d) Ringing experiment	
01-10	Demonstration: a) Relative transpiration b) Ganong's potometer c) Kuhne's tube d) CO2 necessary for photosynthesis	
02-01	To identify following chemicals from plant material: a) Amino acids from legumes. b) Phenols in tea leaves and Supari (Areca-nut) c) Alkaloids in Tobacco/ Datura	Credit
02-02	To construct floral diagram and to write floral formula selecting different flower types	02
02-03	Study of garden tools and equipments	
02-04	Study of propagation- i) Media ii) Containers iii) Potting iv) Repotting	
02-05	Study of Propagation method by a) Cutting b) Layering	
02-06	Study of Propagation method by a) Budding b) Grafting	
02-07	Preparation of preserved food products a) Mix fruit jam b) wood apple or guava jelly c)	
	Lemon/Orange squash d) Tomato ketchup e) Ready to serve-R.T.S./juices.	
02-08	Study of ANY SIX families as per theory syllabus w.r.t. morphological characters, floral	
	formula, floral diagram and systematic position (Sensu Bentham and Hooker) giving	
	reasons, (Selecting families possibly from all plant groups viz., Polypetalae,	
	Gamopetalae, Monochlamydae and Monocotyledons).	

LR Code	Title Author	Edition Year	ISBN Publisher
YCMOU SLM e	Books		
BNY202-P01			
BNY201-T01			
Reference Bool	ks		
BNY202-Embryology of AngiospermsRB01- Bhojwani, S.S. & Bhatnagar, S.P.		2011 5th edi.	Vikas Publication House Pvt. Ltd.New Delhi.
BNY202- RB02	Plant Anatomy - Mauseth, J.D.	1988	The Benjamin/ Cummings Publisher, USA.

COURSE OUTCOMES

After successful completion of this course, student should be able to -

- Demonstrate a comprehensive understanding of the diversity of angiosperms, including their classification and evolutionary relationships.
- Analyze how angiosperms have adapted to different environments and niches and identify their unique ecological roles.
- Interpret the evolutionary history of angiosperms and their relationships with other plant groups.
- Apply fieldwork techniques for the identification and study of angiosperms in their natural habitats.

CHE201: PHYSICAL & ORGANIC CHEMISTRY - II

SN	Description	Details
		Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222,
1	University	Maharashtra, India
		Website: <u>http://www.ycmou.ac.in</u>
2	School	School of Sciences
3	Discipline	Science
4	Level	UG
5	Course Used in	V92: B.Sc (Physics, Chemistry, Mathematics) &
	Course osed III	V100: B.Sc (Botany, Chemistry, Zoology)

PROGRAMME INFORMATION

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Type
03	CHE201	Physical & Organic Chemistry - II	4	12	120	20	80	100	Т

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of	The objectives of this course are–
this course, student should	 Define solution and its components
have successfully completed:	 Describe the different types of solutions
✤ 10+2(12 th) Science Pass	 Express concentration of solution in different ways
(with Biology)	 Explain Henry's law
	 Discuss Kohlrausch law
	 Explore the factors effecting the conductivity of the solution

UN	Detailed Syllabus of the Unit	Credit
01-01	Thermodynamics of ideal solutions: Ideal solutions and Raoult's law, deviations from Raoult's law – non-ideal solutions. Vapour pressure-composition and temperature composition curves of ideal and non-ideal solutions. Distillation of solutions. Leverrule. Azeotropes.	Credit 01
01-02	Partial miscibility of liquids: Critical solution temperature; effect of impurity on partial miscibility of liquids. Immiscibility of liquids-Principle of steam distillation. Nernst distribution law and its applications, solvent extraction.	
01-03	Phase Equilibrium: Phases, components and degrees of freedom of a system, criteria of phase equilibrium. Gibbs Phase Rule and its thermodynamic derivation. Derivation of Clausius– Clapeyron equation and its importance in phase equilibria. Phase diagrams of one-component systems (water and sulphur) and two component systems involving eutectics, congruent and incongruent melting points(lead-silver, FeCl ₃ -H ₂ O and Na-K only).	

02-01	Conductance: Conductivity, equivalent and molar conductivity and their variation with dilution for weak and strong electrolytes. Kohlrausch law of independent migration of ions. Transference number and its experimental determination using Hit torf and Moving boundary methods. Ionic mobility. Applications of conductance measurements: determination of degree of ionization of weak electrolyte, solubility and solubility products of sparingly soluble salts, ionic product of water, hydrolysis constantof asalt. Conductometric titrations(only acid-base). Electrochemistry: Reversible and irreversible cells. Concept of EMF of a cell. Measurement of EMF of a cell. Nernst equation and its importance. Types of electrodes. Standard electrode potential. Electrochemical series. Thermodynamics of a reversible cell, calculation of thermodynamic properties: $\Delta G, \Delta H$ and ΔS from EMF data. Calculation of equilibrium constant from EMF data. Concentration cells with transference and without transference. Liquid junction potential and salt bridge. pH determination using hydrogen electrode and quinhydrone electrode. Potentiometric titrations -qualitative treatment (acid base and oxidation reduction only)	Credit 02
	(actu-base and oxidation-reduction only).	
03-01	Organic Chemistry: Functional group approach for the following reactions	Credit
03-02	 (preparations & reactions) to be studied in context to their structure. (arboxylic acids and their derivatives. Carboxylic acids (aliphatic and aromatic). Preparation: Acidic and Alkaline hydrolysis of esters. Reactions: Hell – Vohlard–Zelinsky Reaction. Carboxylic acid derivatives (aliphatic): (Upto 5 carbons) Preparation: Acid chlorides, Anhydrides, Esters and Amides from acids and their rinterconversion. Reactions: Comparative study of nucleophilicity of acyl derivatives. Reformatsky Reaction, Perkin condensation. Amines and Diazonium Salts. Amines (Aliphatic and Aromatic): (Upto 5 carbons) Preparation: from alkyl halides, Gabriel's Phthalimide synthesis, Hofmann Bromamide reaction. Reactions: Hofmannvs. Saytzeff elimination, Carbylamine test, Hinsbergtest, with HNO2, Schotten–Baumann Reaction. Electrophilic substitution (caseaniline): nitration, bromination, sulphonation. Diazoniumsalts: Preparation: from aromatic amines. Reactions: conversion to benzene, phenol, dyes. 	03
04-01	Amino Acids, Peptides and Proteins: Preparation of Amino Acids: Strecker synthesis using Gabriel's phthalimide synthesis. Zwitterion, Isoelectric point and Electrophoresis. Reactions of Amino acids: ester of–COOH group, acetylation of – NH2 group, complexation with Cu2+ ions, ninhydrin test. Overview of Primary, Secondary, Tertiary and Quaternary Structure of proteins. Determination of Primary structure of Peptides by degradation Edmann degradation (N-terminal) and C-terminal (thio hydantoin and with carboxy peptidase enzyme).Synthesis of simple peptides(upto dipeptides) by N-protection(t- butyl oxy carbonyl and phthaloyl) & C-activating groups and Merrifield solid-phase synthesis.	Credit 04
04-02	Carbohydrates: Classification, and General Properties, Glucose and Fructose (open chain and cyclic structure), Determination of configuration of mono saccharides, absolute configuration of Glucose and Fructose, Muta rotation,	

ascending and descending in monosaccharides. Structure of disacharrides (sucrose, cellulose ,maltose, lactose) and polysacharrides (starch and cellulose) excluding their structure elucidation.

LEARNING RESOURCE DETAILS

LR Code	Title Author	Edition Year	ISBN Publisher
YCMOU SLM e	eBooks		
CHE201-T01	https://goo.gl/ytrJWe	2016	- YCMOU
Reference Bool	ks		
CHE201-RB01	Chemistry for Degree Students (B.Sc. SemIII, CBCS) R L Madan	2016	9789352535200 S Chand
CHE201-RB02	Chemistry @ <u>https://goo.gl/29PGRb</u>	2017	1-947172-09-3 OpenStax
CHE201-RB03	Chemistry: Atoms First @ <u>https://goo.gl/e58NiX</u>	2017	1-947172-18-2 OpenStax
CHE201-RB04	Organic Chemistry with a Biological Emphasis @ https://goo.gl/2W5m8E	2016	BCCampus
CHE201-RB05	Analytical Chemistry @ <u>https://goo.gl/BPaxaz</u>	2010	BCCampus
CHE201-RB06	Introductory Chemistry @ <u>https://goo.gl/WrDfrM</u>	2011	BCCampus
CHE201-RB07	Concept Development Studies in Chemistry @ https://goo.gl/LbQigG	2007	BCCampus
CHE201-RB08	PhET Simulations @ <u>https://goo.gl/rcFu5P</u>	2016	YCMOU

COURSE OUTCOMES

After successful completion of this course, student should be able to –

- Apply mathematical and conceptual approaches to solve problems related to thermodynamics, kinetics, quantum mechanics, and chemical equilibrium.
- Acquire the ability to perform calculations involving thermodynamic parameters, reaction rates, and electrochemical processes.
- Explain the mechanisms of organic reactions and predict reaction outcomes based on mechanistic understanding.
- Apply knowledge of organic chemistry principles to solve problems related to synthesis, reactivity, and structural determination.

CHE202: PHYSICAL & ORGANIC CHEMISTRY - II

SN	Description	Details
1		Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222,
	University	Maharashtra, India
		Website: <u>http://www.ycmou.ac.in</u>
2	School	School of Sciences
3	Discipline	Science
4	Level	UG
5	Course Used in	V92: B.Sc (Physics, Chemistry, Mathematics) &
	Course Oseu III	V100: B.Sc (Botany, Chemistry, Zoology)

PROGRAMME INFORMATION

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Type
03	CHE202	Physical & Organic Chemistry - II	2	6	120	10	40	50	Р

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of	The objectives of this course are–
this course, student should	 Define solution and its components
have successfully completed:	 Describe the different types of solutions
✤ 10+2(12 th) Science Pass	 Express concentration of solution in different ways
(with Biology)	 Explain Henry's law
	 Discuss Kohlrausch law
	 Explore the factors effecting the conductivity of the solution

UN	Detailed Syllabus of the Unit	Credit		
01-01	Distribution: Study of the equilibrium of one of the following reactions by the distribution	L		
	method: $L(a_2) + L(a_2) \rightarrow L(a_2)$	Credit		
	$1_2(aq) + 1(aq) \leftarrow 1_3(aq)$	01		
	$\operatorname{Cu}^{2+}(\operatorname{aq}) + x\operatorname{NH}_2(\operatorname{aq}) \rightleftharpoons [\operatorname{Cu}(\operatorname{NH}_3)_x]^{2+}$	-		
01-02	Phase equilibria:			
	a) Construction of the phase diagram of a binary system (simple eutectic) using			
	cooling curves.			
	b) Determination of the critical solution temperature and composition of the phenol water system and study of the effect of impurities on it.			
	c) Studyofthevariationofmutualsolubilitytemperaturewithconcentrationforthephenol			
	water system and determination of the critical solubility temperature.			
01-03	3 Conductance			
	I. Determination of cell constant			
	II. Determination of equivalent conductance, degree of dissociation and			
	dissociation constant of a weak acid.			

	III. Perform the following conductometric titrations:		
	i. Strong acid vs. strong base		
	ii. Weak acid vs. strong base		
01-04	Potentiometry: Perform the following potentiometric titrations:		
	i. Strong acid vs. strong base		
	ii. Weak acid vs. strong base		
	iii. Potassium dichromate vs. Mohr's salt		
02-01	I Systematic Qualitative Organic Analysis of Organic Compounds possessing mono functional groups (-COOH, phenolic, aldehydic, ketonic, amide, nitro, amines) and preparation of one	Credit	
	derivative.	02	
02-02	II		
	1. Separation of amino acids by paper chromatography		
	2. Determination of the concentration of glycine solution by formylation method.		
	3. Titration curve of glycine		
	4. Action of salivary amylase on starch		
	5. Effect of temperature on the action of salivary amylase on starch.		
	6. Differentiation between a reducing and a non-reducing sugar.		

LR Code	Title Author	Edition Year	ISBN Publisher
YCMOU SLM e	I		
CHE202-P01	https://goo.gl/ytrJWe	2016	- YCMOU
CHE201-T01	https://goo.gl/ytrJWe	2016	- YCMOU
Reference Bool	ζS		
CHE202-RB01	Chemistry for Degree Students (B.Sc. SemIII, CBCS) R L Madan	2016	9789352535200 S Chand
CHE202-RB02	Chemistry @ <u>https://goo.gl/29PGRb</u>	2017	1-947172-09-3 OpenStax
CHE202-RB03	Chemistry: Atoms First @ <u>https://goo.gl/e58NiX</u>	2017	1-947172-18-2 OpenStax
CHE202-RB04	Organic Chemistry with a Biological Emphasis @ https://goo.gl/2W5m8E	2016	BCCampus
CHE202-RB05	Analytical Chemistry @ <u>https://goo.gl/BPaxaz</u>	2010	BCCampus
CHE202-RB06	Introductory Chemistry @ <u>https://goo.gl/WrDfrM</u>	2011	BCCampus
CHE202-RB07	Concept Development Studies in Chemistry @ https://goo.gl/LbQigG	2007	BCCampus
CHE202-RB08	PhET Simulations @ <u>https://goo.gl/rcFu5P</u>	2016	YCMOU
- Apply mathematical and conceptual approaches to solve problems related to thermodynamics, kinetics, quantum mechanics, and chemical equilibrium.
- Acquire the ability to perform calculations involving thermodynamic parameters, reaction rates, and electrochemical processes.
- Explain the mechanisms of organic reactions and predict reaction outcomes based on mechanistic understanding.
- Apply knowledge of organic chemistry principles to solve problems related to synthesis, reactivity, and structural determination.

ZGY201: ANIMAL PHYSIOLOGY & ECOLOGY

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222, Maharashtra, India Website: <u>http://www.ycmou.ac.in</u>
2	School	School of Sciences
3	Discipline	Science
4	Level	UG
5	Course Used in	V100: B.Sc (Botany, Chemistry, Zoology)

PROGRAMME INFORMATION

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Туре
03	ZGY201	Animal Physiology & Ecology	4	12	120	20	80	100	Т

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of this course, student should have successfully completed: • 10+2(12 th) Science Pass	 The objectives of this course are— The learners will be able to identify and critically evaluate their own beliefs, values and actions in relation to professional and societal standards of ethics and its impact on ecosystem and biosphere due to the dynamics in population.
(with biology)	 To understand anticipate, analyse and evaluate natural resource issues and act on a lifestyle that conserves nature. The Learner understands and appreciates the diversity of
	ecosystems and applies beyond the syllabi to understand the local lifestyle and problems of the community

UN	Detailed Syllabus of the Unit	Credit
01-01	Nerve: Structure of a neuron, Resting membrane potential, Graded potential, Origin of Action potential and its propagation in myelinated and non-myelinated nerve fibres	Credit 01
01-02	Muscle : Ultra-structure of skeletal muscle, Molecular and chemical basis of muscle contraction	
01-03	Digestion: Structural organization and functions of gastrointestinal tract and associated glands; Physiology of digestion in the alimentary canal; Absorption of carbohydrates, proteins, lipids	
01-04	Respiration: Structural organization of respiratory system; Pulmonary ventilation, Respiratory volumes and capacities, structure and function of haemoglobin, Transport of Oxygen and carbon dioxide in blood, Bohr and Haldane effect, Chloride shift	
02-01	Excretion: Structure of nephron, Mechanism of Urine formation,	

	Counter-current Mechanism, urea cycle, nitrogenous wastes-ammonia,	Credit
	urea, uric acid, Creatinine, Regulation of water balance; Regulation of	02
	acid-base balance	
02-02	Cardiovascular System: Composition of blood, Hemostasis (Blood clotting	
	system, Kallikrein-Kinninogen system, Complement system& Fibrinolytic	
	system), Structure of Heart, Origin and conduction of the cardiac impulse,	
	Cardiac cycle,	
02-03	Physiology of Osmoregulation in Vertebrates: Temperature regulation in	
	cold desert, Hibernation and Aestivation w.r.t amphibians, reptilians and	
	gastropods	
02-04	Physiology of Reproduction: Hormonal control of spermatogenesis,	
	hormonal control of menstrual cycle	
03-01	Introduction to Ecology :History of ecology, Autecology and synecology,	Credit
	Levels of organization, Laws of limiting factor, Study of physical factors	03
03-02	Ecosystem: Concept of Ecology- Structure and Composition of Ecosystem	
	(Abiotic components and biotic components., Types of ecosystems: Aquatic	
	(Freshwater, estuarine, Marine and terrestrial (Forest, Grassland and Desert),	
	Wetland as ecosystem service provider, concept of Eutrophication in lakes and	
	rivers	
03-03	Food chain: Detritus and grazing food chains, Linear and Y shaped food chain;	
	Food web, Energy flow through the ecosystem, Ecological pyramids: Number,	
	Biomass, and Energy	
03-04	Community characteristics: species richness, dominance, diversity,	
	abundance, vertical stratification, Eco tone and edge effect; Ecological	
	succession with one example	
04-01	Population : Unitary and Modular populations, Characteristic of population:	
	Density, Natality, Mortality, Fecundity tables, survivorship curves, age ratio, sex	
	ratio, dispersial and dispersion; Exponential and logistic growth	Credit
04-02	Population regulation: Density-dependent and independent factors.	04
	Population interactions, Gause's Principle with laboratory and field examples	
	(Quadrate, fine and ben transect methods).	
04-03	Animal interactions: introduction to Animal interactions, Types of Animal	
	Interactions with at least one suitable examples of each (1) Competition:	
	(remore fish on shark Cattle agrees on livestock) Mutualism (Termite and	
	Trichonympha bees and flowers cleaning symbiosis in fish by proving	
04.01	Antagonistic associations: Deregitism (Association and man lise and humans)	
04-04	Provide production (Lion and door)	
	riey predation (Lion and deer)	

LR Code	Title Author	Edition Year	ISBN Publisher
YCMOU SLM	eBooks		

ZGY201-T01			
Reference Boo	ok 🛛		
ZGY201-RB1	Principles of Anatomy and Physiology - Tortora, G.J. and Derrickson, B.H.	2009XII Edition	John Wiley & Sons, Inc.
ZGY201-RB2	Human Physiology - Widmaier, E. P. ,Raff, H. and Strang, K. T. Vander's	2008 XI Edition.	McGraw Hill
ZGY201-RB3	Textbook of Medical Physiology - Guyton, A. C. and Hall, J.E.	XII Edition 2011	Harcourt Asia Pvt. Ltd/ W.B. Saunders Company
ZGY201-RB4	Biochemistry - Berg, J. M., Tymoczko, J. L. and Stryer, L.	2006 VI Edition	W.H Freeman and Co.
ZGY201-RB5	Principles of Biochemistry - Nelson, D. L., Cox, M. M. and Lehninger, A.L.	2009 IV Edition	W.H. Freeman and Co.
ZGY201-RB6	Illustrated Biochemistry – Murray, R.K., Granner, D.K., Mayes, P.A. and Rodwell, V.W. Harper's	2009 XXVIII Edition	Lange Medical Books/Mc Graw3Hill.
ZGY201-RB7	Fundamentals of Ecology - Odum, E.P.	2008	Indian Edition. Brooks/Cole
ZGY201-RB8	Ecology - Ricklefs, R.E	2000 V Edition	Chiron Press

- Explain the cellular and molecular mechanisms underlying physiological processes in animals.
- Integrate knowledge of animal physiology to understand how physiological systems work together to maintain homeostasis.
- Explain ecosystem processes and the roles of animals in ecosystem functioning.
- Recognize the importance of conservation efforts and identify strategies for the protection of animal species and their habitats.

ZGY202: ANIMAL PHYSIOLOGY & ECOLOGY

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222, Maharashtra, India Website: http://www.ycmou.ac.in
	0 -11	Orbert of Origination
2	School	School of Sciences
3	Discipline	Science
4	Level	UG
5	Course Used in	V100: B.Sc (Botany, Chemistry, Zoology)

PROGRAMME INFORMATION

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Туре
03	ZGY202	Animal Physiology & Ecology	2	6	120	10	40	50	Р

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of this course, student should have successfully completed: 10+2(12 th) Science Pass (with Biology)	 The objectives of this course are— The learners will be able to identify and critically evaluate their own beliefs, values and actions in relation to professional and societal standards of ethics and its impact on ecosystem and biosphere due to the dynamics in population. To understand anticipate, analyse and evaluate natural resource issues and act on a lifestyle that conserves nature. The Learner understands and appreciates the diversity of
	ecosystems and applies beyond the syllabi to understand the local lifestyle and problems of the community

UN	Detailed Syllabus of the Unit	Credit
01-01	Preparation of haemin and hemochromogen crystals	
01-02	Study of different types of blood cells using suitable stain/s.	Credit
01-03	Study of permanent slides of T S of duodenum, liver, lung, kidney	01
01-04	Study of permanent slides of spinal cord, bone, cartilage	
01-05	Estimation of bleeding and clotting time	
01-06	Study of nervous & muscular tissue.	
01-07	Study of structure of heart and cardiac cycle.	
01-08	Study of spermatogenesis	
02-01	Study of life tables and plotting of survivorship curves from the hypothetical/real data provided	

02-02	Determination of population density in a natural/hypothetical community by quadrate	
	method	- 11
02-03	Study of microscopic fauna of freshwater ecosystem	Credit
		02
02-04	Estimation of hardness from given water samples	02
02-05	Estimation of dissolved Oxygen (Winkler's method) from water sample.	
02-06	Construction of food chain/food web using given information/data.	
02-07	Study of Eutrophication in lake/river.	
02-08	Estimation of Water Alkalinity from given water sample	

I D Codo	Title Authon	Edition	ICDN
LICOUC	THE Aution	Voon	Dublishon
VONOLLOLM	- n l	Tear	rublisher
YCMOU SLM	ebooks	1	
ZGY202-P01			
ZGY201-T01			
Reference Boo	ok		
ZGY202-RB1	Principles of Anatomy and Physiology	2009XII	John Wiley & Sons,
	- Tortora, G.J. and Derrickson, B.H.	Edition	Inc.
	Human Physiology	2008	
ZGY202-RB2	- Widmaier, E. P. ,Raff, H. and Strang, K. T. Vander's	XI	McGraw Hill
		Edition.	
	Textbook of Medical Physiology	XII	Harcourt Asia Pvt.
ZGY201-RB3	- Guyton A C and Hall J F	Edition	Ltd/W.B. Saunders
		2011	Company
			Company
	Biochemistry	2006	W.H Freeman and Co.
ZGY202-RB4	- Berg, J. M., Tymoczko, J. L. and Stryer, L.	VI	
		Edition	
ZGY202-RB5	Principles of Biochemistry	2009	W.H. Freeman and Co.
	- Nelson, D. L., Cox, M. M. and Lehninger, A.L.	IV Edition	
	Illustrated Biochemistry	2009	Lange Medical
	– Murray, R.K., Granner, D.K., Mayes, P.A. and Rodwell,	XXVIII	Books/Mc Graw3Hill.
ZGY202-RB6	V.W. Harper's	Edition	, 0
	Fundamentals of Ecology	2008	Indian Edition
ZGY202-RB7	- Odum, E.P.	2000	Brooks/Cole
	Fcology	2000	Chiron Press
ZGY202-RB8	- Ricklofe R F	V	
201202 100		Edition	

COURSE OUTCOMES

- Explain the cellular and molecular mechanisms underlying physiological processes in animals.
- Integrate knowledge of animal physiology to understand how physiological systems work together to maintain homeostasis.
- Explain ecosystem processes and the roles of animals in ecosystem functioning.

• Recognize the importance of conservation efforts and identify strategies for the protection of animal species and their habitats.

SEMESTER 04

SEC411: RESEARCH METHODOLOGY

PROGRAMME INFORMATION

SN	Description	Details
		Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222,
1	University	Maharashtra, India
		Website: <u>http://www.ycmou.ac.in</u>
2	School	School of Sciences
3	Discipline	Science
4	Level	UG
_	Course Used in	V92: B.Sc (Physics, Chemistry, Mathematics) &
5		V100: B.Sc (Botany, Chemistry, Zoology)

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Type
04	SEC411	Research Methodology	4	12	120	20	80	100	Т

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of this	The objectives of this course are–
course, student should have successfully completed:	 Students should understand a general definition of research design
 10+2(12th) Science Pass (with Biology) 	 Students should know the primary characteristics of quantitative research and qualitative research Students should be familiar with how to write a good introduction to an educational research study and the components that comprise such an introduction

UN	Detailed Syllabus of the Unit	Credit
01-01	Meaning of Research : Meaning of Research, Types of Research- Basic Research, Applied Research, Exploratory Research, Conclusive Research, Descriptive Research, Analytical Research, Quantitative Research, Qualitative Research, Steps in Research	Credit 01
01-02	Scientific Inquiry : Science and Common Sense, Science and common sense difference, Methods of Knowing	
01-03	Research Interdisciplinary Approach : philosophical and social foundation of research, reasoning, interdisciplinary approach	
01-04	Ethics in Research : Honesty: Honestly report data, results, methods and procedures, and publication status	
	Objectivity:	
	Integrity:	

1	Carefulness:	
	Openness:	
	Respect for Intellectual Property:	
	Confidentiality:	
	Responsible Publication:	
01-05	Survey Research : What is Survey Research, Definition of Survey, Types of Survey	
02-01	Experiment : Variables, Types, Laboratory Experiment, Field Experiment	Credit
02-02	Case Study: Ex-post-facto, Documentary, Content Analysis	02
02-03	Framing Aim, Objectives and Hypothesis : framing Aim, Objectives and Hypothesis for different types of research studies-Survey studies, co-relational studies, and cross- sectional studies	
02-04	Population and Sample Part I : non-probability sampling - Purposive Sampling, Incidental Sampling, Snow – ball Sampling, Quota Sampling, Judgmental Sampling	
02-05	Population and Sample Part II : Probability Sampling-Simple random sampling with replacement, Simple random sampling without replacement, Systematic sampling, Stratified sampling, Stratified random sampling, Random Sampling Technique, Cluster Sampling	
03-01	Tools of Data Collection Part I: Observation Method, Interview/Schedule	
03-02	Tools of Data Collection Part II: Construction of a Scale, Development of a	
	Test	Credit 03
03-03	Test Analysis of Qualitative Data: Content Analysis, Communality of Response	Credit 03
03-03 03-04	TestAnalysis of Qualitative Data: Content Analysis, Communality of ResponseAnalysis of Quantitative Data: Discrete data, Continuous data, TabularPresentation- One-way Table, Two-way Table, Three-way Table, Manifold Table.Graphical Presentation – Frequency Polygon, Frequency Histogram, PieDiagram	Credit 03
03-03 03-04 03-05	Test Analysis of Qualitative Data: Content Analysis, Communality of Response Analysis of Quantitative Data: Discrete data, Continuous data, Tabular Presentation- One-way Table, Two-way Table, Three-way Table, Manifold Table. Graphical Presentation – Frequency Polygon, Frequency Histogram, Pie Diagram Hypothesis Testing Chi Square Test: what is Chi square test, Its use, Steps,	Credit 03
03-03 03-04 03-05	Test Analysis of Qualitative Data: Content Analysis, Communality of Response Analysis of Quantitative Data: Discrete data, Continuous data, Tabular Presentation- One-way Table, Two-way Table, Three-way Table, Manifold Table. Graphical Presentation – Frequency Polygon, Frequency Histogram, Pie Diagram Hypothesis Testing Chi Square Test: what is Chi square test, Its use, Steps, 2x2Contingency Table	Credit 03
03-03 03-04 03-05	Test Analysis of Qualitative Data: Content Analysis, Communality of Response Analysis of Quantitative Data: Discrete data, Continuous data, Tabular Presentation- One-way Table, Two-way Table, Three-way Table, Manifold Table. Graphical Presentation – Frequency Polygon, Frequency Histogram, Pie Diagram Hypothesis Testing Chi Square Test: what is Chi square test, Its use, Steps, 2x2Contingency Table Managunga of Control Tondangy Mana, Modian, Mode, Standard Deviation	Credit 03
03-03 03-04 03-05 03-05	Test Analysis of Qualitative Data: Content Analysis, Communality of Response Analysis of Quantitative Data: Discrete data, Continuous data, Tabular Presentation- One-way Table, Two-way Table, Three-way Table, Manifold Table. Graphical Presentation – Frequency Polygon, Frequency Histogram, Pie Diagram Hypothesis Testing Chi Square Test: what is Chi square test, Its use, Steps, 2x2Contingency Table Measures of Central Tendency: Mean, Median, Mode, Standard Deviation	Credit 03
03-03 03-04 03-05 03-05 04-01	Test Analysis of Qualitative Data: Content Analysis, Communality of Response Analysis of Quantitative Data: Discrete data, Continuous data, Tabular Presentation- One-way Table, Two-way Table, Three-way Table, Manifold Table. Graphical Presentation – Frequency Polygon, Frequency Histogram, Pie Diagram Hypothesis Testing Chi Square Test: what is Chi square test, Its use, Steps, 2x2Contingency Table Measures of Central Tendency: Mean, Median, Mode, Standard Deviation Normal Probability Curve (NPS): what is NPS, Applications of NPC	Credit 03 Credit
03-03 03-04 03-05 03-05 04-01 04-02 04-03	Test Analysis of Qualitative Data: Content Analysis, Communality of Response Analysis of Quantitative Data: Discrete data, Continuous data, Tabular Presentation- One-way Table, Two-way Table, Three-way Table, Manifold Table. Graphical Presentation – Frequency Polygon, Frequency Histogram, Pie Diagram Hypothesis Testing Chi Square Test: what is Chi square test, Its use, Steps, 2x2Contingency Table Measures of Central Tendency: Mean, Median, Mode, Standard Deviation Normal Probability Curve (NPS): what is NPS, Applications of NPC Independent and Dependent Variables: Correlation coefficient	Credit 03 Credit 04
03-03 03-04 03-05 03-05 04-01 04-02 04-03 04-04	Test Analysis of Qualitative Data: Content Analysis, Communality of Response Analysis of Quantitative Data: Discrete data, Continuous data, Tabular Presentation- One-way Table, Two-way Table, Three-way Table, Manifold Table. Graphical Presentation – Frequency Polygon, Frequency Histogram, Pie Diagram Hypothesis Testing Chi Square Test: what is Chi square test, Its use, Steps, 2x2Contingency Table Measures of Central Tendency: Mean, Median, Mode, Standard Deviation Normal Probability Curve (NPS): what is NPS, Applications of NPC Independent and Dependent Variables: Correlation coefficient Selection of Statistical Techniques: How to Select different statistical technique for Research design depending upon the nature of data	Credit 03 Credit 04

LR Code	Title Author	Edition Year	ISBN Publisher				
YCMOU SLM eBooks							

SEC411-T01	https://goo.gl/ytrJWe	2016	- YCMOU					
Reference Bool	Reference Books							
SEC411-RB01	Research Methodology Methods and Techniques C R Kothari		978-81-224-2488-1 New Age					
SEC411-RB02	Fundamentals of Research Methodology and Statistics Yogesh Kumar Singh		978-81-224-2418-8 New Age					
SEC411-RB03	Research Methodology Video Playlist Link: <u>https://goo.gl/4IlEzH</u>	2016	- YCMOU					

- Formulate research questions, hypotheses, and research designs suitable for their areas of interest.
- Analyze research data using appropriate statistical or qualitative analysis techniques and interpret the results.
- Conduct effective literature reviews, synthesize existing research, and identify research gaps.
- Critically evaluate research studies, identify methodological strengths and weaknesses, and assess the validity and reliability of research results.

BNY206: Plant Systematic-Algae, Fungi and **Bryophytes**

PROGRAMME INFORMATION

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222, Maharashtra, India Website: <u>http://www.ycmou.ac.in</u>
2	School	School of Sciences
3	Discipline	Science
4	Level	UG
5	Course Used in	V100: B.Sc (Botany, Chemistry, Zoology)

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Type
04	BNY206	Plant Systematic – Algae, Fungi & Bryophytes	4	12	120	20	80	100	Т

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of	The objectives of this course are–
this course, student should have successfully completed:	 To study different process in relation with structure of organism and its environment.
 10+2(12th) Science Pass (with Biology) 	 To understand growth at various level Explore the classification and characteristics of fungi Develop practical skills in fieldwork, specimen collection, and preservation for herbarium collections

UN	Detailed Syllabus of the Unit	Credit
01-01	Introduction to Algae: 1. Introduction: Definition, Occurrence and Habitat General characters, and similarities and differences with Fungi and Bryophyte 2. Reproduction; Life cycle and Alternation of generation 3. Algae in human welfare.	Credit 01
01-02	Classification of algae: 1. Basis of algal classification and nomenclature; Classification of algae According to F. E. Fritsch (1945) and Parker (1982) up to class and subclass: 2. Comparative account of the algal classes, with respect to pigments, reserve food, cell wall, chloroplast and eyespot, flagella.	
01-03	Cyanophyceae: i) Introduction, Ecology of Blue Green Alga, ii) Thallus organization, Ultra cell structure & Heterocyst, Heterocyst function iii) Reproduction and Economic role	
01-04	Chlorophyceae: i) General characters, Range of thallus structure, Structure of Cell ii) Method of reproduction.	

02-01	Phaeophyceae:i) General characters, Range of thallus structureii)Method of reproduction	Credit 02
02-02	Rhodophyceae: i) General characters, Range of thallus structure ii) Method of reproduction, Introduction and General Characters of following Class i. Bacillariophyceae ii. Euglenophyceae.	
02-03	Fungi: Introduction: 1. Distinguishing characters, Thallus structure, Hyphal modifications 2. Nutrition 3. Classification of fungi up to classes as per-Ainsworth et al., system (1973). 4. Economic importance- Fungi in biotechnology, fungi as food.	
02-04	Myxomycota: i) Distinguishing characters ii) Structure of thallus and reproductive bodies iii) Life cycle pattern with reference to Pysarum.	
03-01	Mastigomycotina: i) Distinguishing characters ii) Thallus structure and reproduction (Asexual and sexual) iii) Life cycle pattern with reference to Plasmopara.	Credit
03-02	Zygomycotina: i) Distinguishing characters ii) Thallus structure, Heterothallism and reproduction iii) Life cycle pattern with reference to Mucor.	03
03-03	Ascomycotina: i) Distinguishing characters ii) Thallus structure, structure of asci, Types of ascocarps iii) Life cycle pattern with reference to Eurotium.	
03-04	Basidiomycotina: i) Distinguishing characters ii) Thallus structure, Types and Structure of basidia and basidiocarps iii) Life cycle pattern with reference to Teliomycetes.	
04-01	Deuteromycotina: i) Distinguishing characters ii) Thallus structure, fructifications, Types of conidia.	Credit
04-02	Introduction to Bryophytes: A) Introduction: - General characteristics, habitat, reproduction, structure of gametophyte & sporophyte B) Classification: - Classification of Bryophytes up to orders by G.M. Smith 1955)	04
04-03	Economic importance of Bryophytes: Evolution of gametophytes & sporophytes in Bryophytes.	
04-04	Hepaticae: (Marchantiales, Jungermannias, Metzeriales and Calobryales) Anthocerotae: Anthocerotales Musci: Polytrichales. (Distinguishing features, phylogeny & evolutionary tendencies of the above orders with their affinities)	

LR Code	Title Author	Edition Year	ISBN Publisher
YCMOU SLM e	Books		
BNY206-T01			
Reference Bool	ζς		
BNY206-RB01	Introductory Phycology - Kumar, H.D.	1999 2nd edition	Affiliated East-West. Press Pvt. Ltd. Delhi.

BNY206-RB02	. Microbiology: An Introduction – Tortora, G.J., Funke, B.R., Case, C.L	2010 10th edition	Pearson Benjamin Cummings, U.S.A.
BNY206-RB03	Text book of Fungi & Their Allie – Sethi, I.K. and Walia, S.K.	2011	MacMillan Publishers Pvt.Ltd., Delhi.
BNY206-RB04	Introductory Mycology – Alexopoulos, C.J., Mims, C.W., Blackwell, M.	1996 4th edition	John Wiley and Sons (Asia), Singapore.
BNY206-RB05	Biology - Raven, P.H., Johnson, G.B., Losos, J.B., Singer S. R.	2005	Tata McGraw Hill, Delhi, India.
BNY206-RB06	Pteridophyta - Vashishta, P.C., Sinha, A.K., Kumar, A.	2010	S. Chand. Delhi, India
BNY206-RB07	Gymnosperms - Bhatnagar, S.P. and Moitra,	1996	New Age International (P) Ltd Publishers, New Delhi, India.
BNY206-RB08	An introduction to Embryophyta. Vol. I. Bryophyta. - Parihar, N.S.	1991	Central Book Depot, Allahabad.

- Demonstrate a comprehensive understanding of the diversity of non-vascular plants, including algae, fungi, and bryophytes.
- Recognize the evolutionary relationships among these plant groups and their significance in the context of plant evolution.
- Apply critical thinking to analyze and interpret plant systematics data and draw conclusions about plant relationships and classification.
- Acquire practical fieldwork skills for collecting, documenting, and preserving plant specimens.

BNY207: PLANT SYSTEMATIC-ALGAE, FUNGI AND BRYOPHYTES

PROGRAMME INFORMATION

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222, Maharashtra, India Website: <u>http://www.ycmou.ac.in</u>
2	School	School of Sciences
3	Discipline	Science
4	Level	UG
5	Course Used in	V100: B.Sc (Botany, Chemistry, Zoology)

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Type
04	BNY207	Plant Systematic – Algae, Fungi & Bryophytes	2	6	120	10	40	50	Р

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of this course, student should have successfully completed: 10+2(12 th) Science Pass (with Biology)	 The objectives of this course are– To study different process in relation with structure of organism and its environment. To understand growth at various level

UN	Detailed Syllabus of the Unit	Credit
	Algae	1
01-01	Cyanophyta: Any two members from Each Order	
01-02	Chlorophyta: Any two members from Each Order	Credit
01-03	Charophyceae: Chara, Nitella	01
01-04	Phaeophyta: Any five members from All Orders	
01-05	Rhodophyta: Any five members from All Orders	
01-06	Class: i. Xanthophyceae – Vaucheria, Botrydium	
	ii. Bacillariophycece- Any Five members	
	iii. Euglenophyceae- Any two members	
	Fungi - Representative genera belonging to following divisions and subdivisions of fungi with respect to vegetative, reproductive structures and classification with reasons according to Ainsworth et al. (1973).	

02-01	Myxomycota -Any four forms	Credit
02-02	Mastigomycotina - Any four forms	02
02-03	Zygomycotina - Any three forms	
02-04	Ascomycotina - Any eight forms	
02-05	Basidiomycotina- Any eight forms	
02-06	Deuteromycotina - Any four form	
	Bryophytes : Morphological, Anatomical and Reproductive studies of the following	
02-07	Marchantiales: Plagiochasma, Targionia, Asterella, Dumortiera	
02-08	Jungermanniales: Pellia, Fossombronia, Pallavicinia, Porella, Frullania	
02-09	Anthocerotales : Anthoceros, Notothylus	
02-10	Musci : Polytrichum, Pogonatum	

L P Codo	Title Author	Edition	ISBN
LK Coue		Year	Publisher
YCMOU SLM	eBooks		
BNY207-P01			
BNY206-T01			
Reference Bo	oks	•	
BNY207-	Introductory Phycology	1999	Affiliated East-West.
RB01	- Kumar, H.D.	2 nd Ed	Press Pvt. Ltd. Delhi.
BNY207-	. Microbiology: An Introduction	2010	Pearson Benjamin
RB02	– Tortora, G.J., Funke, B.R., Case, C.L	10th	Cummings, U.S.A.
		edition	
BNY207-	Text book of Fungi & Their Allie		MacMillan
RB03	– Sethi, I.K. and Walia, S.K.	2011	Publishers Pvt.Ltd.,
			Delhi.
BNY207-	Introductory Mycology	1996	John Wiley and Sons
RB04	– Alexopoulos, C.J., Mims, C.W., Blackwell, M.	4th	(Asia), Singapore.
	ח' ו	edition	
BNY207-	Biology		Tata McGraw Hill,
RB05	- Raven, P.H., Johnson, G.B., Losos, J.B., Singer S. R.	2005	Delhi, India.
BNY207-	Pteridophyta	2010	S. Chand. Delhi,
RB06	- Vashishta, P.C., Sinha, A.K., Kumar, A.		India
BNY207-	Gymnosperms		New Age
RB07	- Bhatnagar, S.P. and Moitra,		International (P) Ltd
		1996	Publishers, New
			Delhi, India.
BNY207-	An introduction to Embryophyta. Vol. I. Bryophyta.		Central Book Depot,
RB08	- Parihar, N.S.	1991	Allahabad.

COURSE OUTCOMES

- Demonstrate a comprehensive understanding of the diversity of non-vascular plants, including algae, fungi, and bryophytes.
- Recognize the evolutionary relationships among these plant groups and their significance in the context of plant evolution.
- Apply critical thinking to analyze and interpret plant systematics data and draw conclusions about plant relationships and classification.
- Acquire practical fieldwork skills for collecting, documenting, and preserving plant specimens.

CHE206: PHYSICAL & INORGANIC CHEMISTRY

SN	Description	Details
1		Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222,
	University	Maharashtra, India
		Website: <u>http://www.ycmou.ac.in</u>
2	School	School of Sciences
3	Discipline	Science
4	Level	UG
5	Course Used in	V92: B.Sc (Physics, Chemistry, Mathematics) &
	Course Osed III	V100: B.Sc (Botany, Chemistry, Zoology)

PROGRAMME INFORMATION

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Туре
04	CHE206	Physical & Inorganic Chemistry	4	12	120	20	80	100	Т

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of	The objectives of this course are–
this course, student should	 Define the transition elements
have successfully completed:	 Discuss their electronic configuration
✤ 10+2(12 th) Science Pass (with Biology)	 Identify the d-block elements and ions which are technically not transitional
(mui biology)	 Justify the position of transition elements in the periodic table
	 Describe the general trends in physical properties of the transition elements
	 Relate the stability of various oxidation states with standard potential
	 Explain what is Latimer diagram
	 Illustrate the applications of Latimer diagrams
	 Calculate the change in Gibbs free energy
	 Discuss the Latimer diagrams for Mn, Fe and Cu and their use

UN	Detailed Syllabus of the Unit	Credit
01-01	Transition Elements (3d series): General group trends with special reference to electronic configuration, variable valency, colour, magnetic and catalytic properties, ability to form complexes and stability of various oxidation states (Latimer diagrams) for Mn, Fe and Cu. Lanthanoids and actinoids: Electronic configurations, oxidation states, colour, magnetic properties, lanthanide contraction, separation of lanthanides (ion exchange method only).	Credit 01
02-01	Coordination Chemistry: Valence Bond Theory (VBT): Inner and outer orbital complexes of Cr, Fe, Co, Ni and Cu (coordination numbers 4 and 6. Structural and stereoisomerism in complexes with coordination numbers 4 and 6. Drawbacks of VBT.	Credit

	IUPAC system of nomenclature.	02
02-02	Crystal Field Theory: Crystal field effect, octahedral symmetry. Crystal field stabilization energy (CFSE), Crystal field effects for weak and strong fields. Tetrahedral symmetry. Factors affecting the magnitude of D. Spectro-chemical series. Comparison of CFSE for Oh and Td complexes, Tetragonal distortion of octahedral geometry. Jahn-Teller distortion, Square planar coordination.	
03-01	Kinetic Theory of Gases: Postulates of Kinetic Theory of Gases and derivation of the kinetic gas equation. Deviation of real gases from ideal behavior, compressibility factor, causes of deviation. Vander Waals equation of state for real gases. Boyle temperature (derivation not required).Critical phenomena, critical constants and their calculation from vander Waals equation. And isotherms of CO2. Maxwell Boltzmann distribution laws of molecular velocities and molecular energies (graphic representation–derivation not required) and their importance. Temperature dependence of these distributions. Most probable, average and root mean square velocities (no derivation). Collision cross section, collision number, collision frequency, collision diameter and mean free path of molecules. Viscosity of gases and effect of temperature and pressure on coefficient of viscosity (qualitative treatment only).	Credit 03
	a liquid and determination of coefficient of viscosity using Ostwald viscometer. Effect of temperature on surface tension and coefficient of viscosity of a liquid (qualitative treatment only).	
04-01	Solids: Forms of solids. Symmetry elements, unit cells, crystal systems, Bravais lattice types and identification of lattice planes. Laws of Crystallography-Law of constancy of interfacial angles, Law of rational indices. Miller indices. X–Ray diffraction by crystals, Bragg's law. Structures of NaCl, KCl and CsCl (qualitative treatment only). Defects in crystals. Glasses and liquid crystals.	Credit 04
04-02	Chemical Kinetics: The concept of reaction rates. Effect of temperature, pressure, catalyst and other factors on reaction rates. Order and molecularity of a reaction. Derivation of integrated rate equations for zero, first and second order reactions(both for equal and unequal concentrations of reactants).Half–life of a reaction. General methods for determination of order of a reaction. Concept of activation energy and its calculation from Arrhenius equation.	
04-03	Theories of Reaction Rates: Collision theory and Activated Complex theory of bimolecular reactions. Comparison of the two theories (qualitative treatment only).	

LR Code	Title Author	Edition Year	ISBN Publisher	
YCMOU SLM e	Books			
CHE206-W01	https://goo.gl/ytrJWe	2016	- YCMOU	
Reference Books				
CHE206-R01	Chemistry for Degree Students (B.Sc. SemIV, CBCS) R L Madan	2016	9789352535194 S Chand	

CHE206-R02	Chemistry @https://goo.gl/29PGRb	2017	1-947172-09-3 OpenStax
CHE206-R03	Chemistry: Atoms First @ <u>https://goo.gl/e58NiX</u>	2017	1-947172-18-2 OpenStax
CHE206-R04	Organic Chemistry with a Biological Emphasis @ https://goo.gl/2W5m8E	2016	BCCampus
CHE206-R05	Analytical Chemistry @ <u>https://goo.gl/BPaxaz</u>	2010	BCCampus
CHE206-R06	Introductory Chemistry @ <u>https://goo.gl/WrDfrM</u>	2011	BCCampus
CHE206-R07	Concept Development Studies in Chemistry @ https://goo.gl/LbQigG	2007	BCCampus
CHE206-R08	PhET Simulations @ <u>https://goo.gl/rcFu5P</u>	2016	- YCMOU

- Apply mathematical and conceptual approaches to solve problems related to thermodynamics, kinetics, quantum mechanics, and chemical equilibrium.
- Acquire the ability to perform calculations involving thermodynamic parameters, reaction rates, and electrochemical processes.
- Analyze and predict the behavior of coordination compounds, including ligand exchange and isomerism.
- Describe the properties, reactions, and uses of key elements and inorganic compounds.

CHE207: PHYSICAL & INORGANIC CHEMISTRY

SN	Description	Details
		Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222,
1	University	Maharashtra, India
		Website: <u>http://www.ycmou.ac.in</u>
2	School	School of Sciences
3	Discipline	Science
4	Level	UG
5	Course Used in	V92: B.Sc (Physics, Chemistry, Mathematics) &
		V100: B.Sc (Botany, Chemistry, Zoology)

PROGRAMME INFORMATION

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Туре
04	CHE207	Physical & Inorganic Chemistry	2	6	120	10	40	50	Р

PRESUMED KNOWLEDGE AND LEA	RNING OBJECTIVES
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Presumed Knowledge	Learning Objectives	
For successful completion of	The objectives of this course are–	
this course, student should	 Define the transition elements 	
have successfully completed:	 Discuss their electronic configuration 	
✤ 10+2(12 th) Science Pass (with Biology)	 Identify the d-block elements and ions which are technically not transitional 	
(with biology)	Solution of transition elements in the periodic table	
	 Describe the general trends in physical properties of the transition elements 	
	 Relate the stability of various oxidation states with standard potential 	
	 Explain what is Latimer diagram 	
	 Illustrate the applications of Latimer diagrams 	
	 Calculate the change in Gibbs free energy 	
	 Discuss the Latimer diagrams for Mn, Fe and Cu and their use 	

UN	Detailed Syllabus of the Unit	Credit
01-01	Semi-micro qualitative analysis (using H2S or other methods) of mixtures-not more than four ionic species (two anions and two cations, excluding in soluble salts) out of the following: Cations : NH4+, Pb2+, Bi3+, Cu2+, Cd2+, Fe3+, Al3+, Co2+ ,Ni2+ ,Mn2+ ,Zn2+ ,Ba2+, Sr2+, Ca2+, K+	Credit 01
	Anions: CO32–, S2–, SO2–, S2O32–, NO3–, CH3COO–, Cl–, Br–, I–, NO3–, SO42-, PO43-,BO33-, C2O42-, F-	
	(Spot tests should be carried out wherever feasible)	
	1. Estimate the amount of nickel present in a given solution as bis (dimethyl glyoximato) nickel(II) or aluminiumasoximate in a given solution gravimetrically.	

	2. Estimation of (i)Mg2+or(ii)Zn2+by complexo metric titrations using EDTA.	
	3. Estimation of total hardness of a given sample of water by complexometric titration.	
02-01	(I) Surface tension measurement (use of organic solvents excluded).	a 1'.
	a) Determination of the surface tension of a liquid or a dilute solution using a	Credit
	stalagmo meter.	02
	b) Study of the variation of surface tension of a detergent solution with	
	concentration.	
02-02	(II) Viscosity measurement (use of organic solvents excluded).	
	a) Determination of the relative and absolute viscosity of a liquid or dilute solution Using an Ostwald's viscometer.	
	b) Study of the variation of viscosity of an aqueous solution with concentration of	
	solute.	
02-03	(III) Chemical Kinetics: Study the kinetics of the following reactions.	
	1. Initial rate method :Iodide-per sulphate reaction	
	2. Integrated rate method:	
	a. Acid hydrolysis of methyl acetate with hydrochloric acid.	
	b. Saponification of ethyl acetate.	
	c. Compare the strengths of HCl and H2SO4 by studying kinetics of hydrolysis of methylacetate	

	Title Author		ISBN
LK Code		Year	Publisher
YCMOU SLM e	eBooks		
CHE207-P01	https://goo.gl/ytrJWe	2016	- YCMOU
CHE206-T01	https://goo.gl/ytrJWe	2016	- YCMOU
Reference Boo	ks		
CHE207-R01	Chemistry for Degree Students (B.Sc. SemIV, CBCS) R L Madan	2016	9789352535194 S Chand
CHE207-R02	Chemistry @ <u>https://goo.gl/29PGRb</u>	2017	1-947172-09-3 OpenStax
CHE207-R03	Chemistry: Atoms First @ <u>https://goo.gl/e58NiX</u>	2017	1-947172-18-2 OpenStax
CHE207-R04	Organic Chemistry with a Biological Emphasis @ https://goo.gl/2W5m8E	2016	BCCampus
CHE207-R05	Analytical Chemistry @ <u>https://goo.gl/BPaxaz</u>	2010	BCCampus
CHE207-R06	Introductory Chemistry @ <u>https://goo.gl/WrDfrM</u>	2011	BCCampus
CHE207-R07	Concept Development Studies in Chemistry @ https://goo.gl/LbQigG	2007	BCCampus
CHE207-R08	PhET Simulations @ <u>https://goo.gl/rcFu5P</u>	2016	- YCMOU

- Apply mathematical and conceptual approaches to solve problems related to thermodynamics, kinetics, quantum mechanics, and chemical equilibrium.
- Acquire the ability to perform calculations involving thermodynamic parameters, reaction rates, and electrochemical processes.
- Analyze and predict the behavior of coordination compounds, including ligand exchange and isomerism.
- Describe the properties, reactions, and uses of key elements and inorganic compounds.

ZGY206: GENETICS & EVOLUTIONARY BIOLOGY

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222, Maharashtra, India Website: <u>http://www.ycmou.ac.in</u>
2	School	School of Sciences
3	Discipline	Science
4	Level	UG
5	Course Used in	V100: B.Sc (Botany, Chemistry, Zoology)

PROGRAMME INFORMATION

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Туре
04	ZGY206	Genetics & Evolutionary Biology	4	12	120	20	80	100	Т

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives					
For successful completion of	The objectives of this course are–					
this course, student should have successfully completed: ✤ 10+2(12 th) Science Pass (with Biology)	 Know genetics problems, make accurate predictions about inheritance of genetic traits, and map the locations of genes. Describe a scientific hypothesis about the origin of life on Earth. Explore the molecular basis of genetics Examine complex inheritance patterns 					

UN	Detailed Syllabus of the Unit	Credit
01-01	Introduction to Genetics: Introduction to genetics; Genetic Variation, Mendel's work	Credit 01
01-02	Mendelian Genetics and its Extension: Principles of Inheritance, Chromosome theory of inheritance, Incomplete dominance and codominance	
01-03	Multiple alleles, Lethal alleles, Epistasis, Pleiotropy, sex linked inheritance, extra- chromosomal inheritance	
01-04	Sex Determination: Chromosomal mechanisms of sex determination in Drosophila and Man, dosage compensation	
02-01	Linkage, Crossing Over and Chromosomal Mapping: Linkage and crossing over, Cytological basis of crossing over, Recombination frequency as a measure of linkage intensity, two factor and three factor crosses	Credit
02-02	Interference and coincidence, Somatic cell genetics – an alternative approach to gene mapping	
02-03	Chromosomal Aberrations: Definition and types -Deletion, Duplication, Inversion, Translocation, Aneuploidy and Polyploidy	
02-04	Gene mutations: Definition and Classification of gene mutation, Induced versus Spontaneous mutations, Back versus Suppressor mutations	

03-01	History of Life: Major Events in History of Life-Chemogeny, RNA world, Biogeny, Origin of photosynthesis, Evolution of eukaryotes	Credit 03			
03-02	Introduction to Evolutionary Theories: Lamarckism, Darwinism, Neo- Darwinism				
03-03	Direct Evidences of Evolution: Fossil record; Types of fossils, Incompleteness of fossil record, Dating of fossils, Phylogeny of horse				
03-04	Macro-evolution: Adaptive radiation/Macro-evolutionary Principles (example: Darwin's Galapagos Finches)				
04-01	Micro-evolution: Micro evolutionary changes (inter-population variations, clines, races, Species concept, Isolating mechanisms, modes of speciation-allopatric, sympatric, Organic variations; Isolating Mechanisms; Natural selection (Example: Industrial melanism)	Credit 04			
04-02	Processes of Evolutionary Change I: Hardy-Weinberg Law (HW law) Evolutionary forces upsetting H-W equilibrium				
04-03	Processes of Evolutionary Change II: Natural selection, selection coefficient, derivation of one unit of selection for a dominant allele, genetic load, mechanism of working, types of selection, density-dependent selection, heterozygous superiority, kin selection, adaptive resemblances, sexual selection, Artificial selection				
04-04	Extinction: Mass extinction (Causes, Names of five major extinctions, K-T extinction in detail), Role of extinction in evolution				

	Title	Edition	ISBN
LR Code	Author	Year	Publisher
YCMOU SLM e	Books		
ZGY206-T01			
Reference Bool	CS S		
ZGY206-RB1	Principles of Genetics – Gardner, E.J., Simmons, M.J., Snustad, D.P.	2008 VIII Edition	Wiley India.
ZGY206-RB2	Principles of Genetics – Snustad, D.P., Simmons, M.J.	2009 V Edition.	John Wiley and Sons Inc.
ZGY206-RB3	Concepts of Genetics – Klug, W.S., Cummings, M.R., Spencer, C.A.	2012 X Edition	Benjamin Cummings.
ZGY206-RB4	Genetics- A Molecular Approach. - Russell, P. J.	2009 III Edition	Benjamin Cummings.
ZGY206-RB5	Introduction to Genetic Analysis - Griffiths, A.J.F., Wessler, S.R., Lewontin, R.C. and Carroll, S.B	IX Edition	W. H. Freeman and Co.

ZGY206-RB6	Evolution - Ridley, M.	2004 III Edition	Blackwell Publishing
ZGY206-RB7 Evolution. - B. and Patel, N. H.			Harbour Laboratory Press.
ZGY206-RB8 Evolution. - Hall, B. K. and Hallgrimsson, B.		2008IV Edition.	Jones and Bartlett Publishers
ZGY206-RB9	Biology - Campbell, N. A. and Reece J. B.	2011 IX Edition	Pearson, Benjamin, Cummings.
ZGY206-RB10	Evolutionary Biology - Douglas, J. Futuyma	1997	Sinauer Associates.

- Explain the molecular mechanisms of DNA replication, transcription, and translation.
- Recognize the sources and significance of genetic variation within populations.
- Construct and interpret phylogenetic trees to illustrate evolutionary relationships among organisms.
- Apply critical thinking skills to evaluate scientific evidence, analyze evolutionary concepts, and synthesize information to answer complex questions.

ZGY207: GENETICS & EVOLUTIONARY BIOLOGY

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222, Maharashtra, India Website: <u>http://www.ycmou.ac.in</u>
2	School	School of Sciences
3	Discipline	Science
4	Level	UG
5	Course Used in	V100: B.Sc (Botany, Chemistry, Zoology)

PROGRAMME INFORMATION

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Туре
04	ZGY207	Genetics & Evolutionary Biology	2	6	120	10	40	50	Р

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of	The objectives of this course are–
this course, student should	* Know genetics problems, make accurate predictions about
have successfully completed:	inheritance of genetic traits, and map the locations of genes.
✤ 10+2(12th) Science Pass	 Describe a scientific hypothesis about the origin of life on Earth.
(with Biology)	 Explore the molecular basis of genetics
	 Examine complex inheritance patterns

UN	Detailed Syllabus of the Unit		
01-01	Study of Mendelian Inheritance and Gene interactions (Non Mendelian		
	Inheritance) using suitable examples. Verify the results using Chi-square test.	0 11	
01-02	Study of Linkage, Recombination, Gene Mapping using the data.		
01-03	Study of Human Karyo types (normal and abnormal).		
01-04	Study of Hardy- Weinberg law with suitable recording of genetic traits		
02-01	Study of Fossil evidences from plaster cast models and pictures		
02-02	Study of Homology and Analogy from suitable specimens/ pictures		
02-03	Charts:	On th	
_	a) Phylogeny of horse with diagrams/ cut outs of limbs and teeth of horse	Credit	
	ancestors		
	b) Darwin's Finches with diagrams/ cut outs of beaks of different species		
02-04	To Record Zoogeographical distribution of animals to respective zoogeographical		
	real ms on the world map (Lung fishes, Marsupials, Flightless birds, Camel, Elephant,		
	Ostrich etc.)		

LD Cada	Title	Edition	ISBN
LK Code	Author	Year	Publisher
YCMOU SLM e	Books		
ZGY207-P01			
ZGY206-T01			
Reference Bool	ζ <u>S</u>	·	
ZGY207-RB1	Principles of Genetics – Gardner, E.J., Simmons, M.J., Snustad, D.P.	2008 VIII Edition	Wiley India.
ZGY207-RB2	Principles of Genetics – Snustad, D.P., Simmons, M.J.	2009 V Edition.	John Wiley and Sons Inc.
ZGY207-RB3	Concepts of Genetics – Klug, W.S., Cummings, M.R., Spencer, C.A.	2012 X Edition	Benjamin Cummings.
ZGY207-RB4	Genetics- A Molecular Approach. - Russell, P. J.	2009 III Edition	Benjamin Cummings.
ZGY207-RB5	Introduction to Genetic Analysis - Griffiths, A.J.F., Wessler, S.R., Lewontin, R.C. and Carroll, S.B	IX Edition	W. H. Freeman and Co.
ZGY207-RB6	Evolution - Ridley, M.	2004 3 rd Ed	Blackwell Publishing
ZGY207-RB7	Evolution. - B. and Patel, N. H.		Harbour Laboratory Press.
ZGY207-RB8	Evolution. - Hall, B. K. and Hallgrimsson, B.	2008IV Edition.	Jones and Bartlett Publishers
ZGY207-RB9	Biology - Campbell, N. A. and Reece J. B.	2011 IX Edition	Pearson, Benjamin, Cummings.
ZGY207-RB10	Evolutionary Biology - Douglas, J. Futuyma	1997	Sinauer Associates.

COURSE OUTCOMES

- Explain the molecular mechanisms of DNA replication, transcription, and translation.
- Recognize the sources and significance of genetic variation within populations.
- Construct and interpret phylogenetic trees to illustrate evolutionary relationships among organisms.
- Apply critical thinking skills to evaluate scientific evidence, analyze evolutionary concepts, and synthesize information to answer complex questions.

SEMESTER 05

SEC511: FINANCIAL & INVESTMENT SKILLS

PROGRAMME INFORMATION

SN	N Description Details	
1		Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222,
	University	Maharashtra, India
		Website: <u>http://www.ycmou.ac.in</u>
2	School	School of Sciences
3	Discipline	Science
4	Level	UG
5	Course Used in	V92: B.Sc (Physics, Chemistry, Mathematics) &
		V100: B.Sc (Botany, Chemistry, Zoology)

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Type
05	SEC511	Financial & Investment Skills	4	12	120	20	80	100	Т

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of this	The objectives of this course are–
course, student should have	 Understand the need to invest
successfully completed:	 Explain role of regulators for financial markets
✤ 10+2(12 th) Science Pass (with Biology)	 Outline functions of financial inter mediaries in investment process
210108,7	 Explain what IPO market is and discuss the process leading to IPO.

UN	Detailed Syllabus of the Unit	Credit
01-01	Introduction to Stock Markets - 01 : The Need to Invest, Regulators, Financial Intermediaries, The IPO Markets	Credit 01
01-02	IntroductiontoStockMarkets-02:The Stock Markets, The Stock Markets Index, Commonly Used Jargons, The Trading Terminal	
01-03	IntroductiontoStockMarkets-03 :Clearing and Settlement Process, Five Corporate Actions and Its Impact on Stock Prices, Key Events and Their Impact on Markets, Getting started!	
02-01	Fundamental Analysis - 01: Introduction to Fundamental Analysis, Mindset of an	
	Investor, How to Read the Annual Report of a Company	Credit
02-02	FundamentalAnalysis-02:Understanding the P & L Statement, Understanding Balance	02
	Sheet Statement, The Cash Flow statement, The Financial Ratio Analysis	
02-03	Fundamental Analysis - 03 : The Investment Due Diligence, Equity Research, Discounted Cash Flow (DCF) and Time Value of Money, The follies of DCF Analysis,	

	Margin of Safety, When to sell? How many stocks in the portfolio?	
03-01	Technical Analysis - 01: Background, Introducing Technical Analysis, The Chart Types,	
	Getting Started with Candlesticks	Credit
03-02	TechnicalAnalysis-02: Single Candle stick patterns, Multiple candle stick patterns, The	Credit
	Support and Resistance	03
03-03	Technical Analysis - 03: Volumes, Moving Averages, Indicators, The Fibonacci	
	Retracements, The Dow Theory, Getting Started	
04-01	Markets and Taxation: Introduction, Basics, Classifying Your Market Activity,	
04-01	Markets and Taxation : Introduction, Basics, Classifying Your Market Activity, Taxation for Investors, Taxation for Traders, Turnover, Balance Sheet, and P&L,	a 1'.
04-01	Markets and Taxation : Introduction, Basics, Classifying Your Market Activity, Taxation for Investors, Taxation for Traders, Turnover, Balance Sheet, and P&L, ITR Forms	Credit
04-01	Markets and Taxation: Introduction, Basics, Classifying Your Market Activity, Taxation for Investors, Taxation for Traders, Turnover, Balance Sheet, and P&L, ITR Forms Trading Psychology and Risk Management: Risk, Equity Curve, Expected Returns,	Credit 04
04-01	 Markets and Taxation: Introduction, Basics, Classifying Your Market Activity, Taxation for Investors, Taxation for Traders, Turnover, Balance Sheet, and P&L, ITR Forms Trading Psychology and Risk Management: Risk, Equity Curve, Expected Returns, Portfolio Optimization, Value at Risk, Position Sizing for Active Trader 	Credit 04
04-01	 Markets and Taxation: Introduction, Basics, Classifying Your Market Activity, Taxation for Investors, Taxation for Traders, Turnover, Balance Sheet, and P&L, ITR Forms Trading Psychology and Risk Management: Risk, Equity Curve, Expected Returns, Portfolio Optimization, Value at Risk, Position Sizing for Active Trader Mutual Funds: Concept of Mutual Funds, Structure of Mutual Funds in India, 	Credit 04
04-01 04-02 04-03	 Markets and Taxation: Introduction, Basics, Classifying Your Market Activity, Taxation for Investors, Taxation for Traders, Turnover, Balance Sheet, and P&L, ITR Forms Trading Psychology and Risk Management: Risk, Equity Curve, Expected Returns, Portfolio Optimization, Value at Risk, Position Sizing for Active Trader Mutual Funds: Concept of Mutual Funds, Structure of Mutual Funds in India, Classification of Mutual Funds, Evaluation and Selection of Mutual Funds, Portfolio 	Credit 04
04-01 04-02 04-03	 Markets and Taxation: Introduction, Basics, Classifying Your Market Activity, Taxation for Investors, Taxation for Traders, Turnover, Balance Sheet, and P&L, ITR Forms Trading Psychology and Risk Management: Risk, Equity Curve, Expected Returns, Portfolio Optimization, Value at Risk, Position Sizing for Active Trader Mutual Funds: Concept of Mutual Funds, Structure of Mutual Funds in India, Classification of Mutual Funds, Evaluation and Selection of Mutual Funds, Portfolio Management Process, Taxation of Mutual Funds, Investment Checklist 	Credit 04
04-01 04-02 04-03 04-04	 Markets and Taxation: Introduction, Basics, Classifying Your Market Activity, Taxation for Investors, Taxation for Traders, Turnover, Balance Sheet, and P&L, ITR Forms Trading Psychology and Risk Management: Risk, Equity Curve, Expected Returns, Portfolio Optimization, Value at Risk, Position Sizing for Active Trader Mutual Funds: Concept of Mutual Funds, Structure of Mutual Funds in India, Classification of Mutual Funds, Evaluation and Selection of Mutual Funds, Portfolio Management Process, Taxation of Mutual Funds, Investment Checklist Financial Planning: Planning, Investing, Insurance, Tax, Retirement, Loans, Credit 	Credit 04

LR Code	Title Ed Author Y		ISBN Publisher				
YCMOU SLM e							
SEC511-W01 https://goo.gl/ytrJWe		2016	- YCMOU				
Reference Bool	Reference Books						
SEC511-R01	SEC511-R01 Zerodha Varsity @ <u>https://goo.gl/E2jnve</u>		ISBN Publisher				

COURSE OUTCOMES

- Create a retirement plan, set financial goals, and select appropriate retirement savings strategies.
- Apply knowledge of economic factors to make investment decisions that consider economic conditions and trends.
- Effectively communicate financial and investment strategies and decisions, both in writing and verbally.
- Apply critical thinking skills to analyze investment opportunities, assess risks, and adapt to changing financial markets.

BNY301: CELL BIOLOGY & GENETICS

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222, Maharashtra, India
		Website: <u>http://www.ycmou.ac.in</u>
2	School	School of Sciences
3	Discipline	Science
4	Level	UG
5	Course Used in	V100: B.Sc (Botany, Chemistry, Zoology)

PROGRAMME INFORMATION

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Туре
05	BNY301	Cell Biology & Genetics	4	12	120	20	80	100	Т

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of this	The objectives of this course are–
course, student should have successfully completed:	 To study the cell, cell components and their functions
 10+2(12th) Science Pass (with Biology) 	 To introduce the students with "Science of Heredity" Identify various stages of cell cycle. Describe Mendelian laws

UN	Detailed Syllabus of the Unit	Credit
01-01	The Cell: Cell as a unit of structure and function, Characteristics of prokaryotic and eukaryotic cells	
01-02	Cell wall and plasma membrane: Structure and function of Plant Cell Wall, Overview of membrane function; fluid mosaic model; Chemical composition of membranes; Membrane transport –Passive, active and facilitated transport	Credit 01
01-03	Cell organelles: Protoplasm, Nucleus, Nucleolus, Chloroplast, Mitochondria, Plastids, Endoplasmic Reticulum, Ribosomes, Golgi Body, Lysosome, Tonoplast, Plasmadesmata, Centrosome, Chromosome and peroxisomes	
01-04	Cell division: Cell Cycle and its regulation, Mitosis, Meiosis and their significance	
02-01	Genetics as Science of Heredity: Introduction, History and scope	Credit
02-02	Mendelian Genetics: Mendelism, History, Genetical Terminologies, Mendel's Law of Dominance, Segregations and Independent Assortment, Incomplete Dominance, Monohybrid, Dihybrid cross	02
02-03	Gene interaction: Lethal gene, Inhibitory Genes, Complementary gene, Supplementary Genes, Duplicate and Dominant epistatic	
02-04	Multiple Allele: Definition, characters and examples (<i>Nicotianasps</i> .)	

03-01	1 Cytoplasmic inheritance: Definition, chloroplast inheritance in variegated 4'O clock plant (<i>Mirabilisjalapa</i>). Cytoplasmic male sterility in maize				
03-02	Sex determination: Sex chromosome, Chromosomal basis of sex determination, Sex determination in higher plants (<i>Melandrium album</i>)	Credit 03			
03-03	Gene mutations: General account and Types-somatic/germinal, spontaneous/induced, gross/point-base pair substitutions- transversion, transition				
03-04	Extra Nuclear Genome: Mitochondrial DNA and Chloroplast DNA				
04-01	Chromosome : Chromosome: Morphology, Types of chromosomes on the basis				
	of centromere	a 1'.			
04-02	Chromosomal aberrations: Introduction, Definition, Types of Chromosomal	Credit			
	Aberrations, Numerical change: Euploidy, aneuploidy and its types, Structural	04			
	changes: Addition, deletion, substitution, translocation and inversion				
04-03	Linkage: Introduction: Concept and history of linkage, Kinds of Linkages,				
	Hypothesis of Linkages (Bateson and Punnett)				
04-04	Crossing Over: Introduction, Definition, Mechanism and types (Single and Double)				

L R Code	Title	Edition	ISBN		
LIK COUC	Author	Year	Publisher		
YCMOU SLM e					
BNY301-T01					
Reference Book	ζS				
	Cell and Molecular Biology: Concepts and	2010	John Wiley & Sons.		
BNY301-RB01	Experiments.	6 th Ed	Inc.		
	– Karp, G.				
	E.M.F. Cell and Molecular Biology	2006.	Lippincott Williams		
BNY301-RB02	- De Robertis, E.D.P. and De	8th	And Wilkins,		
	Robertis	edition.	Philadelphia.		
		2009	ASM Press &		
PNWoo1 DPoo	The Cell: A Molecular Approach.	5th	Sunderland,		
DN1301-KD03	- Cooper, G.M. and Hausman, R.E.	edition	Washington, D.C.;		
			Sinauer Associates		
	The World of the Cell.	2009.	Pearson Benjamin		
BNY301-RB04	- Becker, W.M., Kleinsmith, L.J., Hardin. J. and	7th	Cummings Publishing,		
	Bertoni, G. P	edition.	San Francisco		

COURSE OUTCOMES

- Explain key cellular processes such as cell division, energy production, and cell signaling.
- Describe mechanisms of membrane transport and how they regulate the movement of molecules into and out of cells.
- Explain the molecular mechanisms of DNA replication, transcription, and translation.
- Apply critical thinking to evaluate scientific evidence, analyze genetic concepts, and synthesize information to answer complex questions.

BNY302: CELL BIOLOGY & GENETICS

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222, Maharashtra, India
		Website: <u>http://www.ycmou.ac.in</u>
2	School	School of Sciences
3	Discipline	Science
4	Level	UG
5	Course Used in	V100: B.Sc (Botany, Chemistry, Zoology)

PROGRAMME INFORMATION

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Туре
05	BNY301	Cell Biology & Genetics	2	6	120	10	40	50	Р

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives			
For successful completion of this	The objectives of this course are—			
course, student should have	 To study the cell, cell components and their functions 			
successfully completed:	 To introduce the students with "Science of Heredity" 			
✤ 10+2(12 th) Science Pass (with Biology)	 Identify various stages of cell cycle. Describe Mendelian laws 			

UN	Detailed Syllabus of the Unit	Credit
01-01	Isolation of Mitochondria from Plants	
01-02	Study of the Photomicrographs of Cell Organelles	Credit
01-03	To Study the Structure of Plant Cell through Temporary Mounts.	01
01-04	Isolation of Chloroplast	
01-05	Squash Preparation for the study of various stages of Mitosis	
01-06	Smear Preparation for the study of various stages of Meiosis	
02-01	Study of Mitosis and Meiosis (Temporary mounts and Permanent slides).	Credit
02-02	Study the Effect of Temperature, Organic solvent on Semi Permeable Membrane.	02
02-03	Demonstration of Dialysis of Starch and Simple Sugar.	
02-04	Study of Plasmolysis and Deplasmolysis on <i>Rhoeo</i> leaf.	
02-05	To Prove Mendel's Monohybrid ratio	
02-06	To Prove Mendel's Dihybrid ratio	

LR Code	Title Author	Edition	ISBN
LIK COUC		Year	Publisher
YCMOU SLM	eBooks		
BNY302-P01			
BNY301-T01			
Reference Bo	oks		
	Cell and Molecular Biology: Concepts and Experiments.	2010	John Wiley & Sons.
BNY302-RB01	– Karp, G.	6th	Inc.
		Edition	
	E.M.F. Cell and Molecular Biology	2006.	Lippincott Williams
BNY302-RB02	- De Robertis, E.D.P. and De Robertis	8th	and Wilkins,
		edition.	Philadelphia.
		2009	ASM Press &
DNW200 DD00	The Cell: A Molecular Approach.	5th	Sunderland,
BN1302-KB03	- Cooper, G.M. and Hausman, R.E.	edition	Washington, D.C.;
			Sinauer Associates
		2009.	Pearson Benjamin
PNV000 PP04	The World of the Cell.	7th	Cummings
DN1302-KD04	- Becker, W.M., Kleinsmith, L.J., Hardin. J. and	edition.	Publishing, San
	Bertoni, G. P		Francisco

COURSE OUTCOMES

- Explain key cellular processes such as cell division, energy production, and cell signaling.
- Describe mechanisms of membrane transport and how they regulate the movement of molecules into and out of cells.
- Explain the molecular mechanisms of DNA replication, transcription, and translation.
- Apply critical thinking to evaluate scientific evidence, analyze genetic concepts, and synthesize information to answer complex questions.

CHE301: MOLECULAR MODELING CHEMISTRY

SN	Description	Details
		Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222,
1	University	Maharashtra, India
		Website: <u>http://www.ycmou.ac.in</u>
2	School	School of Sciences
3	Discipline	Science
4	Level	UG
5	Course Used in	V92: B.Sc (Physics, Chemistry, Mathematics) &
		V100: B.Sc (Botany, Chemistry, Zoology)

PROGRAMME INFORMATION

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Туре
05	CHE301	Molecular Modeling Chemistry	4	12	120	20	80	100	Т

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of	The objectives of this course are—
this course, student should	 Define molecular modeling
have successfully completed:	 Describe the advantages of computational chemistry
✤ 10+2(12th) Science Pass	 Explore tools of computational chemistry
(with Biology)	 List the limitations of computational chemistry
	 Explore the Vander Waal's interaction in force fields
	 Explain the cross terms in the force field energy equations
	 Compare the energies of molecules of different structures
	 Discuss the parameterizing of force field

UN	Detailed Syllabus of the Unit	Credit
01-01	Introduction to Molecular Modelling : Introduction. Useful Concepts in Molecular Modelling: Coordinate Systems. Potential Energy Surfaces. Molecular Graphics. Surfaces. Computer Hardware and Software. The Molecular Modelling Literature.	Credit 01
01-02	Force Fields 01 : Fields. Bond Stretching. Angle Bending. Introduction to non-bonded interactions. Electrostatic interactions.	
02-01	Force Fields 02 : van der Waals Interactions. Hydrogen bonding in Molecular Mechanics. Force Field Models for the Simulation of Liquid Water. Energy Minimization and Computer Simulation: Minimization and related methods for exploring the energy surface. Non-derivative method, First and second order minimization methods. Computer simulation methods. Simple thermodynamic properties and Phase Space. Boundaries. Analyzing the results of a simulation and estimating Errors.	Credit 02

03-01	Molecular Dynamics & Monte Carlo Simulation:	Credit
	Molecular Dynamics Simulation Methods. Molecular Dynamics using simple models. Molecular Dynamics with continuous potentials. Molecular Dynamics at constant	03
	temperature and pressure. Metropolis method. Monte Carlo simulation of molecules.	
	Models used in Monte Carlo simulations of polymers.	
04-01	Structure Prediction and Drug Design:	Credit
	Structure prediction - Introduction to comparative Modeling. Sequence alignment. Constructing and evaluating a comparative model. Predicting protein structures by 'Threading', Molecular docking. Structure based de novo ligand design, Drug Discovery – Chomo informatics OSAR	04
	Chemo informatics – QSAR.	

LR Code	Title Author	Edition Year	ISBN Publisher
YCMOU SLM eBooks			
CHE301-T01	https://goo.gl/ytrJWe	2016	- YCMOU
Reference Book	ζs		
CHE301-R01	Chemistry for Degree Students (B.Sc. SemV/VI, CBCS) R L Madan	2016	9789352535859 S Chand
CHE301-R02	Chemistry@ <u>https://goo.gl/29PGRb</u>	2017	1-947172-09-3 OpenStax
CHE301-R03	Chemistry: Atoms First @ <u>https://goo.gl/e58NiX</u>	2017	1-947172-18-2 OpenStax
CHE301-R04	Organic Chemistry with a Biological Emphasis @ https://goo.gl/2W5m8E	2016	BCCampus
CHE301-R05	Analytical Chemistry @ https://goo.gl/BPaxaz	2010	BCCampus
CHE301-R06	Introductory Chemistry @ <u>https://goo.gl/WrDfrM</u>	2011	BCCampus
CHE301-R07	Concept Development Studies in Chemistry @ https://goo.gl/LbQigG	2007	BCCampus
CHE301-R08	PhET Simulations @ <u>https://goo.gl/rcFu5P</u>	2016	YCMOU

COURSE OUTCOMES

- Understand the basics of quantum mechanics and its relevance to electronic structure calculations.
- Apply quantum chemistry methods to study electronic structure and spectroscopic properties of molecules.
- Recognize the interdisciplinary nature of molecular modeling and its applications in chemistry, biochemistry, materials science, and other fields.
CHE302: MOLECULAR MODELING CHEMISTRY

SN	Description	Details
		Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222,
1	University	Maharashtra, India
		Website: <u>http://www.ycmou.ac.in</u>
2	School	School of Sciences
3 Discipline		Science
4	Level	UG
5	Course Used in	V92: B.Sc (Physics, Chemistry, Mathematics) &
	Course Oseu III	V100: B.Sc (Botany, Chemistry, Zoology)

PROGRAMME INFORMATION

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Туре
05	CHE302	Molecular Modeling Chemistry	2	6	120	10	40	50	Р

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of	The objectives of this course are—
this course, student should	 Define molecular modeling
have successfully completed:	 Describe the advantages of computational chemistry
✤ 10+2(12 th) Science Pass	 Explore tools of computational chemistry
(with Biology)	 List the limitations of computational chemistry
	 Explore the Vander Waal's interaction in force fields
	 Explain the cross terms in the force field energy equations
	 Compare the energies of molecules of different structures
	 Discuss the parameterizing of force field

UN	Detailed Syllabus of the Unit	Credit
01-01	Compare the optimized C-C bond lengths in ethane, ethene, ethyne and benzene. Visualize the molecular orbitals of the ethane σ bonds and ethene, ethyne, benzene and pyridine π bonds.	Credit 01
01-02	(a)Perform a conformational analysis of butane.(b)Determine the enthalpy of isomerization of cis and trans 2-butene.	
01-03	Visualize the electron density and electrostatic potential maps for LiH, HF, N2, NO and CO and comment. Relate to the dipole moments. Animate the vibrations of these molecules.	
01-04	(a)Relate the charge on the hydrogen atom I nhydrogen halides with their acid character. (b) Compare the basicities of the nitrogen atoms in ammonia, methylamine, dimethyl amine and trimethyl amine.	
02-01	(a)Compare the shapes of the molecules : 1-butanol, 2-butanol, 2-methyl-1-propanol, and 2-methyl- 2-propanol. Note the dipole moment of each molecule. (b)Show how the shapes affect the trend in boiling points: (118°C,100°C,108°C,82°C, respectively).	Credit 02
02-02	Build and minimize organic compounds of your choice containing the following	

	functional groups. Note the dipole moment of each compound: (a) alkyl halide (b)aldehyde (c)ketone (d)amine (e)ether (f)nitrile (g)thiol (h)carboxyli c acid (i)ester (j)amide.				
02-03	3 (a)Determine the heat of hydration of ethylene.(b)Compute the resonance energy of benzene by comparison of its enthalpy of hydrogenation with that of cyclohexene.				
02-04	4 Arrange 1-hexene, 2-methyl-2-pentene, (E)-3-methyl-2-pentene, (Z)-3-methyl-2- pentene, and 2,3- dimethyl-2-butene in order of increasing stability.				
02-05	(a)Compare the optimized bond angles H2O, H2S, H2Se. (b)Compare the HAH bond angles for these condrow dihydrides and compare with the results from qualitative MO theory. Note: Software: Chem Sketch, Argus Lab(www.planaria-software.com),TINKER6.2 (dealer wurdthedu (ffe) WebLebViewen Umerschem energy imilereoftware.				

LR Code	Title Author	Edition	ISBN Bublisher
YCMOU SLM e	Books	Year	rublisher
CHE302-P01	https://goo.gl/ytrJWe	2016	- YCMOU
CHE301-T01	https://goo.gl/ytrJWe	2016	- YCMOU
Reference Book	ζS		
CHE302-R01	Chemistry for Degree Students (B.Sc. SemV/VI, CBCS) R L Madan	2016	9789352535859 S Chand
CHE302-R02	Chemistry@ <u>https://goo.gl/29PGRb</u>	2017	1-947172-09-3 OpenStax
CHE302-Ro3	Chemistry: Atoms First @ <u>https://goo.gl/e58NiX</u>	2017	1-947172-18-2 OpenStax
CHE302-R04	Organic Chemistry with a Biological Emphasis @ https://goo.gl/2W5m8E	2016	BCCampus
CHE302-R05	Analytical Chemistry @ https://goo.gl/BPaxaz	2010	BCCampus
CHE302-R06	Introductory Chemistry @ <u>https://goo.gl/WrDfrM</u>	2011	BCCampus
CHE302-R07	Concept Development Studies in Chemistry @ https://goo.gl/LbQigG	2007	BCCampus
CHE302-R08	PhET Simulations @ <u>https://goo.gl/rcFu5P</u>	2016	YCMOU

COURSE OUTCOMES

- Understand the basics of quantum mechanics and its relevance to electronic structure calculations.
- Apply quantum chemistry methods to study electronic structure and spectroscopic properties of molecules.
- Recognize the interdisciplinary nature of molecular modeling and its applications in chemistry, biochemistry, materials science, and other fields.

ZGY301: MAMMALIAN HISTOLOGY

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222, Maharashtra, India
		Website: <u>http://www.ycmou.ac.in</u>
2	School	School of Sciences
3	Discipline	Science
4	Level	UG
5	Course Used in	V100: B.Sc (Botany, Chemistry, Zoology)

PROGRAMME INFORMATION

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Туре
05	ZGY301	Mammalian Histology	4	12	120	20	80	100	Т

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of	The objectives of this course are–
this course, student should	 Enrich themselves with histology of different tissues and systems
have successfully completed:	for research and job opportunities in Pathology and Cancer
✤ 10+2(12th) Science Pass	research centers
(with Biology)	 Explore quantum chemistry methods for calculating electronic structure, molecular orbitals, and energy levels of molecules.

UN	Detailed Syllabus of the Unit	Credit
01-01	Tissue: Structure, location, classification and functions of epithelial tissue, connective tissue, muscular tissue and nervous tissue	Credit 01
01-02	Bone and cartilage : Structure and types of bones and cartilages, Ossification, bone growth and re sorption	
01-03	Histology of Digestive system – histological structure of tongue, Structure and functions histological structure of oesophagus, stomach, duodenum, colon and rectum;, histological structure of digestive glands -salivary gland, liver, pancreas (exocrine and endocrine)	
01-04	Histology of Respiratory system: Histological structure of trachea and lung	
02-01	Skin: Structure and function, Derivatives of skin - Horns, Nails, Hair, Sweat and Sebaceous gland	Credit
02-02	Histology of Circulatory system: T S of Artery and Vein. Blood-composition ,types of blood cells and their function	02
02-03	Histology of Reproductive system : T S of testis, Penis and duct system, Hormones released by Testis, T S of ovary and duct system, Hormones released by Ovary, Placental hormones	
02-04	Puberty, Methods of contraception in males, Methods of contraception in females	

03-01	Histology of Kidney: L.S. of Kidney, microscopic structure of uriniferous tubules, Juxtra Glomerular complex (JG complex), Bowman's capsule & Glomerulus	Credit 03
03-02	Histology of Nervous system and sense organs: T S of brain, T S of Spinal cord, V. S. of eye ball, Structure of external, middle and internal ear	
03-03	Resting membrane potential, Origin of action potential and its propagation across the myelinated and unmyelinated nerve fibers	
03-04	Types of synapse, Synaptic transmission and, Neuromuscular junction; Reflex action and its types - reflex arc; Physiology of hearing and vision	
04-01	Histology of Endocrine organs Part I- Introduction to endocrine organs, histology of pineal gland, Histology of pituitary gland, Significance of pineal body ; Hormones released by pituitary	
04-02	Histology of Endocrine organs Part II- histology of Thyroid and its hormone, histology of parathyroid and its hormone, histology of pancreas and its hormone, histology of adrenal and its hormones	Credit 04
04-03	Hypothalamus (neuro endocrine gland) - principal nuclei involved in neuro endocrine control of anterior pituitary and endocrine system	
04-04	Classification of hormones; Regulation of their secretion; Mode of hormone action, Signal transduction pathways for steroidal and non-steroidal hormones	

I P Codo	Title	Edition	ISBN
LK Coue	Author	Year	Publisher
YCMOU SLN	M eBooks		
ZGY301-T01			
Reference B	ooks		
7GV201-RB1	Ham's Histology	1987	Philadelphia,
201301 Kb1	– Arthur W. Ham:	9™Edition	USA
ZGY301-RB2	Histology and Genetics		
	– Muzammih Ullah		
ZGY301-RB3	Histology		
	- Roy O. Greep		
ZGY301-RB4	General Endocrinology		
	- Turner and Bungera		
ZGY301-RB5	Text book of Histology		
	- William F.Windle		

COURSE OUTCOMES

- Apply quantum chemistry methods to study electronic structure and spectroscopic properties of molecules.
- Apply computational techniques to solve chemical problems, predict molecular properties, and investigate reaction mechanisms.
- Develop research skills for designing and conducting computational experiments and interpreting results.

ZGY302: MAMMALIAN HISTOLOGY

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222, Maharashtra, India
		Website: <u>http://www.ycmou.ac.in</u>
2	School	School of Sciences
3	Discipline	Science
4	Level	UG
5	Course Used in	V100: B.Sc (Botany, Chemistry, Zoology)

PROGRAMME INFORMATION

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Туре
05	ZGY302	Mammalian Histology	2	6	120	10	40	50	Р

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of this course, student should have successfully completed: • 10+2(12 th) Science Pass (with Biology)	 The objectives of this course are– Enrich themselves with histology of different tissues and systems for research and job opportunities in Pathology and Cancer research centers

UN	Detailed Syllabus of the Unit	Credit			
01-01	Study of following tissue with the help of chart/permanent slides/simulations:				
	a) Squamous epithelial tissue b) Cuboidal epithelial tissue	Credit			
	c) Columnar epithelial tissue d) Ciliated epithelial tissue	01			
	e) Areolar connective tissue f) Blood smear permanent slide				
01-02	Temporary preparation of the following tissue of preserved Rat:				
	a)Striated muscle fibre b) Smooth muscle fibre				
	c) Medullated nerve fibres d) Hyaline cartilage				
01-03	Study of histological permanent slide of mammalian skin				
01-04	Study of histological permanent slide of V. S. of Tooth, V. S. of Tongue				
01-05	Study of histological permanent slide of Salivary gland (Parotid gland), T. S. of oesophagus				
01-06	Study of histological permanent slide of T. S. of stomach, T. S. of duodenum				
02-01	Study of histological permanent slide of T. S. of rectum, T. S. of pancreas				
02-02	Study of histological permanent slide of C. S. of liver, C. S. of lung				

02-03	Study of histological permanent slide of blood vessels- T. S. of artery, T. S. of vein	Credit
02-04	Study of histological permanent slide of excretory L. S. of kidney	02
02-05	Study of histological permanent slide of reproductive system- T. S. of testis, L. S. of ovary	
02-06	Study of histological permanent slide of endocrine glands- T. S. of pituitary gland, T. S. of adrenal gland, thyroid gland	

L P Codo	Title	Edition	ISBN
LK Coue	Author	Year	Publisher
YCMOU SLI	vI eBooks		
ZGY302-P01			
ZGY301-T01			
Reference B	ooks		
ZGY302-RB1	Ham's Histology – Arthur W. Ham:	1987 9™Edition	Philadelphia, USA
ZGY302-RB2	Histology and Genetics – Muzammih Ullah		
ZGY302-RB3	Histology - Roy O. Greep		
ZGY302-RB4	General Endocrinology - Turner and Bungera		
ZGY302-RB5	Text book of Histology - William F.Windle		

COURSE OUTCOMES

- Apply quantum chemistry methods to study electronic structure and spectroscopic properties of molecules.
- Apply computational techniques to solve chemical problems, predict molecular properties, and investigate reaction mechanisms.
- Develop research skills for designing and conducting computational experiments and interpreting results.

SEMESTER 06

SEC611: PERSONALITY & CAREER SKILLS

PROGRAMME INFORMATION				
SN	Descri	ption	Details	

SIN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222, Maharashtra, India Website: <u>http://www.ycmou.ac.in</u>
2	School	School of Sciences
3	Discipline	Science
4	Level	UG
5	Course Used in	V92: B.Sc (Physics, Chemistry, Mathematics) & V100: B.Sc (Botany, Chemistry, Zoology)

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Туре
06	SEC611	Personality & Career Skills	4	12	120	20	80	100	Т

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of this	The objectives of this course are–
course, student should have	 Comprehend the meaning of soft skills
successfully completed:	 Estimate the importance of soft skills for career success
✤ 10+2(12 th) Science Pass (with	 Explore how to improve and sell your soft skills
Biology)	 Enlist various soft skills
	 Reflect on how to polish your soft skills
	 Define perception.
	 Understand the process of perception.
	 Describe factors influencing perception.
	 Comprehend how to improve perceptual skills.
	 Apply perception in organisations.

DETAILED SYLLABUS

UN	Detailed Syllabus of the Unit	Credit
01-01	Soft Skills : What are soft skills? Importance of soft skills, Selling your soft skills, Attributes regarded as soft skill, Soft skills, Social soft skills, Thinkings of its kills, Negotiating, Exhibiting your soft skill, Identifying your soft skills, Improving your soft skills, Train yourself, Top 60 soft skills, Practicing soft skills, Measuring attitude	Credit 01
01-02	Self-Discovery: Introduction, Importance of knowing yourself, Process of knowing yourself, SWOT analysis, Benefits of SWOT analysis, Using SWOT analysis, SWOT analysis grid, Questions to complete the grid	

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01-03	Developing Positive Attitude: Introduction, Meaning, Features of attitudes, Attitude and behavior, Formation of attitudes, Change of attitudes, What can you do to change attitude? Ways of changing attitude in a person, Attitude in a workplace, The power of positive attitude, Developing positive attitude, Obstacles in developing positive attitude, Staying positive, Examples of positive attitudes, Positive attitude and its results, Staying negative, Examples of negative attitude, Overcoming negative attitude, Negative attitude and its results	
01-04	values: Introduction, Meaning, What is a value? A core of values, Values relating to education, Values relating to self and others, Values relating to civic responsibilities, Values and attitudes, Importance of values, Formation of values, Types of values, Terminal and instrumental values, Power of values, Personal values, Cultural values, Social values, Values some examples	
02-01	Improving Perception : Introduction, Meaning, Factors influencing perception, Perceptual process, Improving perception, Perception and its application in organizations	Credit 02
02-02	Career Planning : Introduction, Benefits of career planning, Guidelines for choosing a career, Myths about choosing a career, Tips for successful career planning, Developing career goals, Final thoughts on career planning	
02-03	The Art of Writing E-mail : Introduction, The mail magic, Use appropriate salutations, Make the subject matter significant, Keep a dictionary close by, Use commas, Use smileys, When in doubt, preface– include previous message, Shorten the file attachments, Reread before pressing the "send" button, Be polite and reciprocate good deeds, Anticipate, empathize, understand	
02-04	Body Language : Introduction, Body talk, Voluntary an din voluntary body language, Forms of body language, Parts of body language, Origin of body language, Uses of body language, Body language in building industrial relations, Reasons to study body language, Improving your body language, Types of body language, Gender differences, Female interest and body language, Shaking hands with women, Interpreting body language	
03-01	Team Building and Teamwork : Introduction, Meaning, Aspects of team building, Skills needed for team work, A model of team building, Team vs group, Characteristics of effective team, Role of a team Leader, Role of Team Members, Nine persons a successful team should have, Inter–group collaboration, Advantages of inter–group collaboration, Difficulties faced in inter–group collaboration, Factors shaping inter–group collaboration	Credit 03
03-02	Group Discussion : Introduction, Meaning of GD, Why group discussion? Characters tested in a GD, Tips on GD, Types of GD, Skills required in a GD, Consequences of GD, Behavior in GD, Essential elements of GD, Different characters in GD, Traits tested in GD, GD etiquette, Areas to be Concentrated while preparing for a GD, Initiating a GD, Techniques to initiate GD, Non– verbal communication in GD, Movement and gestures to avoide dinaGD, Topics for GD	
03-03	Uette and Manners : uette introduction, Modern etiquette, Benefits of etiquette, Classification of etiquette, Accompanying women, Taboo topics, Proposing the toast. Manners Introduction, Poor manners noticed in youth, Why should you practice good manners? Practicing good manners, Manners at the wheel: driving, Manners in the flight, Respecting the sacred, Visiting holy places, Dealing with the challenged, Attending funeral, Professional manners, Social Skills or manners, Getting along with people, Manners to get respect from others	
04-01	Preparing Resume : Introduction, Meaning, The terms, The purpose of Resume writing, Types of resumes, Interesting facts about resume, Resume writing tips, Resume preparation-the dos, Resume preparation-the don'ts, Resume checkup, Design of a Resume, The content of the resume, Electronic	Credit

	resume tips, References, Power words, Common resume blunders, Key skills that <mark>04</mark>
	can be mentioned in the resume, Cover letters, Cover letter tips
04-0	Interview Skills : Introduction, Why an interview? Types of interview, Interview panel, Types of questions asked, Reasons for selecting a candidate, Reasons for rejecting a candidate, On the day of interview, On to the interview table, Attending job fair, Common mistakes to avoid, Post– interview etiquette, How does one follow up? Telephonic interview, Dress code at interview, Typical questions asked, Interview mistakes, Quick tips, How to present well in interview, Job interview–basic tips, How to search for job effectively, Quo test ore member about interview
04-0	Time Management : Introduction, The 80:20 rule, Take a good look at the people around you, Examine your work, Sense of time management, Time is money, Features of time, Three secrets of time management, Time management matrix, Analysis of time matrix, Effective scheduling, Grouping of activities, Five steps to successful time management, Difficulties in time management, Evils of not planning, Interesting facts about time, Ideal way of spending a day, Time wasters, Time savers, Realizing the value of time, Time circle planner
04-0	Stress Management : Introduction, Meaning, At one level stress may be a positive aid to performance, At one stress may be a negative aid to performance, Effects of stress, Kinds of stress, Sources of stress, Few other common sources of stress, Case study, Behavior identified with stress, Assessing the existence of stress, What are the signs of stress? Spotting stress in you, Stress management tips

L D Codo	Title	Edition	ISBN					
LK Code	Author	Year	Publisher					
YCMOU SLM e	YCMOU SLM eBooks							
SEC611-T01	https://goo.gl/ytr.IWe	2016	-					
SECOII-101	<u>nttps:// 500.51/910/00</u>		YCMOU					
Reference Books								
SEC611-R01	Soft Skills Know Yourself & Know the World	1stEd	8121931924					
SLEON KOI	Dr K Alex	2009	S Chand					

COURSE OUTCOMES

- Build and maintain a professional network of contacts and mentors.
- Develop adaptability and resilience in response to changes in the job market and evolving career goals.
- Recognize the importance of life-long learning and continuous skill development for career success.
- ake ownership of their career development and continue to apply the skills and knowledge gained in the course throughout their professional lives.

BNY307: ANALYTICAL TECHNIQUES IN PLANT SCIENCES & HORTICULTURE

PROGRAMME INFORMATION

SN	Description	Details
		Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222,
1	University	Maharashtra, India
		Website: <u>http://www.ycmou.ac.in</u>
2	School	School of Sciences
3	Discipline	Science
4	Level	UG
5	Course Used in	V100: B.Sc (Botany, Chemistry, Zoology)

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Type
06	BNY307	Analytical Techniques in Plant Sciences & Horticulture	4	12	120	20	80	100	Т

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of this course, student should have successfully completed: • 10+2(12 th) Science Pass (with Biology)	 The objectives of this course are– Exhibit a knowledge base in molecular biology To describe, explain facts related to the molecular basis of biological activity

UN	Detailed Syllabus of the Unit	Credit
01-01	Microscopy: Introduction, Principles of microscopy; Image quality, Magnification concept, Choice of eye piece and objective combinations to ensure optimal magnification, magnification power, Resolution - phenomenon, resolving power of microscope, contrast and resolution of images.	Credit 01
01-02	Light microscopy: Fluorescence microscopy, Brief account of Transmission and Scanning electron microscopy	
01-03	Micrometry and Micro technique: Introduction, Principle, micrometer types, Eye piece Reticle/inserts, stage micrometer, Calibration of ocular scale and microscope.	
01-04	Micro technique: Introduction, preparations for microscopic, observation - WM, smears, squashes, sections, Materials -cover glass, micro slides, Stains: nature and use of Haematoxyline, Cotton blue, Light Green, Safranin, Sectioning - Free hand.	
02-01	Biophysicochemical techniques: Centrifugation: Principle of Centrifugation;	Credit

	types centrifuge and applications. Spectrophotometry: Introduction, types, Principle and its application in biological research	02
02-02	Chromatography: Principle. Paper chromatography. TL chromatography.	
02 02	HPLC.	
02-03	Biostatistics: Introduction to Statistics, Sampling Methods: Random,	
	Systematic Representation of Data: Tabular, Graphical	
02-04	Measures of central tendency: Arithmetic mean, mode, median, Measures of	
	dispersion: Range, mean deviation, Standard deviation, Chi square test.	
03-01	Horticulture: Introduction, Definition, Scope and importance of Horticulture, Dissiplings of Horticulture i) Remology ii) Obvioulture iii) Eleviculture iii)	
	Ornamental horticulture v) Landscape horticulture Nutritive value of Fruits and	Credit
	Vegetables	03
03-02	Propagation of Horticultural plants: Sexual Propagation: Advantages and	
05 02	Disadvantages, Asexual /Vegetative Propagation: Advantages and Disadvantages,	
	Natural methods of vegetative propagation: Bulb, Corm, Tuber, Rhizome,	
	Runner, Offset, Sucker.	
03-03	Artificial methods of vegetative propagation: A) Cutting: a) Definition b)	
	Types of Cutting: i) Stem cutting - Soft wood cutting and Hard wood Cutting ii)	
	Leaf Cutting iii) Root Cutting.	
	B) Layering: a) Definition b) Types of Layering: 1) Simple layering 11)	
	Compound layering III) Air layering/Gootee.	
	Budding	
	D) Grafting: a) Definition b) Types of Grafting - i) Whip grafting ii) Tongue	
	grafting.	
03-04	Special Horticultural Practices: Training and pruning of Plants: a)	
	Definition b) Objectives of Training and Pruning c) Advantages of Training and	
	Pruning d) Difference between Training and Pruning e) Methods of Training: i)	
	Central leader system ii) Open centre system iii) Modified leaders. f) Methods of	
	Pruning: i) Heading back ii) Thinning out.	
0.1.01	Pakar Treatment: a) Definition Principles and Importance b) Types of Pakar	
04-01	i) Ambe Bahar ii) Mrig Bahar iii) Hasta Bahar	
	Cultural practices: a) Definition b) Types of cultural practices: i) Ringing ii)	Credit
	Girdling iii) Notching iv) Bending	04
04-02	Fruits (Grapes) and vegetables (Tomato) production technology: i)	
	Introduction ii) Soil and climate requirement iii) Commercial varieties iv) Pest	
	and disease management v) Harvesting and post harvest management	
	B) Polyhouse, Green house and Glass house technology with reference to	
	Ornamental Horticulture, Scope and impor	
04-03	of fruits and vegetables preservation. Methods of preservation, so Temperature	
	or nuns and vegetables preservation, memous of preservation: a) remporary	
	Potato, Cabbage, Onions, Bitter Gourd Green Pea Spinach iii) Use of mild	
	antiseptic iv) Pasteurization v) Low temperature	
04-04	Permanent preservation: i) Sterilization and Processing: Use of sugar. salts.	
	vinegar or preservation by food additives i. e. Chemical preservatives: citric acid.	

Potassium meta-bisulphite, sodium benzoate, Sulphur-dioxide ii) Drying, Dehydration and concentration of fruits and vegetables iii) Ionizing radiation, Preparation of preserved products: a) Mix fruit Jam b) Wood apple/Guava Jelly c) Lemon/ Orange Squash d) Tomato ketchup

LEARNING RESOURCE DETAILS

LR Code	Title	Edition	ISBN Bublicher							
	Author	rear	Publisher							
YCMOU SLM e	(CMOU SLM eBooks									
BNY307-T01										
Reference Book	TS CONTRACTOR OF CONT									
BNY307-RB01	Introductory Phycology - Kumar, H.D.	1999 2nd edition	Affiliated East-West. Press Pvt. Ltd. Delhi.							
BNY307-RB02	. Microbiology: An Introduction – Tortora, G.J., Funke, B.R., Case, C.L	2010 10th edition	Pearson Benjamin Cummings, U.S.A.							
BNY307-RB03	Text book of Fungi & Their Allie – Sethi, I.K. and Walia, S.K.	2011	MacMillan Publishers Pvt.Ltd., Delhi.							
BNY307-RB04	Introductory Mycology – Alexopoulos, C.J., Mims, C.W., Blackwell, M.	1996 4th edition	John Wiley and Sons (Asia), Singapore.							
BNY307-RB05	Biology - Raven, P.H., Johnson, G.B., Losos, J.B., Singer S. R.	2005	Tata McGraw Hill, Delhi, India.							
BNY307-RB6	Pteridophyta - Vashishta, P.C., Sinha, A.K., Kumar, A.	2010	S. Chand. Delhi, India							
BNY307-RB07	Gymnosperms - Bhatnagar, S.P. and Moitra,	1996	New Age International (P) Ltd Publishers, New Delhi, India.							
BNY307-RB08	An introduction to Embryophyta. Vol. I. Bryophyta. - Parihar, N.S.	1991	Central Book Depot, Allahabad.							

COURSE OUTCOMES

- Operate spectroscopic instruments and interpret spectroscopic data for plant characterization.
- Analyze and interpret data obtained from analytical techniques and present results effectively.
- Apply critical thinking skills to select appropriate analytical methods and troubleshoot technical issues.
- Develop research skills necessary for conducting experiments, collecting data, and drawing conclusions in the context of plant sciences and horticulture.

BNY308: ANALYTICAL TECHNIQUES IN PLANT SCIENCES & HORTICULTURE

SN	Description	Details
	TT	Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222,
1	University	Manarashtra, India
		Website: <u>http://www.ycmou.ac.in</u>
2	School	School of Sciences
3	Discipline	Science
4	Level	UG
5	Course Used in	V100: B.Sc (Botany, Chemistry, Zoology)

PROGRAMME INFORMATION

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Type
06	BNY308	Analytical Techniques in Plant Sciences & Horticulture	2	6	120	10	40	50	Р

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Lear	Learning Objectives				
For successful completion of this course, student should have		objectives of this course are— Exhibit a knowledge base in molecular biology Evaluin facts related to the molecular basis of biological				
 \$ 10+2(12th) Science Pass (with Biology) 	*	activity				

UN	Detailed Syllabus of the Unit	Credit					
	Analytical Techniques in Plant Sciences						
01-01	Extraction and Separation of amino acids by paper chromatography						
01-02	1-02 Isolation of chloroplasts by solvent method						
01-03	D1-O3 Study of different microscopic techniques light and fluorescence by using photographs						
01-04	4 Preparation of different types of stains (Permanent and temporary)						
01-05	Preparation of permanent slides (double staining)						
01-06	Computation of mean, mode, median, variance and standard deviation from the given data						
	Horticulture						
02-01	Study of Garden tools and equipment: Sprayer, Duster, Pruning knife, Sprinkler.	Credit					
02-02	Study of propagation requirement: i) Media ii) Containers iii) Potting iv) Repotting	cicuit					

02-03 Study of propagation methods: a) Cutting b) Layering c) Budding d) Grafting

02-04 Preparations of different types of fruit products (Any three): a) Mix fruit Jam b)Wood apple/Guava Jelly, c) Lemon/Orange Squash d)Tomato ketchup

LEARNING RESOURCE DETAILS

LR Code	Title	Edition	ISBN
	Author	Year	Publisher
YCMOU SLM e	Books		
BNY308-P01			
BNY307-T01			
Reference Book	ζS		
BNY308-RB01	Introductory Phycology - Kumar, H.D.	1999 2nd edition	Affiliated East-West. Press Pvt. Ltd. Delhi.
BNY308-RB02	. Microbiology: An Introduction – Tortora, G.J., Funke, B.R., Case, C.L	2010 10th edition	Pearson Benjamin Cummings, U.S.A.
BNY308-RB03	Text book of Fungi & Their Allie – Sethi, I.K. and Walia, S.K.	2011	MacMillan Publishers Pvt.Ltd., Delhi.
BNY308-RB04	Introductory Mycology – Alexopoulos, C.J., Mims, C.W., Blackwell, M.	1996 4th edition	John Wiley and Sons (Asia), Singapore.
BNY308-RB05	Biology - Raven, P.H., Johnson, G.B., Losos, J.B., Singer S. R.	2005	Tata McGraw Hill, Delhi, India.
BNY308-RB6	Pteridophyta - Vashishta, P.C., Sinha, A.K., Kumar, A.	2010	S. Chand. Delhi, India
BNY308-RB07	Gymnosperms - Bhatnagar, S.P. and Moitra,	1996	New Age International (P) Ltd Publishers, New Delhi, India.
BNY308-RB08	An introduction to Embryophyta. Vol. I. Bryophyta. - Parihar, N.S.	1991	Central Book Depot, Allahabad.

COURSE OUTCOMES

After successful completion of this course, student should be able to –

- Operate spectroscopic instruments and interpret spectroscopic data for plant characterization.
- Analyze and interpret data obtained from analytical techniques and present results effectively.
- Apply critical thinking skills to select appropriate analytical methods and troubleshoot technical issues.
- Develop research skills necessary for conducting experiments, collecting data, and drawing conclusions in the context of plant sciences and horticulture.

02

CHE307: GREEN CHEMISTRY

SN	Description	Details
		Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222,
1	University	Maharashtra, India
		Website: <u>http://www.ycmou.ac.in</u>
2	School	School of Sciences
3	Discipline	Science
4	Level	UG
_	Course Used in	V92: B.Sc (Physics, Chemistry, Mathematics) &
5		V100: B.Sc (Botany, Chemistry, Zoology)

PROGRAMME INFORMATION

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Туре
06	CHE307	Green Chemistry	4	12	120	20	80	100	Т

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of	The objectives of this course are-
this course, student should	 Learn the History of Green Chemistry (GC).
have successfully completed:	 Find what is the role of Environmental Protection Agency (EPA) in USA
(with Biology)	 List the Green Chemistry aspects. Find the Need for Green Chemistry.
	 Explain Benign-by-Designing Chemistry.
	 Describe Atom Economy (AE), Green Chemistry (GC) and Waste Management.
	 Explain how the Addition and Rearrangement reactions are the best examples of Green Chemistry as they reach 100%AE.

UN	Detailed Syllabus of the Unit	Credit
01-01	Introduction to Green Chemistry: What is Green Chemistry? Need for Green Chemistry. Go also of Green Chemistry. Limitations/Obstacles in the pursuit of the goals of Green Chemistry	
01-02	 Principles of Green Chemistry and Designing a Chemical synthesis: Twelve principles of Green Chemistry with their explanations and examples and special emphasis on the following: Designing a Green Synthesis using these principles; Prevention of Waste/ byproducts; maximum incorporation of the materials used in the process into the final products, Atom Economy, calculation of atom economy of the rearrangement, addition, substitution and elimination reactions. Prevention/minimization of hazardous/toxic products reducing toxicity. Risk = (function) hazard ×exposure; waste or pollution prevention hierarchy. 	

	 Green solvents-super critical fluids, water as a solvent for organic reactions, ionic liquids, fluorous biphasic solvent, PEG, solvent less processes, immobilized solvents and how to compare greenness of solvents. 	
02-01	Principles of Green Chemistry and Designing a Chemical synthesis: Twelve principles of Green Chemistry with their explanations and examples and special emphasis on the following:	Credit 02
	 Energy requirements for reactions – alternative sources of energy: use of microwaves and ultra sonic energy. Selection of starting materials: avoidance of unnecessary derivatization – 	
	 careful use of blocking/protecting groups. Use of catalytic reagents (wherever possible) in preference to 	
	stoichiometric reagents; catalysis and green chemistry, comparison of heterogeneous and homogeneous catalysis, bio catalysis, asymmetric catalysis and photo catalysis.	
	 Prevention of chemical accidents designing greener processes, inherent safer design, principle of ISD "What you don't have cannot harm you", greener alternative to Bhopal Gas Tragedy (safer route to carcarbaryl)and 	
	Flixibo rough accident (safer route to cyclohexanol) subdivision of ISD, minimization, simplification, substitution, moderation and limitation.	
	Strengthening/ development of analytical techniques to prevent and minimize the	
	generation of nazardous substances in chemical processes.	
00.01		Crodit
03-01	Examples of Green Synthesis/ Reactions and some real world cases	
	catechol, di sodium imino diacetate (alternative to Strecker synthesis)	0
	2. Microwave assisted reactions in water: Hofmann Elimination, methyl benzoate to benzoic acid, oxidation of toluene and alcohols; microwave assisted reactions	
	3. Ultra sound assisted reactions: sono chemical Simmons-Smith Reaction	
	(Ultrasonic alternative to lodine)	
	4 Surfactants for carbon dioxide–replacing smog producing and ozone depleting solvents withCO2 for precision cleaning and dry cleaning of garments.	
	5 Designing of Environmentally safe marine anti foulant.	
	Right fit pigment: synthetic azo pigment store place toxic organic and inorganic pigments.	
04-01	Examples of Green Synthesis/ Reactions and some real world cases	Credit
	7 An efficient, green synthesis of a compostable and widely applicable plastic(poly lactic acid) made from corn.	04
	8 Healthier fats and oil by Green Chemistry: Enzymatic inter esterification for production of no Trans-Fats and Oils	
	9 Development of Fully Recyclable Carpet: Cradle to Cradle Carpeting	
04-02	Future Trends in Green Chemistry: Oxidation reagents and catalysts; Bio mimetic, multi functional reagents; Combinatorial green chemistry; Proliferation of solvent less reactions; co crystal controlled solid state synthesis (C2S3);Green chemistry	
	in sustainable development.	

LD Code	Title	Edition	ISBN
LR Code	Author	Year	Publisher
YCMOU SLM e			
CHE307-T01	https://goo.gl/ytrJWe	2016	- YCMOU
Reference Bool	KS		
CHE307-R01	Chemistry for Degree Students (B.Sc. SemV/VI, CBCS)R L Madan	2016	9789352535859 S Chand
CHE307-R02	Chemistry@ <u>https://goo.gl/29PGRb</u>	2017	1-947172-09-3 Open Stax
CHE307-R03	Chemistry: Atoms First @ <u>https://goo.gl/e58NiX</u>	2017	1-947172-18-2 Open Stax
CHE307-R04	Organic Chemistry with a Biological Emphasis @ https://goo.gl/2W5m8E	2016	BC Campus
CHE307-R05	Analytical Chemistry @ <u>https://goo.gl/BPaxaz</u>	2010	BC Campus
CHE307-R06	Introductory Chemistry @ <u>https://goo.gl/WrDfrM</u>	2011	BC Campus
CHE307-R07	Concept Development Studies in Chemistry @ https://goo.gl/LbQigG	2007	BC Campus
CHE307-R08	PhET Simulations @ <u>https://goo.gl/rcFu5P</u>	2016	- YCMOU

COURSE OUTCOMES

- Apply knowledge of renewable resources and feedstocks in chemical processes.
- Choose and use green solvents effectively to reduce the environmental impact of chemical processes.
- Perform life cycle assessments (LCAs) to evaluate the environmental impact of chemical products and processes.
- Apply critical thinking to evaluate chemical processes and propose green alternatives.

CHE308: GREEN CHEMISTRY

SN	Description	Details
		Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222,
1	University	Maharashtra, India
		Website: <u>http://www.ycmou.ac.in</u>
2	School	School of Sciences
3	Discipline	Science
4	Level	UG
5	Course Used in	V92: B.Sc (Physics, Chemistry, Mathematics) &
	Course Osed III	V100: B.Sc (Botany, Chemistry, Zoology)

PROGRAMME INFORMATION

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Туре
06	CHE308	Green Chemistry	2	6	120	10	40	50	Р

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of	The objectives of this course are–
this course, student should	✤ Learn the History of Green Chemistry (GC).
have successfully completed:	 Find what is the role of Environmental Protection Agency (EPA) in USA
(with Biology)	 List the Green Chemistry aspects. Find the Need for Green Chemistry.
	 Explain Benign-by-Designing Chemistry.
	 Describe Atom Economy (AE), Green Chemistry (GC) and Waste Management.
	 Explain how the Addition and Rearrangement reactions are the best examples of Green Chemistry as they reach 100%AE.

UN	Detailed Syllabus of the Unit	Credit			
01-01	Safer starting materials: Preparation and characterization of nano particles of gold using				
	tea leaves.				
	1. Using renewable resources: Preparation of biodiesel from vegetable/waste cooking oil.				
	2. Avoiding waste: Principle of atom economy.				
01-02	² Use of molecular model kit to stimulate the reaction to investigate how the atom economy can illustrate Green Chemistry.				
01-03	Preparation of propene by two methods can be studied (I) Triethylamine ion + OH [*] \rightarrow propene + trimethylpropene + water (II) 1-propanol $\xrightarrow{H_2SO_4/\Delta}$ propene + water				
	Other types of reactions, like addition, elimination, substitution and rearrangement				

	should also be studied for the calculation of atom economy.	
02-01	Use of enzymes as catalysts: Benzoin condensation using Thiamine Hydro chlorideasa	
	catalyst instead of cyanide.	Credit
02-02	Alternative Green solvents: Extraction of D-limonene from orange peel using liquid	02
	CO2 prepared form dry ice. Mechano chemical solvent free synthesis of azomethines	
02-03	Alternative sources of energy: (1) Solvent free, microwave assisted one pot synthesis of	
	Phthalo cyanine complex of copper (II). (2)Photo reduction of benzo phenone to benzo	
	pinacol in the presence of sunlight.	

I P Code	Title	Edition	ISBN				
LK Code	Author	Year	Publisher				
YCMOU SLM eBooks							
CHE308-P01	https://goo.gl/ytrJWe	2016	YCMOU				
CHE307-T01	https://goo.gl/ytrJWe	2016	YCMOU				
Reference Bool	ΧS						
CHE308-R01	Chemistry for Degree Students (B.Sc. SemV/VI, CBCS)R L Madan	2016	9789352535859 S Chand				
CHE308-R02	Chemistry@ <u>https://goo.gl/29PGRb</u>	2017	1-947172-09-3 Open Stax				
CHE308-R03	Chemistry: Atoms First @ <u>https://goo.gl/e58NiX</u>	2017	1-947172-18-2 Open Stax				
CHE308-R04	Organic Chemistry with a Biological Emphasis @ https://goo.gl/2W5m8E	2016	BC Campus				
CHE308-R05	Analytical Chemistry @ <u>https://goo.gl/BPaxaz</u>	2010	BC Campus				
CHE308-R06	Introductory Chemistry @ <u>https://goo.gl/WrDfrM</u>	2011	BC Campus				
CHE308-R07	Concept Development Studies in Chemistry @ https://goo.gl/LbQigG	2007	BC Campus				
CHE308-R08	PhET Simulations @ <u>https://goo.gl/rcFu5P</u>	2016	- YCMOU				

COURSE OUTCOMES

- Apply knowledge of renewable resources and feedstocks in chemical processes.
- Choose and use green solvents effectively to reduce the environmental impact of chemical processes.
- Perform life cycle assessments (LCAs) to evaluate the environmental impact of chemical products and processes.
- Apply critical thinking to evaluate chemical processes and propose green alternatives.

ZGY307: PEST MANAGEMENT & PARASITOLOGY

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222, Maharashtra, India Website: <u>http://www.ycmou.ac.in</u>
2	School	School of Sciences
3	Discipline	Science
4	Level	UG
5	Course Used in	V100: B.Sc (Botany, Chemistry, Zoology)

PROGRAMME INFORMATION

COURSE INFORMATION

	• • • •								
Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Туре
06	ZGY307	Pest Management & Parasitology	4	12	120	20	80	100	Т

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of	The objectives of this course are-
this course, student should have successfully completed:	Explain why identification of the pest is the first step in developing an effective pest control strategy.
◆ 10+2(12 th) Science Pass	Explain the differences between continuous pests, sporadic pests, and potential pests.
(with biology)	Describe "monitoring" as it relates to pest control and explain why it is important to pest control strategy.
	To understand the basic terminologies in parasitology.
	✤To understand the concepts of animal association with examples.
	 To understand the morphology and life cycle of common parasites (Protists and Platyhelminthes).

UN	Detailed Syllabus of the Unit	Credit
01-01	Agricultural Pests: An introduction to Agricultural Pests, Types of pests (agricultural, store grain, veterinary), Major insect pests of agricultural importance (Marks of identification, life cycle, nature of damage and control measures): a) Jowar stem borer, b) Red cotton bug, c) Brinjal fruit borer, d) Mango stem borer, e) Blister beetle, f) Rice weevil, g) Pulse beetle, h) Tick., Non insect pests: Rats, Crabs, Snails, and Squirrels	Credit 01
01-02	Pest management using Regulatory control: Quarantine, Eradication, Control districts, "Crop-free" periods	
01-03	Pest management using Cultural control : Sanitation, Tillage, Crop rotation, Cropping systems	
01-04	Pest management using Biological control : Ecological considerations, Biological control of insects, Biological control of plant disease, Biological control of weeds	
02-01	Biotechnology approaches in pest management : Introduction, Recent advance in use of fungi and viruses, Methodology in Biotechnology, Somaclonal	

	variability, Concept of Genetic engineering and Transgenic plants	Credit
02-02	Integrated pest management (IPM): Principles and its components,	02
	Advantages and disadvantages, Biological control - Predators, Parasitoids,	
	Entomo pathogens, Weed killers and their mass production	
02-03	Insecticides: Classification of insecticides based on mode of entry, Action and	
	chemical nature, insecticides formulations and their uses, safe handling of	
00.04	Insecticide regidue. Methods of regidue detection Organochlaring	
02-04	Organophosphates Synthetic Pyrithroides Systemic Problems in fruits	
	vegetables medicinal plants Maximum permissible residue limits (MRLs)	
	regetables, medicinal plants, maximum permissible residue mints (mittes)	
03-01	Introduction, Scope and Branches of Parasitology: Definition: host.	Credit
-0	parasite, vector, commensalisms, mutualism and parasitism. Branches of	03
	Parasitology	-0
03-02	Types of Parasites and Hosts: Ectoparasites, Endo-parasites and its	
	subtypes, Types of hosts - Intermediate, definitive, paratenic and reservoir	
00.00	Host Departs gratery Host gradificity Types of host gradificity structure	
03-03	specificity, physiological specificity and ecological specificity. Effects of parasite	
	on host.	
03-04	Study of Parasitic Protists : Entamoeba histolytica - (Morphology, Life Cycle,	
Ŭ I	Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and	
	Treatment), Plasmodium vivax - (Morphology, Life Cycle, Prevalence,	
	Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment)	
04-01	Study of Parasitic worms - I: Taenia solium (Tapeworm) - Study of	
	Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis,	
	Prophylaxis and Treatment.	0
04-02	Study of Parasitic worms – II: Ascaris lumbricoides	Credit
	(Nematode worm) - Study of Morphology, Life Cycle, Prevalence, Epidemiology,	04
04.00	Pathogenicity, Diagnosis, Prophylaxis and Treatment	
04-03	monsures of Soft tick Mites and Head louse	
	ineasures of -soft lick, whiles and near louse	
04-04	Study of Parasitic Arthropoda - II: Morphology, Pathogenicity and control	
	measures of – Housefly, Rat flea, Bed bug	
		1

LR Code	Title	Edition	ISBN
	Author	Year	Publisher
YCMOU SLM	eBooks		
ZGY307-T01			
Reference Bo	oks		
ZGY307-RB01	Handbook of Pest Management in Agriculture – Pimentel		
ZGY307-RB02	Principles of Insect Pest Management - Dhaliewal and Arora		
ZGY307-RB03	Agricultural Pest of India & South East Asia -A. Satwal.		

ZGY307-RB04	Analysis of Pesticides Residues -H. A. Moye (JW)			
ZGY307-RB05	Advance in Pest Control Research -R. L. Methcalf (JW)			
ZGY307-RB06	. Insecticide Biochemistry and Physiology -C. F. Wilkinson.			
ZGY307-RB07	Parasitology -K. D. Chatterjee.			
ZGY307-RB08	Parasites: ecology, diseases, and management	2013		
ZGY307-RB09	Parasitic Helminths: Targets, Screens, Drugs, and Vaccines,.	2019		
ZGY307-RB10	Principles of Veterinary Parasitology	2016 1 st edition	Dennis E. Mark Fox, L Gibbons, Hermosilla, Wiley & Sons	Jacobs, ynda M. Carols John
ZGY307-RB11	Encyclopedia of parasitology,	2008.		
ZGY307-RB12	Textbook of medical parasitology – C. K. Jayaram Panikar			

COURSE OUTCOMES

- Explain the biology, life cycles, and behavior of pests and parasites.
- Apply ecological principles to understand pest and parasite interactions within ecosystems.
- Develop knowledge and skills to implement integrated pest management strategies for sustainable pest control.
- Analyze the economic impact of pests and parasites on agriculture, livestock, and public health and propose mitigation strategies.

ZGY308: PEST MANAGEMENT & PARASITOLOGY

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University, Nasik - 422 222, Maharashtra, India
		Website: <u>http://www.ycmou.ac.in</u>
2	School	School of Sciences
3	Discipline	Science
4	Level	UG
5	Course Used in	V100: B.Sc (Botany, Chemistry, Zoology)

PROGRAMME INFORMATION

COURSE INFORMATION

Sem	Code	Course Name	CR	CST	ST	CA	EE	TM	Туре
06	ZGY308	Pest Management & Parasitology	2	6	120	10	40	50	Р

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of	The objectives of this course are–
this course, student should have successfully completed:	Explain why identification of the pest is the first step in developing an effective pest control strategy.
 ◆ 10+2(12th) Science Pass (with Biology) 	Explain the differences between continuous pests, sporadic pests, and potential pests.
	Describe "monitoring" as it relates to pest control and explain why it is important to pest control strategy.
	✤To understand the basic terminologies in parasitology.
	✤To understand the concepts of animal association with examples.
	To understand the morphology and life cycle of common parasites (Protists and Platyhelminthes).

UN	Detailed Syllabus of the Unit	Credit
01-01	To study some important Insect pest	
01-02	Study of non Insect pests	Credit
01-03	Study of life cycle of Red cotton bug and Lemon butterfly	01
01-04	To study detection of damage caused by stored grain pests (Rice weevil and pulse	
	beetle)	
01-05	To detect the pesticides residues in food stuffs	
01-06	Rearing of pest species (Any 2 species)	
02-01	To study the life cycle, Pathogenicity, diagnosis and treatment of Entamoeba	
	histolytica and Plasmodium vivax through permanent slides or microphotographs	

02-02	To study the life cycle, Pathogenicity, diagnosis and treatment of Ascaris lumbricoides and Taenia solium through specimen, permanent slides or			
	microphotographs	Credit		
02-03	To study of effects of parasites on host body 0			
02-04	To study of the Pathogenicity and control measures of - Tick (soft tick and hard tick) and Mite (Sarcoptesscabiei)			
02-05	To study of parasites from the gut of cockroach			
02-06	To collection & submission of various parasites			

I P Codo	Title	Edition	ISBN
LKCOUE	Author	Year	Publisher
YCMOU SLM	l eBooks		
ZGY308-P01			
ZGY307-T01			
Reference Bo	oks		
ZGY308-RB01	Handbook of Pest Management in Agriculture – Pimentel		
ZGY308-RB02	Principles of Insect Pest Management - Dhaliewal and Arora		
ZGY308-RB03	Agricultural Pest of India & South East Asia -A. Satwal.		
ZGY308-RB04	Analysis of Pesticides Residues -H. A. Moye (JW)		
ZGY308-RB05	Advance in Pest Control Research -R. L. Methcalf (JW)		
ZGY308-RB06	Insecticide Biochemistry and Physiology -C. F. Wilkinson.		
ZGY308-RB07	Parasitology -K. D. Chatterjee.		
ZGY308-RB08	Parasites: ecology, diseases, and management	2013	
ZGY308-RB09	Parasitic Helminths: Targets, Screens, Drugs, and Vaccines,.	2019	
ZGY308-RB10	Principles of Veterinary Parasitology	2016 1 st edition	Dennis E. Jacobs, Mark Fox, Lynda M. Gibbons, Carols Hermosilla, John Wiley & Sons
ZGY308-RB11	Encyclopedia of parasitology,	2008	
ZGY308-RB12	Textbook of medical parasitology – C. K. Jayaram Panikar		

COURSE OUTCOMES

After successful completion of this course, student should be able to -

- Explain the biology, life cycles, and behavior of pests and parasites.
- Apply ecological principles to understand pest and parasite interactions within ecosystems.
- Develop knowledge and skills to implement integrated pest management strategies for sustainable pest control.
- Analyze the economic impact of pests and parasites on agriculture, livestock, and public health and propose mitigation strategies.

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