Minutes of 5th meeting of BOS in Faculty of Science held on 05/06/2024 at 11:00 A.M. in the Dr. A.P.J. Abdul Kalam Conference Hall, Admin. Block, P.K. University

Minutes of 5th meeting of BOS in Faculty of Science held on 05/06/2024 at 11:00 A.M. in the Dr. A.P.J. Abdul Kalam Conference Hall, Admin. Block. The following members were present in the meeting:

1. Dr. Aiman Fatima	Member
2. Dr. Jitendra Malik	Member
3. Prof. (Dr.) Mahalaxmi Johri	Member
4. Dr. Ashish Vishwakarma	Chairman
5. Dr. Praveen Kumar	Member
6. Mr. Gaurav Saxena	Member
7. Ms. Ayushi Chaurasiya	Member
8. Mr. Ashish Pratap Singh	Member

External Member

9. Dr. Ramesh Kumar	Expert Member

Special Invitee

10. Dr. Deepesh Namdev	Member
11. Dr. Bhaskar Nalla	Member
12. Ms. Nisha Yadav	Member
13. Mr. Gauri Dutt Tiwari	Member

The agenda items of the meeting were taken up by the BOS one by one as follows:

Agenda no. 01: To Confirm minutes of previous meeting of Board of Studies held on 09/08/2023.

- The BOS meeting confirmed the minutes of the previous meeting of the BOS held on 09/08/2023.

Agenda no. 02: Action taken on the minutes of previous Board of Studies held on 09/08/2023.

- The action taken on the previous meeting of BOS held on 09/08/2023 was presented to the BOS & same were noted.

Agenda no. 03: Approval of Scheme and Syllabus of B.Sc. 2nd year (3rd and 4th Semester) courses as per 52(A) ordinance NEP.

- The new schemes and syllabus of various courses B.Sc. 3rd & 4th semester in Faculty of Science were discussed in the BOS. After detail discussion, the BOS meeting approved the same.

Agenda no. 04:

- Addition of statics portion in research methodology paper in Ph.D. syllabus was discussed in the BOS. After detail discussion, the BOS meeting approved the same

Agenda no. 05: Any other matter with the permission of the Chairman.

- Nil

1. Dr. Aiman Fatima
2. Dr. Ramesh Kumar
3. Dr. Jitendra Malik
4. Prof. (Dr.) Mahalaxmi Johri
5. Dr. Ashish Vishwakarma
6. Dr. Praveen Kumar
7. Mr. Gaurav Saxena
8. Ms. Ayushi Chaurasiya
9. Mr. Ashish Pratap Singh
10. Dr. Deepesh Namdev
11. Dr. Bhaskar Nall
12. Ms. Nisha Yadav
13. Mr. Gauri Dutt Tiwari

P.K.University
Shivpuri (M.P.)
University Established Under section 2f of UGC ACT 1956 Vide MP Government Act No 17 of 2015

5TH MEETING OF THE BOARD OF STUDIES

AGENDA

(FOR MEMBER ONLY)

Date of Meeting: - 05/06/2024

Time of Meeting: - 11:00AM

Venue of Meeting: - Dr. A.P.J. Abdul Kalam, Conference Hall, Administrative Block

ADD: VIL: THANARA, TAHSIL KARERA, NH-27, DIST: SHIVPURI, M.P.-473665,
MOB: 7241115081 to 90, Email:registrar.pkuniversity @gmail.com

P.K.University
Shivpuri (M.P.)
University Established Under section 2f of UGC ACT 1956 Vide MP Government Act No 17 of 2015

Notice

Ref. No: F7(9)1/1 Date : **01/06/2024**

Subject: Board of Studies Meeting of Faculty of Science

Minutes of 5th meeting of BOS in Faculty of Science held on 05/06/2024 at 11:00 A.M. in the Conference Hall, Admin. Block. The following members were present in the meeting:

1. Dr. Aiman Fatima	Member	.....
2. Dr. Jitendra Malik	Member	.....
3. Prof. (Dr.) Mahalaxmi Johri	Member	.....
4. Dr. Ashish Vishwakarma	Chairman	.....
5. Dr. Praveen Kumar	Member	.....
6. Mr. Gaurav Saxena	Member	.....
7. Ms. Ayushi Chaurasiya	Member	.....
8. Mr. Ashish Pratap Singh	Member	.....
External Member		
9. Dr. Ramesh Kumar	Expert Member	.....
Special Invitee		
10. Dr. Deepesh Namdev	Member	.....
11. Dr. Bhaskar Nalla	Member	.....
12. Mrs. Nisha Yadav	Member	.....
13. Mr. Gauri Dutt Tiwari	Member	.....

Dean Academic
P.K. University, Shivpuri (M.P.)

Copy to:-
VC office- For Information
Director Administration
Registrar
Deputy Registrar
All Teaching & Non- Teaching Staff

ADD: VIL: THANARA, TAHSIL KARERA, NH-27, DIST: SHIVPURI, M.P.-473665,
MOB: 7241115081 to 90, Email:registrar.pkuniversity @gmail.com

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Shivpuri (M.P.)

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Ref No. PKU/FOC/2024/Board of Studies/ **Date: 01/06/2024**

To,
The Members
Board of Studies
Faculty of Science
P.K. University, Shivpuri (M.P.)

Subject: - 5th Board of Studies Meeting of Faculty of Science.

Dear Ma'am/Sir

The 5thBoard of Studies Meeting is scheduled to be held on 05/06/2024 at Dr. A.P.J. Abdul Kalam, Conference Hall in Admin Block, as per directives of M.P. Government Statute no. 19 to finalize the syllabus of B.Sc. 2nd year (3rd & 4th semester) course under Ordinance 52 (A) as per NEP pattern from the academic session 2024-2025. You are requested to kindly grace the meeting.

PROGRAMME:

Date of Meeting : - 05/06/2024
Time of Meeting : - 11.00 AM
Venue of Meeting: - Conference Hall (Administrative Block) P.K. University Shivpuri M.P.

With kind regards

Dean Academic
P.K. University, Shivpuri (M.P.)

Copy to Kind Information:
PS to Chancellor for kind information of the Hon'able Chancellor, P.K.University, Shivpuri (M.P.)
PS to VC for kind information of the Hon'able Vice-Chancellor, P.K.University, Shivpuri (M.P.)
Director (Admin.)Office, P.K.University, Shivpuri (M.P.)
Dean Academic Office, P.K.University, Shivpuri (M.P.)
Member of BOS, Faculty of Science

ADD: VIL: THANARA, TAHSIL KARERA, NH-27, DIST: SHIVPURI, M.P.-473665,
MOB: 7241115081 to 90, Email:registrar.pkuniversity @gmail.com

Guard File

P.K.University
Shivpuri (M.P.)

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Ref No. : - PKU/FOS/2024/BOARD OF STUDIES/ **Date: 01/06/2024**

To,
Dr. Ramesh Kumar
Associate Professor
Bundelkhand University, Jhansi (U.P.)

Subject: - 5th Board of Studies Meeting of Faculty of Science.

Dear Ma'am/Sir

The 5thBoard of Studies Meeting is scheduled to be held on 05/06/2024 at Dr. A.P.J. Abdul Kalam, Conference Hall in Admin Block as per directives of M.P. Government Statute no. 19 to finalize the syllabus of B.Sc. Degree course as per NEP pattern from the academic session 2024-2025 . You are requested to kindly grace the meeting as Expert member.

PROGRAMME:

Date of Meeting : - 05/06/2024
Time of Meeting : - 11.00 A.M.
Venue of Meeting: - Dr. A.P.J. Abdul Kalam, Conference Hall (Admin. Block) P.K. University Shivpuri M.P.

With kind regards

Dean Academic
P.K. University, Shivpuri (M.P.)

Copy to Kind Information:
PS to Chancellor for kind information of the Hon'able Chancellor, P.K.University, Shivpuri (M.P.)
PS to VC for kind information of the Hon'able Vice-Chancellor, P.K.University, Shivpuri (M.P.)
Director (Admin.)Office, P.K.University, Shivpuri (M.P.)
Dean Academic Office, P.K.University, Shivpuri (M.P.)
Member of BOS, Faculty of Science
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Shivpuri (M.P.)
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Ref No. PKU/FOS/2024/Board of Studies **Date:**

AGENDA OF THE 5th BOARD OF STUDY OF FACULTY OF SCIENCE, P.K. UNIVERSITY, SHIVPURI (M.P.)

Agenda no. 01

- Confirmation of the previous meeting of Board of Studies held on 09/08/ 2023.

Agenda no. 02

- Action taken on the minutes previous of Board of Studies held on 09/08/ 2023.

Agenda no. 03

- Approval of Scheme and Syllabus of B.Sc. 2nd year (3rd and 4th Semester) courses as per 52(A) ordinance NEP.

Agenda no. 04

- Addition of Statistic portion in Research Methodology paper in Ph.D. syllabus.

Agenda no. 05

- Any other matter with the permission of Chairman.

Dean Academic
P.K. University, Shivpuri (M.P.)

Copy to:

1. Office of the Vice – Chancellor
2. Office of the Director(Administration)
3. Office of the Registrar
4. Office of the Assistant Registrar
5. Office of the Exam- Cell
6. Copy to all the Members with the Request to attend the meeting.

ADD: VIL: THANARA, TAHSIL KARERA, NH-27, DIST: SHIVPURI, M.P.-473665,
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ABBREVIATION SUBJECT CODES

S. No.	Faculty Wise S. No.	Subject	Code
1	1	Common Paper for D/G/U/M/P	CP
Faculty of Art			AR
2	1	Hindi	HI
3	2	Sociology	SO
4	3	English	EN
5	4	Sanskrit	SA
6	5	Political Science	PO
7	6	Home Science	HO
8	7	Psychology	PH
9	8	Geography	GE
10	9	Economics	EO
11	10	Social Work	SW
12	11	Public Administration	PA
13	12	History	HT
14	13	Education	ED
15	14	Library Science	LS
Faculty of Engineering			
16	1	Digital Communication	DC
17	2	Digital Electronics	DE
18	3	Electronics & Communication	EC
19	4	Electrical Engineering	EE
20	5	Electrical & Electronics Engineering	EX
21	6	Mechanical Engineering	ME
22	7	Civil Engineering	CE
23	8	Information Technology	IT
24	9	Chemical Engineering	CH
25	10	Agriculture Engineering	AE
26	11	Automobile Engineering	AU
27	12	Production Engineering	PE

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28	13	Computer Science & Engineering	CO
29	14	Power System	PS
30	15	Structural Engineering	SE
31	16	Transportation Engineering	TE
32	17	Construction, Planning & Management Engineering	CE
33	18	Farm Machinery & Power Engineering	FE
34	19	Irrigation & Drainage Engineering	ID
35	20	Soil & Water Conservation	SC
36	21	Thermal Engineering	TH
37	22	VLSI Design	VL
38	23	Artificial Intelligence & Machine Learning	AI
39	24	Data Science	DS
40	25	Internet of Things	IO
41	26	Robotics (M. Tech)	RO
42	27	Remote Sense (M. Tech)	RS
Faculty of Management			**MG**
43	1	Marketing Management	MM
44	2	Human Resources	HR
45	3	Finance Management	FM
46	4	Information Technology	IT
47	5	Hospital Management	HM
48	6	Healthcare Management	HC
49	7	Agri-Business Marketing	AM
50	8	Livestock Products Management	LP
51	9	Supply-Chain Management	SM
52	10	Operation Management	OM
Faculty of Science			**SC**
53	1	Physics	PH
54	2	Zoology	ZO
55	3	Botany	BO
56	4	Chemistry	CH
57	5	Mathematics	MA
58	6	Microbiology	MB
59	7	Biochemistry	BC
60	8	Biotechnology	BT
61	9	Computer Science	CS
62	10	Food Technology	FT
Faculty of Computer Science & Application			**CA**
63	1	Computer Science & Application	CA
Faculty of Commerce			**CM**
64	1	Management of Services	MS
65	2	Banking & Insurance	BI

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66	3	Human Resource Development	HD
67	4	Financial Analysis and Control	FC
68	5	Marketing Management	MM
Faculty of Law			LA
69	1	Criminal Group	CR
70	2	Constitution Group	CO
71	3	Corporate Group	CG
Faculty of Paramedical*			
72	1		
Faculty of Medical*			
73	1		
Faculty of Nursing*			
74	1		
Faculty of Agriculture*			
75	1	Agronomy	
76	2	Agricultural Extension	
77	3	Horticulture	
78	4	Seed Technology	
Faculty of Pharmacy*			
79	1	Pharmaceutical Chemistry	PC
80	2	Pharmaceutics	PH
81	3	Pharmacology	PL
82	4	Pharmacognosy	PG
Research Cell			DR
83	1	Common Research Paper	RC
84	2	Viva-Voice	VIVA

*As per Council Body

Course Indication:

D - For Diploma
G - For Post Graduate Diploma
U - For Under Graduate
M - For Post Graduate
P - For Research Scholar

Please use this code formula to generate the subject code

Course Indication + First Four Letter Subject Name + Serial No = Subject Code

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AGENDA OF THE 5thBOARD OF STUDY OF FACULTY OF SCIENCE

AGENDA NO. 01

Confirmation of minutes of the previous meeting of Board of Studies held on 09/08/ 2023.

Minutes of 4th meeting of BOS in Faculty of Science held on 09/08/2023 at 11:00 A.M. in the Conference Hall, Admin. Block, P.K. University

1. Prof. (Dr.) Ranjit Singh	Chairman
2. Prof. (Dr.) G. Pawan Kumar	Member
3. Dr. Mahalaxmi Johri	Member
4. Dr. Ashish Vishwakarma	Member
5. Dr. Praveen Kumar	Member
6. Dr. Brijesh Shivhare	Member
7. Mr. Gaurav Saxena	Member
8. Ms. Ayushi Chaurasiya	Member
9. Dr. Vikrant Sharma	Member
10. Dr. Meenu Gupta	Member
11. Mrs. Shweta Sharma	Member
12. Mr. Ashish pratap Singh	Member
External Expert	
13. Dr. Sanjeev Srivastva	Member
Special Invitee	
14. Dr. Deepesh Namdev	Member
15. Dr. Bhaskar Natla	Member
16. Mrs. Nisha Yadav	Member
17. Mr. Pankaj Singh	Member

The agenda items of the meeting were taken up by the BOS one by one as follows:

Agenda no. 01: To Confirm minutes of previous meeting of Board of Studies held on 13.12.2022.

- The BOS meeting confirmed the minutes of the previous meeting of the BOS held on 13.12.2022 as given in agenda 1 from page 1 to 3.

Agenda no. 02: Action taken on the minutes of previous Board of Studies held on 13.12.2022.

- The action taken on the previous meeting of BOS held on 13.12.2022 was presented to the BOS & same were noted. as given in agenda 2 from page 4 to 5.

Agenda no. 03: Approval of Scheme and syllabus of various B.Sc. courses as per 52(A) of NEP.

- The new schemes and syllabus of various courses B.Sc. 1st & IInd semester in Faculty of Science were discussed before the BOS. After detail discussion, the BOS meeting approved the same. as given in agenda 3 from page 6 to 22.

Agenda no. 04: Approval of Scheme and Syllabus of various M.Sc. (1st - 4th Semester) degree courses.

- The new schemes and syllabus of various courses of M.Sc. 1st to 4th semester in Faculty of Science were discussed before the BOS. After detail discussion, the BOS meeting approved the same. as given in agenda 04 from page 23 to 34.

Agenda no. 05: Approval of scheme and syllabus of various B.Sc. 3rd year degree courses as per 52(B).

- The new schemes and syllabus of various courses of B.Sc. 3rd year in Faculty of Science were discussed before the BOS. After detail discussion, the BOS meeting approved the same. as given Agenda 05 from page 35 to 39.

Agenda no. 06: Approval of rules in addition to ordinance 52 (A) (Under Graduate Courses)

To approve rules in addition to ordinance 52A (as per NEP) and common to all graduate course in faculty of Science were presented to the meeting of BOS and same as approved in the meeting. as given agenda 06 from page 40-44.

Agenda no. 07: Approval of scheme and syllabus of various [redacted] Ph.D. for part time Programme.

- The new schemes and syllabus of various courses B.Sc., M.Sc., and Ph.D. for part time Programme in Faculty of Science were discussed before the BOS. After detail discussion, the BOS meeting approved the same. asgiven Agenda 07 from page 45 to 63

Agenda no. 08: Any other matter with the permission of the Chairman.

- Nil as given Agenda 08 from page 64.

1. Prof. (Dr.) Ranjit Singh
2. Dr. Sanjeev Srivastava
3. Prof. (Dr.) Gajendra Kumar
4. Prof. (Dr.) Mahalaxmi Johri
5. Dr. Ashish Vishwakarma
6. Dr. Praveen Kumar
7. Dr. Brijesh Shivhare
8. Mr. Gaurav Saxena
9. Ms. Krishi Chaurasiya
10. Dr. Vikrant Sharma
11. Dr. Meenu Gupta
12. Mrs. Shweta Sharma
13. Mr. Ashish pratap Singh
14. Dr. Deepesh Namdev
15. Dr. Shankar Nall
16. Ms. Nisha Yadav
17. Mr. Pankaj Singh

P.K.University
Shivpuri (M.P.)

University Established Under section 2f of UGC ACT 1956 Vide MP Government Act No 17 of 2015

AGENDA OF THE 5th BOARD OF STUDY OF FACULTY OF SCIENCE

AGENDA NO. 02

Action taken on the minutes previous of Board of Studies held on 09/08/ 2023.

Faculty of Science

Ref. No: F (7)9-1/1 Date: - 5/6/2024

Action Taken on Minutes of 4th BOS held on 09/08/2023

S. No.	Description	Action
1	Minutes of 4th meeting of BOS	Confirmed
2	The Action taken on 4th meeting of BOS was presented in the meting	Noted
3	Approval of Scheme and Syllabus of various B.Sc.1st & 2nd syllabus as per 52(A) NEP.	Implemented
4	Approval of Scheme and Syllabus of various M.Sc. (1st-4th Semester) degree courses.	Implemented
5	Approval of Scheme and Syllabus of various B.Sc. 3rd Year degree course as per 52(B).	Implemented
6	Approval of rules in Addition of Ordinance 52(A) for B.Sc. (Under Graduate Courses).	Implemented

Department of Science

P.K. University, Shivpuri (M.P.)

P.K.University
Shivpuri (M.P.)
University Established Under section 2f of UGC ACT 1956 Vide MP Government Act No 17 of 2015

AGENDA OF THE 5th BOARD OF STUDY OF FACULTY OF SCIENCE

AGENDA NO. 03

Approval of Scheme and Syllabus of B.Sc. 2nd year (3rd and 4th Semester) courses as per 52(A) ordinance according to NEP.

ADD: VIL: THANARA, TAHSIL KARERA, NH-27, DIST: SHIVPURI, M.P.-473665,
MOB: 7241115081 to 90, Email:registrar.pkuniversity @gmail.com

P.K.University
Shivpuri (M.P.)

Faculty of Science

Scheme
For
B.Sc.

(III Semester Course)

W.E.F. - Session 2024 - 2025

P.K.UNIVERSITY SHIVPURI (M.P.)

Program: - B.Sc. (All Branch)

Programme Specific Objectives

1. To nurture academicians with focus and commitment to their subject
2. To shape good and informed citizens from the students entering into the programme.
3. To credit a skilled workforce to match the requirements of the society.
4. To impart knowledge of science is the basic objective of this programme.
5. To develop scientific attitude is the major objective so as to make the students open minded, critical and curious.
6. To develop skill in practical work, experiments and laboratory materials and equipment's along with the collection and interpretation of scientific data to contribute to science.

Programme Out Come

1. The students will graduate with proficiency in the subject of their choice.
2. The students will be eligible to continue higher studies in their subject.
3. The students will be eligible to pursue higher studies abroad.
4. The students will be eligible to appear for the examinations for their jobs in government organizations.
5. The students will be eligible to apply for jobs with a minimum requirement of B.Sc.

P.K.University
Shivpuri (M.P.)

B.Sc. 3rd Semester

S. No.	Subject	Subject Code	Paper Title	Paper Code
1.	Desktop publishing	CP	Desktop Publishing with advance page Maker	UDESKCP201
			Desktop Publishing Lab I	UDESKCP202
2.	Physics	PH	Electricity Magnetism and Electromagnetic Theory	UELECPH201
			Physic slab III	UPHYSPH202
3.	Chemistry	CH	Transition Elements, Chemi energetics, Phase Equilibrium	UTRANCH201
			Chemistry Lab III	UCHEMCH202
4.	Mathematics	MA	Abstract Algebra and linear Algebra	UABSTMA201
5.	Computer Science	CS	Computer Network & Information Security	UCOMPCS201
			Computer Science Lab III	UCOMPCS202
6.	Botany	BO	Industrial Botany	UINDUBO201
			Botany Lab III	UBOTABO202
7.	Zoology	ZO	Diversity of Chordates and Comparative Anatomy	UDIVEZO201
			Zoology Lab III	UZOOLZO202
8.	Biochemistry	BC	Clinical Biochemistry	UCLINBC201
			Biochemistry Lab III	UBIOCBC202
9.	Microbiology	MB	Microbial Physiology and Metabolism	UMICRMB201
			Microbiology Lab III	UMICRMB202
10.	Biotechnology	BT	Basic Molecular Biology	UBASIBT201
			Biotechnology Lab III	UBIOTBT202
11.	Food Technology	FT	Technology of Cereals, Pulses, Bakery & Confectionary	UTECHFT201
			Food technology Lab III	UFOODFT202

	B.Sc. 3rd Semester Course Structure – Faculty of Science												
	Compulsory courses for B.Sc. 3rd semester students (Level 6)												
S. No.	Course	Subjects/Paper type/Total Credits	Paper Title	Paper Code	Credits	: Lecture T: Tutorial P: Practical			Distribution of Theory Marks		Distribution of Practical Marks		Total Marks (CCE+UE)
						L	T	P	CCE	UE	CCE	UE	
1.	PHYSICS	DESKTOP PUBLISHING/SEC/4	Desktop Publishing Theory	UDESKCP201	3	3	0	0	40	60	0	0	100
			Desktop Publishing Lab I	UDESKCP202	1	0	0	1	0	0	40	60	100
2.		PHYSICS/ Major/6	Electricity Magnetism and Electromagnetic Theory	UELECPH201	4	4	0	0	40	60	0	0	100
3.			Physics Lab III	UPHYSPH202	2	0	0	2	0	0	40	60	100
4.		MATHEMATICS/Minor/6	Abstract Algebra and linear Algebra	UABSTMA201	6	6	0	0	40	60	0	0	100
5.		CHEMISTRY/GE/4	Transition Elements, Chemi energetics, Phase Equilibrium	UTRANCH201	3	3	0	0	40	60	0	0	100
6.			Chemistry Lab III	UCHEMCH202	1	0	0	2	0	0	0	100	100
	Total				**22**				**160**	**240**	**80**	**120**	**700**

Streaming audio and video: digital audio and video, streaming stored media, real-time streaming.
Keywords: routing algorithm, IPv4, IPv6, ATM, SMTP, POP, ftp, http, https, Wi-Fi, video streaming.

Unit: V (No. of Lecturer 10)

Network Security and Information Security: Fundamental of network and information security: principles of security and attack, Security Goals (Confidentiality, Integrity and Availability), Non- Repudiation.
Overview of Security Threats and Vulnerability: Types of attacks on Confidentiality, Integrity and Availability, Vulnerability and Threats: Phishing Attacks, E-mail threats, Web-threats, Intruders and Hackers, Insider threats, SQL injection Attacks, Ransom ware.
Malware: Worms, Virus, Spams, Adware, Spyware, Trojans.
Security Technology: Firewalls, Intrusion detection and prevention systems, Scanning and Analysis Tools: Biometric access controls, Cipher methods, Cryptographic algorithms, Cryptographic tools, Protocols for secure communication.
Keywords: phishing, SQL injection, Worms, Computer virus, Spyware, Trojans, Firewall, Cipher, Cryptography.

Unit: VI (No. of Lecturer 10)

Computer and Cyber- crimes: Cyber- crimes and related concepts, distinction between cyber-crimes and conventional crimes, Cyber criminals and their objectives. Kinds of cyber-crimes, cyber stalking, forgery and fraud crime related to IPRs, cyber terrorism, Ransom ware attacks, computer vandalism.
Cyber Laws: Introduction to IT laws & Cyber Crimes – Internet, Hacking, Cracking, Viruses, Virus Attacks, Software Piracy, Intellectual property, legal System of Information Technology, Social Engineering, Mail Bombs, Bug Exploits. Scope of cyber laws: e-commerce, online contracts, IPRs (copyright, Trademarks and software patenting), e-taxation e-governance and cyber- crimes, Cyber law in India with special reference to Information Technology Act, 2000 and recent amendments.
Keywords: cyber- crime, cyber stalking, and cyber- fraud, IPR, IT laws, e- commerce, e-taxation, e- governance, mail bombs.

Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

Textbooks:

- Andrew S. Tanenbaum, Nick Feamster, David J. Wetherall, Computer Networks, 6th Edition, (2021), Pearson.
- Michael E Whitman and Herbert J Mattord, Principles of Information Security, Fourth Edition, CENGAGE Learning, 6th Indian Reprint.
- M. Merkow, J. Breithauth, Information Security Principles and Practices, 2nd Edition, 2014, Pearson Education
- G.R.F. Snyder, T. Pardoe, Network Security, Cengage Learning.
- Praveen Kumar Shukla, Surya Prakash Tripathi, Ritendra Goel "Introduction to Information Security and Cyber Laws", 2014, Dreamtech Press.
- Faiyaz Ahamad, KLSI "Cyber Law and Information Security", 2013, Dreamtech Press.
- Books published by M.P. Hindi Granth Academy, Bhopal.

Reference books:

- Kurose James F., Ross Keith W., Computer Networking, A Top-Down Approach, Sixth

Edition, 2017, Pearson
- Micki Krause, Harold F. Tipton, Handbook of Information Security Management; Vol. 1-3, CRC Press LLC.
- B. A. Forouzan: Data Communications and Networking, Fourth edition, TMH Publishing Company Ltd.
- Basta, W.Halton, Computer Security: Concepts, Issues and Implementation, Cengage Learning India.

Computer Science Lab III
UCOMPCS202

Unit: I Study of UTP network cable
- Study the color code of UTP cable
- Categories of UTP n/w cable
- Shielding of n/w cable
- Electricity interference with n/w cable
- Maximum length for which data cable can be used
- Crimping of RJ45 connector and Punching of data n/w cable
- Penta scanning of cabling work
- Rules of UTP laying

Unit: II Knowledge of Structured Cabling and its components
- Information outlet with box
- Network Rack (4U, 6U, 9U, 12U, 24U, 32U, 42U)
- Patch Panel

Rack Management

Unit: III Study of Optical Fiber cable
- Different cores of OFC (6 core, 12, 24 core)
- Multimode & Single mode OFC cable
- Shielding Of OFC
- Splicing/ Termination of OFC
- OTDR Testing
- LIU fixing
- LIU management (pigtail/ fiber patch cord)
- Media Convertor
- SFP module
- Rules of OFC laying

Unit: IV Use of tools
- Crimping Tool
- Punching Tool
- Nose Plier
- Wire Stripping and cable Cutter
- Multimeter
- RJ45, RJ11, RJ12, Cat5 Cat6 Network Cable Tester
- In-Line Coupler (RJ45 F/F)

- RJ45 NETWORK SPLITTER ADAPTER 2- way.

Unit: V Configuration/ Management of Local Area Network

- Implementation of file and printer sharing.
- Installation of ftp server and client.
- Connect the computer in local Area Network
- Configuring Class A IP Address on LAN Connection in Computer LAB and then use following tools: ping, ipconfig, getmac, hostname, nslookup, tracert, arp, pathping, systeminfo.
- Configure VLAN using Managed switch Device/ Packet Tracer
- Implementation of Subnet ting in class A,B and C
- Ping between 2 systems using IPv6
- Configuration of NAT for incoming packet request
- Configuration of Software / Hardware firewall to block outgoing requests to facebook.com

Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

- Andrew S. Tanenbaum, Nick Feamster, David J. Wetherall, Computer Networks, 6th Edition, (2021), Pearson.
- Michael E Whitman and Herbert J Mattord, Principles of Information Security, Fourth Edition, CENGAGE Learning, 6th Indian Reprint.
- Books published by M.P. Hindi Granth Academy, Bhopal.

Reference books:

- Hacking Exposed, Stuart McClure, Joel Scrambray, George Kurtz, TMH.
- Computer Security Art and Science, Matt Bishop, Pearson/PHI.

Subject- Botany
Course Title: Industrial Botany
Subject code: UINDUBO201

Unit: I [No. of Lectures: 12]
1. Plants in Timber Industry:
1.1 Timber yielding trees of India and their product (Shisham, Sal, Teak, Deodar, Babool).
1.2 Bamboo and Cane Industry.
1.3Kattha's Industry.

Unit: II [No. of Lectures: 12]
1. Leaf Based Industries-
1.1Utility products of leaf (Palash, Banana).
1.2Tea Industry (Production of various types of teas).
1.3Leaf oil Industry (Mint, Camphor, Neem, Tulsi, Eucalyptus and Lemon grass).
1.4Leavesused as spices (Kasoori Methi, Pudina, Curry patta, Onion, Tejpatta).

Unit: III [No. of Lectures: 12]
1. Flower based Industries —
1.1Perfume products of Gulab, Jasmine, Henna
1.2Color industry (Food and Holi colors).
1.3 Raw material for Fermentation (Mahua).

Unit: IV [No. of Lectures: 12]
1. Fruits and Seeds based Industries-
1.1 Jams, Jellies, Juice, Sauce and Pickles.
1.2 Poha and Daal Industry.
1.3 Edible Oil Industry (Groundnut, Soybean)
1.4 Starch, Glucose, and Dextrose Industry.

Unit: V [No. of Lectures: 12]
1. Other parts of plants based Industries-
1.1 Sugar and Jaggery Industries.
1.2 Jute and Agarbatti stick making industry.
1.3 Project proposal preparation for establishment of an industry.
1.4 Grants and funding provider organizations of India.

Learning Resources
Text Books, Reference Books, Other resources
Suggested Readings:

- Gerald E Wickens Economic Botany, principles and Practice, Kluver Academic
- Publishers (2001)
- Kocchar, S.L. Economic Botany, Cambridge University Press, UK (2016)
- Simpson, B.B. and Ogorzal, M.C. Economic Botany, Tata Macgray Hill Publisher (1986)

Botany Lab III
UBOTABO202

- Preparation of Holi color's from locally available flowers
- Preparation of food colors from locally available flowers
- Perfume extraction process by distillation method
- Preparation and preservation techniques of jams, jellies and prickles.
- Extraction and preservation of juices (lemon and orange etc.)
- Preparation of different types of teas (Tulsi tea, lemon tea etc.)
- Identification, collection and extraction of oil yielding leaves.
- Identification, collection and specimen preparation of leafy spices.
- Hands on training for preparation of "Douna and Pattal" using Palash and Banana leaves.
- Visit to any plant based industry.
- Herbarium preparation of different parts of plants used in various industries

Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

- Simpson, B.B. and Ogorzaly, M.C. Economic Botany, Tata Macgray Hill Publisher(1986)

Subject- Zoology

Course Title: Diversity of Chordates and Comparative Anatomy

Subject code: UDIVEZO201

Unit: I (No. of Lecturer 12)

1. Introduction to Chordates:

1.1 Traditional Knowledge on Animal Science in ancient Indian Civilization.

1.2 Origin of Chordates, General characteristics and outline classification of Phylum Chordata up to orders according to Parker and Haswell, Seventh Edition.

2. Protochordata:

2.1 General characteristics and classification of Sub – Phylum Urochordata and Cephalochordate.

2.2. Type study of Herdmania and retrogressive metamorphosis in ascidian tadpole.

2.3 Type study of Amphioxus and its Affinities.

3. Agnatha

3.1 Comparison of Petromyzon and Myxine.

Keywords: Chordata, Herdmania, Amphioxus, Cephalochordate, Petromyzon

Unit: II (No. of lectures: 12)

1. Pisces

1.1 General Characteristics and classification of Pisces.

1.2 Accessory respiratory organs, Parental care in fishes.

2. Amphibia

2.1 General Characteristics and classification of Amphibia.

2.2 Parental care in Amphibia and Paedomorphosis.

3. Reptilia

3.1 General Characteristics and classification of Reptilia.

3.2 Difference between Poisonous and Non Poisonous snakes, Venom and Antivenom.

3.3 Poison apparatus and biting mechanism in snake.

Keywords: Pisces, Parental care, Amphibia, Reptiles, and Poison apparatus.

Unit: III (No. of lectures: 12)

1. Aves

1.1 Brief Introduction of "Birdman" of India – Dr. Salim Ali.

1.2 General characteristics and classification of Aves.

1.3 Migration of birds, principles and aerodynamics of flight.

1.4 Flight adaptation in birds.

2. Mammalia

2.1. General characteristics and classification of mammals.

2.2. Adaptive radiation in mammals with reference to locomotory appendages.

2.3. Introduction of ZSI (Zoological Survey of India).

Keywords: Aves, Aerodynamics, Flight adaptation, Mammalia, Adaptive radiation, Locomotory appendages.

Unit: IV (No. of lectures: 14)

1. Comparative Anatomy of Vertebrates.

1.1. Comparative study of integument and its derivatives of Vertebrates.

1.2. Comparative study of appendicular skeleton (Limb and girdles) of Vertebrates.

1.3. Comparative study of digestive system of Vertebrates.

1.4. Comparative study of respiratory system of Vertebrates.

Keywords: Integuments, Derivatives, Girdles, Digestive system, Respiratory system

Unit: V (No. of lectures: 10)

1. Comparative Anatomy of Vertebrates.

1.1. Comparative study of aortic arches and heart of Vertebrates.

1.2. Comparative study of Brain of Vertebrates.

1.3. Comparative study of Urinogenital System of Vertebrates.

1.4. Study of Eye and Ear of Mammals.

Keywords: Heart, Brain, Kidney, Urinogenital System, Eye, Ear

Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

- Dhami, P. S., and Dhami, J. K. "Chordate Zoology" R. Chand & Co. (2006).
- Young J. Z. "The Life of Vertebrates. III Edition", Oxford University Press. (2004).
- Parker T. J. &Haswell, W. A., "Textbook of Zoology – Vertebrates", VII Edition, Volume II. (1972).
- Hyman, L. H. "Hyman's Comparative Vertebrate Anatomy" Third Edition, Univ. of Chicago Press, Chicago & London.
- Kent, G. C., Cart R. K., "Comparative Anatomy of the Vertebrates" 9th Edition, McGraw Hill, Boston, USA. (2015).
- Jordan and Verma; "Chordate Zoology" Revised & enlarged edition, S. Chand & Co. (1965).
- Jordan E. L., "Chordate Zoology" S. Chand & Co., New Delhi (2009 reprint).
- Kotpal, R. L. "Modern Textbook of Zoology – Vertebrates", Rastogi Publications, Meerut (2017).
- Tortara, G. J. 8 Derrickson, B. H. "Principles of Anatomy & Physiology", Global Edition, John Willey & Sons, In. (2017).
- Kotpal, R. L, Shastri. Shukla. "Comparative Anatomy" Edition – I, Rastogi Publications, Meerut (2017).
- Sinha A. K., Adhikari S., Ganguly B. B "Biology of Animals" Vol II, New Central Book Agency, Calcutta (2012).
- Deoras, P. J., "Snakes of India" National Book Trust of India, (1981).
- Kotpal, R. L., ShastriShukhla. "Comparative Anatomy and development Biology", Edition – I, Rastogi Publications, Meerut (2019).
- Banerjee, Ananda., "Common birds of the Indian Subcontinent" A field Guide, II Edition, Rupa& Co., New Delhi (2008).
- Ali, Salim. "The Book of Indian Birds", 12th Edition, Bombay Natural History Society, Mumbai (1968).
- Kulshreshtha, S. K., "Comparative Anatomy of Vertebrates" II revised Edition, Anmol Publications Pvt. Ltd, New Delhi, 2004.
- Books Published by MP Hindi Granth Academy, Bhopal.

Zoology Lab III
UZOOLZO202

Unit: I Study of museum specimens: (No. of Lectures: 6)

- Protochordata: Herdmania, Amphioxus.
- Fishes: Scoliodon, Stegostoma, Torpedo, Heteropneustes, Labeo, Exocoetus, Hippocampus, Anabas, Eel, Flat Fish.
- Amphibia: Necturus, Bufo, Rana, Salamander, Hyla, Axolotl larva, Mild wife Toad, Ichthyophis.
- Reptilia: Chelone, Trionyx, Hemidactylus, Varanus, Chameleon, Draco, Viper, Naja, Hydrophis.
- Aves: Local Birds, Vulture, Great Indian Bustard, Lesser Florican.
- Mammalia: Bat, Funambulus, Platypus, Rat.

Unit: II Study of Histological slides (No. of Lectures: 2)

- T. S. of Duodenum, Stomach, Small Intestine, Liver, Pancreas, Testis, Ovary, V. S. of Skin, L. S. of Kidney of vertebrates.

Unit: III Osteology (No. of Lectures: 3)

- Study of Limb Bones and Girdles of Vertebrates (Amphibia, Reptilia, Aves, Mammalia).

Unit: IV Study of different types of feathers/beaks of birds. (No. of Lectures: 2)

Unit V: (No. of Lectures: 8)

- Dissection of Local fish (Only demonstration of commercially available local fish/ through computer simulation method/ through YouTube videos/ through models and charts.)

a) General Viscera, arterial system.

b) Cranial nerves V, VII, IX and X.

Unit: VI Mounting of Scales of fishes. (No. of Lectures: 2)

Unit: VII Comparative study of heart and brain of vertebrates. (No. of Lectures: 2)

Unit: VIII (No. of Lectures: 3)

Study of local bird fauna of surrounding area (College campus/ Village/ Garden / Ward).

Unit: IX Collection. (No. of Lectures: 2)

Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

- Lal, S. S., "Vertebrate Practical Zoology", 11 revised editions, Rastogi publications, Meerut (2009).
- Sharma, VijayLaxmi, "Practical Zoology", Paragon Industrial publication (2004).
- Verma P. S., "Manual of Practical Zoology - Chordates", S. Chand Co. Ltd. 11th Edition (2010).
- Prakash, M., &Arora, C. K., "Laboratory animals", Anmol Publications, New Delhi (1998).

- Yadav Varshney, "Practical Zoology", Kedarnath Ramnath (2015).
- Books Published by MP Hindi Granth Academy, Bhopal.

Subject- Biochemistry
Course Title: Clinical Biochemistry
Subject code: UCLINBC201

Unit: I Introduction and Historical background of Physiology and Biochemistry (No. of lectures: 12):

Biomolecules and Regulatory mechanism.

1. Contribution of Indian Scientists-
1.1 Contribution of Charak.
1.2 Contribution of Sushrut.
2. Biomolecules-
2.1 Micro and Macro molecules.
2.2 Water and Buffer System.
3. Enzymes-
3.1 Definition and general properties.
3.2 Nomenclature and Classification and functions.
3.3 Mechanism and Regulation of Enzyme action.
3.4 Co- Enzyme.
4. Vitamins and Minerals-
4.1 Types and Sources.
4.2 Biological importance.
4.3 Deficiencies and Disorders.

Keywords: Biomolecules, Buffer system, Enzymes, Vitamins

Unit: II Metabolism, Physiology and Regulation (No. of lectures: 14)

1. Protein –
1.1 Structure, Nomenclature, Classification and Biological importance.
1.2 Metabolism – Deamination, Decarboxylation, Transamination of amino acids and Ornithine cycle
2. Carbohydrates
2.1 Structure, Nomenclature, Classification and Biological importance.
2.2 Metabolism - Glycogenesis, Gluconeogenesis, Glycogenolysis, Glycolysis, Citric Acid Cycle and Electron Transport Chain.
3. Lipids –
3.1 Structure, Classification and Biological importance.
3.2 Metabolism-Beta oxidation of fatty acids.
4. Physiology of Digestion, regulation and disorders.
5. Homeostasis and Basal Metabolic rate (BMR).
6. Thermoregulation

Keywords: Proteins, Carbohydrates, Krebs cycle, Digestion, Homeotherms

Unit: III Respiration, Excretion and Immune System (No. of lectures: 12)

1. Respiration –
1.1 Mechanism -Inspiration and Expiration.
1.2 Physiology-Exchange and Transport of Gases (Oxygen and carbon dioxide), Chloride shift, role of Respiratory pigment.
1.3 Disorders – Apnea, Hypoxia, Asphyxia, Carbon monoxide poisoning, Bronchitis, Asthma.
2. Excretion –
2.1 Physiology – Urea, Urine formation and Counter Current mechanism.
2.2 Excretory products, disorders.
2.3 Osmoregulation.
3. Immunity –
3.1 Innate and acquired Immunity.
3.2 Immune cells and Immunoglobulin's.
3.3 Antigen responses.
Keywords: Chloride shift, Excretion, Urea, Immunity, Antigen

Unit: IV Neuromuscular Co-ordination (No. of lectures: 10)
1. Nerves –
1.1 Structure and type of Neurons.
1.2 Physiology of nerve impulse conduction.
1.3 Neuromuscular disorders – Epilepsy, Alzheimer's and Parkinson's disease.
2. Muscles –
2.1 Structure and type of muscles.
2.2 Physiology of muscles contraction and its Biochemistry.
2.3 Muscular disorders – Fatigue.
Keywords: Neuron, Impulse conduction, Muscle

Unit: V Hormones, Endocrine system and Reproductive Physiology (No. of lectures: 12)
1. Hormones
1.1 Definition and Classification
1.2 Mechanism of hormone action
2. Endocrine system
2.1 Structure, functions and disorders of Pituitary gland.
2.2 Structure, functions and disorders of Thyroid and Parathyroid gland.
2.3 Structure, functions and disorders of Adrenal gland
2.4 Structure, functions and disorders of Thymus gland, Pineal gland and Pancreas.
3. Reproductive Physiology
3.1 Physiology of reproduction
3.2 Sex Hormones

Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

- Lehninger A.L., Cox. M.M. and Nelson, D.L. "Principles of Biochemistry". Edition W.H. Freeman and Co., New York. (2008).
- Berg, J.M., Tymoczko, J.L. and Stryer, L." Biochemistry", VI Edition W.H. Freeman and Co., New York. (2007)"
- Murray, R.K., Bender, D.A., Botham, K.M. Kennelly, P.J., Rodwell, V.W. and Well, P.A. "Harper's Illustrated Biochemistry", XXXVIII Edition, International Edition, The McGraw-Hill Companies Inc. (2009).

- Hames. B.D. and Hooper, N.M." Instant Notes in Biochemistry". II Edition, BIOS Scientific Publishers Ltd., U.K (2000).Guyton, A.C. & Hall, J.E., "Textbook of Medical Physiology", XI Edition Hercourt Asia PET Ltd., W.B. Saunders Company (2006).
- Tortara, G.J. & Grabowski, S.," Principles of Anatomy & Physiology", XI Edition, John Wiley & sons (2006).
- Victor P. Erosehenko, diFiore's "Atlas of Histology with Functional correlations" XII Edition, Lippincott W. & Wilkins (2008).
- Vander A. Sherman J. And Luciano D, "Vander's Human Physiology: The Mechanism of Body Function". XIII Edition, McGraw Hills. (2014).
- Hoar, W.S.," General Comparative Physiology & Biochemistry", Prentice & Hall (1975).
- Subrahmaniyam, S. and Madhavankutty, K. "The Textbook of Physiology", Orient Longman Ltd, New Delhi (1977).
- Jain, J.L.et. al. "Fundamental of Biochemistry", S. Chand & co. New Delhi (2005).
- Rastogi Veer Bala, "Text book of Animal Physiology", new Age International Publishers (2008).
- Singh H.R., "Text book of Animal Physiology and Biochemistry", Vishal Publishing Co., 9th Edition (2014).

Biochemistry Lab III
UBIOCBC202

Unit: I (No. of lectures: 7)

- Qualitative estimations of Protein, Carbohydrates and Lipids.
- Study of effect of temperature and pH on salivary amylase activity.
- Study of enzymatic activity of Trypsin and Lipase.
- Detection of ammonia, urea and uric acid.

Unit: II (No. of lectures: 12)

- Estimation of hemoglobin using haemometer.
- Preparation of haemin crystals.
- Preparation of blood smear, study and identification of blood cells.
- Determination of ABO blood groups. RBC, WBC counting.

Unit: III (No. of lectures: 5)

- Measurement of blood pressure using sphygmomanometer.
- Principles and uses of instruments-Sphygmomanometer, Stethoscope, biochemistry analyser.
- Study of endocrine glands through histological slides of pituitary gland, adrenal gland, thyroid gland, pancreas, testis, ovary, spleen and thymus.
- Study of histological slides of organ systems of mammalian oesophagus, stomach, duodenum, ileum, rectum, liver, trachea, lung, and kidney.

Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

1.Lehninger A.L., Cox M.M. and Nelson, D.L. "Principles of Biochemistry". W.H. Freeman and Co., New York. (2008).

2. Hames. B.D. and Hooper, N.MInstant "Notes in Biochemistry", II Edition, BIOS Scientific Publishers Ltd., U. K. (2000).

3. Guyton, A.C. & Hall, J.E "Textbook of Medical Physiology", XI Edition Hercourt Asia PET Ltd., W.B. Saunders Company (2006).

4. Tortora, G.J. & Grabowski, S. "Principles of Anatomy & Physiology", XI Edition John Wiley & sons (2006).

5. Victor P., Eroschenko.,diFiore's "Atlas of Histology with Functional correlations" XII Edition, Lippincott W. & Wilkins. (2008).

6. Tembhare, T.B., "Techniques in Life Sciences", Himalaya Publications (2010).

Mali, R.P., Afsar, S.K.."A Practical manual on Innovative Animal Physiology"" Oxford Book Company (2015).

8. Dr Pal, G.K., Dr Pal, Pravati., "Practical Physiology", 4" Edition, Orient Blackswan (2016).

9. Sawhney S.K. & Singh Randhir," Introducation to Practical Biochemisty", Narosa Publishing House.

Subject- Microbiology
Course Title: Microbial Physiology and Metabolism
Subject code: UMICRMB201

Unit: I (No. of Lecturer: 15)
1.1 Bio-molecules: An Overview.
1.2 Carbohydrate: Characters, Classification and Structure of Monosaccharaides, Disaccharides, Polysaccharides (Storage polysaccharides and structural polysaccharides).
1.3 Synthesis and Breakdown of Carbohydrates: Aerobic and anaerobic chemolithotrophy with an example of each. Phototrophic metabolism. Aerobic respiration, anaerobic respiration and
Fermentation, Sugar degradation pathways i.e. EMP (Embden Meyerhof-Parnas), ED (Entner-Doudoroff), Pentose phosphate pathway (PPP), TCA (Tricarboxylic Acid) cycle. Electron transport chain (ETC): Components and comparison of mitochondrial and bacterial ETC.
Key words- biomolecules, carbohydrates, synthesis of carbohydrates, respiration, Fermentation,
Unit: II (No. of Lecturer: 18)
Protein
2.1 Amino acids: Classification, biochemical structure and Significance.
2.2 Protein: Primary, secondary, tertiary and quaternary structures. Denitrification; nitrate/nitrite and nitrate/ammonia respiration; Fermentative nitrate reduction. Introduction to biological nitrogen fixation Ammonia assimilation. Assimilatory nitrate reduction, dissimilatory nitrate reduction,
2.3 Enzymes: Structure of enzyme, Apo enzyme and cofactors,
Prosthetic group-TPP, coenzyme -NAD, metal cofactors.
Classification of enzymes, Nomenclature, Mechanism of action of enzymes: active Site, transition state complex and activation energy. Lock and key hypothesis, and Induced Fit hypothesis. Km, and allosteric mechanism, Effect of pH and temperature on enzyme activity.
Enzyme inhibition: competitive; non-competitive.
Key words- Amino acids, Proteins, Enzymes
Unit: III (No. of Lecturer: 15)
Lipids and Vitamins
3.1 Lipids: Definition and major classes of storage and structural lipids. Biosynthesis of lipids and fatty acids.
3.1.1General structure of lipids, Fatty acids - structure and functions. Storage lipids,

Structural lipids.
3.1.2. Phosphoglycerides: Building blocks, general structure, functions and properties,
3.1.3 Functions of lipids
3.2 Vitamins: Concept and types of vitamins -water soluble and fat soluble, their structure, biosynthesis and their role in metabolism
Key words- Lipids, Fatty Acids, Vitamins
Unit: IV (No. of Lecturer: 12)
Nucleic acids
4.1 Nucleic acids: Physical and chemical properties of Nucleic Acids, Biosynthesis of nucleotides, Structure and functions of DNA and RNA.
4.2 Basic concept of nucleic acids protein interactions.
Key words- DNA, RNA, Nucleic Acids
Learning Resources
Text Books, Reference Books, Other resources
Suggested Readings:

- Pawar. C.B. Cell Biology. Himalaya Publishing House 2010
- David T. Plummer. An Introduction to Practical Biochemistry. McGraw Hill Education, 3rd Edition, 2017.
- Lehninger Principles of Biochemistry by Nelson DL and Cox MM, W.H. Freeman and Company, 5th Ed., 2008.
- Biochemistry by Voet, D. and Voet J.G., John Wiley and Sons, 3rd Ed., 2004.
- Campbell, PN and Smith AD Biochemistry Illustrated, Published by Churchill Livingstone, 4th Edition, 2011.
- Satyanarayana and Chakrapani, Biochemistry, Elsevier, 5th Edition. 2020
- Ganesh MK & Shivashankara AR Laboratory Manual for Practical Biochemistry, Jaypee publications, 2nd Edition 2012

Microbiology Lab III
UMICRMB202

Unit (No. of Lab Hours 30)

- Qualitative/Quantitative tests for carbohydrates, reducing sugars, and non-reducing sugars.
- Qualitative/Quantitative tests for Proteins.
- Study of secondary and tertiary structures of protein with the help of models.
- Qualitative/Quantitative tests for lipids.
- Study of effect of temperature, substrate concentration, enzyme concentration, pH and heavy metals on enzyme activity.
- Isolation of DNA.
- Study of Structure of DNA and RNA with the help of Charts and models.
- Separation of amino acids by paper Chromatography.
- Separation of Sugars by Paper Chromatography.
- Any other practical(s) based on theory paper.

Keywords: Carbohydrate tests, Lipid tests, Protein tests, Protein structure, Enzyme activity, DNA Structure, RNA Structure.
Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

- Ganesh MK & Shivashankara AR, "Laboratory Manual for Practical Biochemistry", Jaypee publications, 2nd Edition 2012
- Dubey, R.C. and Maheshwari, D.K., "Practical Microbiology", S. Chand & Co. Ltd., New Delhi, (2002).
- Gopal Reddy, M., Reddy, M.N., Saigopal, D.V.R. and Mallaiah K.V., "Laboratory Experiments in Microbiology", Himalaya Publishing House, Mumbai. (2007).
- Aneja, K.R., "Laboratory Manual of Microbiology and Biotechnology. 2nd Edition", Meditech Scientific International. (2018).

Subject- Biotechnology

Course Title: Basic Molecular Biology

Subject code: UBASIBT201

Unit: I (No. of Lectures: 12)

1.1 Genome organization:

Anatomy of gene, gene structure of prokaryotes and eukaryotes. Flow of genetic information.

1.2 Cell signalling:Hormones and their receptors, second messengers, signalling through G protein coupled receptors

1.3 Cancer: Oncogenes, Tumour suppressor genes, Cancer and the cell cycle; Apoptosis, Necrosis.

Unit: II (No. of Lectures: 12)

2.1 Replication: Prokaryotic and Eukaryotic replication: models for replication, Unit of replication, replication initiation, elongation and termination, replication inhibitors

2.2 DNA repair: Direct reversal, Excision repair -nucleotide and base excision, Mismatch repair Trans lesion DNA synthesis, Recombination repair, SOS Response

2.3 DNA recombination: Models for recombination, Enzymes and proteins involved in recombination, Site-specific recombination

Unit: III (No. of Lectures: 12)

Transcription: Prokaryotic and Eukaryotic transcription: RNA polymerases, General and specific transcription factors, Promoters, insulator, repressor, enhancer.

Unit: IV (No. of Lectures: 12)

Translation: Prokaryotic and eukaryotic translation: Translation machinery, initiation, elongation and termination factors, translational inhibitors.

Regulation of translation.

Unit: V (No. of Lectures: 12)

5.1 Control of gene expression in Prokaryotes: DNA binding proteins, posttranscriptional control of gene expression. Gene regulation in Bacteria, Gene silencing, Overview of ribozyme technology

5.2 Control of gene expression in Eukaryotes: enhancers, chromatin remodelling,

5.3 Mutation: Types and causes, mutant types – lethal, conditional, biochemical, loss of function, gain of function

Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

- Molecular Biotechnology, Channarayappa.

- Lewin's Gene XII -J. E. Kerb's, Jones and Barlett.
- Molecular Cell Biology -H. Lodish, et.al., W H Freeman & Co (Sd), 2016, 8th edition
- Cell Biology -G. Karp, Wiley, 2013, 7th edition
- Molecular Biology of Cell-B. Alberts and A, Johnson, Garland Sciences, 2014
- Molecular Biology, P. K. Gutpa.
- Biotechnology-B.D. Singh
- Biotechnology-U. Satyanarayana
- Books published by M.P. Hindi Granth Academy, Bhopal

Biotechnology Lab III
UMICRMB202

Unit (No. of Lab hours)

- Isolation of genomic DNA.
- Isolation of Plasmid DNA.
- Visualization of DNA using EtBr
- Electrophoresis of DNA-linear, circular and super coiled plasmid.
- Isolation of DNA from Tissue/Blood/Microorganism
- Plasmid restriction map.
- Quantification of DNA using UV/VIS spectrophotometer
- Effect of UV on microbial/plant cell.

Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

- Laboratory manual of Biotechnology by P.N. Swamy, Rastogi Publication, Meerut.
- Manual of Experiment in Biotechnology by Leera Lakhaw, Sheeba Khan, Kailash Pustak Sadan Bhopal.
- Biotechnology –A lab project in molecular biology by Thiel, Bissen, Lyone. TATA Mc GrawHill.
- Molecular Biology Principles and practices by Siwach and Singh.
- Books published by M.P. Hindi Granth Academy, Bhopal

Subject- Food Technology
Course Title: Technology of Cereals, Pulses, Bakery & Confectionary
Subject code: UTECHFT201

Unit: I (No. of Lectures: 12)

1. Introduction to Cereals and development in Cereals based products

1.1 Wheat -Types, structure and composition

1.2 Wheat milling, Wheat flour by products; Factors affecting quality parameters

1.3 Rice: Types, structure and composition and methods of milling, Concept of Parboiled rice

1.4 Rice bran: Composition and applications

Keywords- Wheat, Rice, Bakery, Milling

Unit: II (No. of Lectures: 12)

2. Technology of Milling of Pulses

2.1 Concepts of Milling of Pulses —Tempering, dry ,splitting , polishing and de husking

2.2 Improved milling methods- Dry and Wet milling

2.3 Pulses- structure and composition, Nutritive value, Anti-nutritional factors.

Keywords: Pulses, De-husking, Anti-nutritional factors, Milling

Unit: III (No. of Lectures: 12)

3. Introduction to Corn, Barley milling and by products.

3.1 Corn composition and milling — dry and wet milling and use as breakfast cereals.

3.2 Oat composition, processing of oats, by products of oatmeal milling.

3.3 Barley composition and milling- malting of barley, changes during malting, uses of malt in industry. ,\,,1

Keywords-Corn, Oats, Barley, Malting, Milling

Unit: IV (No. of Lectures: 12)

4.1 Importance & types of Millets, composition of different type of millets and food uses

4.2 Ragi: Composition, products, Health implications

4.3 Jowar: Composition, products, Health implications

4.4 Bajra: Composition, products, Health implications

Keywords- Millets, Ragi, Jowar, Bajra, Milling

Unit: V (No. of Lectures: 12)

5. Introduction of Baking and Confectionary

5.1 Principle of baking, implications and applications

5.2 Confectionery products: Nature of ingredients
5.3 Stages of cooking Sugar, Shortening — Fats and oil, Egg, Moistening agent, Leavening Agents ,
5.4 Chocolate: Process of chocolate tempering, Chocolate designs, garnishes and presentations
Keywords- Baking, Confectionery, Tempering, Shortening, Leavening, Milling

Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

- Chemistry and Technology of Oils and Fats. Prentice Hall Chakrabarthy, M.M. (2003).
- Cereal and Cereal Products. Aspen Dendy, D.A.V., &Dobraszczyk, B.J. (2001).
- Fats and Oils - Chemistry and Technology. App. Sci.Publ. Hamilton, ILL, &Bhati, A. (1980)
- Principles of Cereal Science and Technology. 2nd Ed.AACC.Hoseney, R.S. (1994).
- Technology of Cereals. 4th Ed. Pergamon Press Kent, N.L. (1983).

Food technology Lab III
UFOODFT202

Unit: I (No. of Lectures: 5)

- Preparation and analysis of Rice and rice bran based products.
- Determination of elongation ratio in different rice sample.
- Preparation of and analysis of wheat based products.
- Preparation of Bread and Biscuits.
- Determination of ash content.

Unit: II (No. of Lectures: 7)

- Drying of pulses by different method to safe storage moisture content.
- Determination of de husking efficiency for each pretreatment
- Development of value added products from different pulses and with other combinations
- Preparation of papad and quality evolution.
- Adulteration tests in different samples.

Unit: III (No. of Lectures: 8)

- Preparation of and analysis of Corn bases products.
- Preparation of and analysis of Oat based products.
- Preparation of and analysis of barely based products.
- Quality assessment / parameters of above products.

Unit: IV (No. of Lectures: 5)

- Preparation of and analysis of Jowar based products.
- Preparation of and analysis of Bajra based products.
- Preparation of and analysis of Ragi based products.
- Nutritional analysis of various products.

Unit: IV (No. of Lectures: 5)

- Demonstration of cooking stages of sugar.
- Preparation of Candy.
- Preparation of Chocolate.

Keywords: Chocolate, Candy, Barley, Bajra, Rice, Wheat products.

Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

- International Journal of Food Science and Technology 2012, 47,627-632
- IS 12711:1989 Bakery products- Methods of Analysis
- IS 12741 – 1989 Bakery products – Methods of sampling
- ISI Handbook of Food Analysis (Part IV) – 1984 Page 121

P.K.University
Shivpuri (M.P.)

Faculty of Science

Scheme
For
B.Sc.

(IV Semester Course)

W.E.F. - Session 2024 - 2025

P.K.UNIVERSITY SHIVPURI (M.P.)

P.K.University
Shivpuri (M.P.)

B.Sc. 4th Semester

S. No.	Subject	Subject Code	Paper Title	Paper Code
1.	Web Designing	CP	Web designing	UWEBDCP201
			Web designing Lab I	UWEBDCP202
2.	Physics	PH	Wave and Optics	UWAVEPH203
			PhysicsLab IV	UPHYSPH204
3.	Chemistry	CH	Reactions, Reagents and Mechanisms in Organic Chemistry	UREACCH203
			ChemistryLab IV	UCHEMCH204
4.	Mathematics	MA	Advanced Calculus and Partial differential equation	UADVAMA202
5.	Computer Science	CS	Object Oriented Programming with Java	UOBJECS203
			Computer Science Lab IV	UCOMPCS204
6.	Botany	BO	Plant Anatomy and Embryology	UPLANBO203
			Botany Lab IV	UBOTABO204
7.	Zoology	ZO	Physiology and Biochemistry	UPHYSZO203
			Zoology Lab IV	UZOOLZO204
8.	Biochemistry	BC	Intermediary Metabolism	UINTEBC203
			Biochemistry Lab IV	UBIOCBC204
9.	Microbiology	MB	Microbial Diversity and Growth	UMICRMB203
			Microbiology LabIV	UMICRMB204
10.	Biotechnology	BT	Recombinant DNA Technology	URECOBT203
			Biotechnology LabIV	UBIOTBT204
11.	Food Technology	FT	Food Microbiology	UFOODFT203
			Food technology Lab IV	UFOODFT204

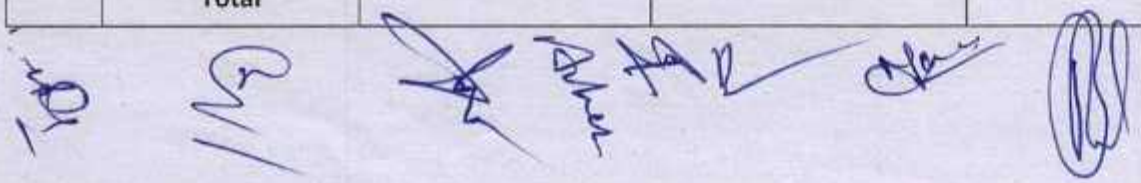
	B.Sc. 4th Semester Course Structure – Faculty of Science												
	Compulsory courses for B.Sc. 4th semester students (Level 6)												
S. No.	Course	Subjects/Paper type/Total Credits	Paper Title	Paper Code	Credits	: Lecture T: Tutorial P: Practical			Distribution of Theory Marks		Distribution of Practical Marks		Total Marks (CCE+UE)
						L	T	P	CCE	UE	CCE	UE	
1.	PHYSICS	WEB DESIGNING/SEC/4	Web designing	UWEBDCP201	4	4	0	0	40	60	0	0	100
			Web designing Lab I	UWEBDCP202	2	0	0	4	0	0	40	60	100
2.		PHYSICS/ Major/6	Wave and Optics	UWAVEPH203	4	4	0	0	40	60	0	0	100
3.			Physics Lab IV	UPHYSPH204	2	0	0	4	0	0	40	60	100
4.		MATHEMATICS/Minor /6	Advanced Calculus and Partial differential equation	UADVAMA202	6	6	0	0	40	60	0	0	100
5.		CHEMISTRY/GE/4	Reactions, Reagents and Mechanisms in Organic Chemistry	UREACCH203	3	3	0	0	40	60	0	0	100
6.			Chemistry Lab IV	UCHEMCH204	1	0	0	2	0	0	0	100	100
	Total				22				160	240	80	120	700

1.	MATHEMATICS	WEB DESIGNING/SEC/4	Web designing	UWEBDCP201	4	4	0	0	40	60	0	0	100
			Web designing Lab I	UWEBDCP202	2	0	0	4	0	0	40	60	100
2.		MATHEMATICS/ Major/6	Advanced Calculus and Partial differential equation	UADVAMA202	6	6	0	0	40	60	0	0	100
3.		PHYSICS/Minor/6	Wave and Optics	UWAVEPH203	4	4	0	0	40	60	0	0	100
4.			Physics Lab IV	UPHYSPH204	2	0	0	4	0	0	40	60	100
5.		CHEMISTRY/GE/4	Reactions, Reagents and Mechanisms in Organic Chemistry	UREACCH203	3	3	0	0	40	60	0	0	100
6.			Chemistry Lab IV	UCHEMCH204	1	0	0	2	0	0	0	100	100
	Total				**22**				**160**	**240**	**80**	**120**	**700**
1.	**COMPUTER SCIENCE**	WEB DESIGNING/SEC/4	Web designing	UWEBDCP201	4	4	0	0	40	60	0	0	100
			Web designing Lab I	UWEBDCP202	2	0	0	4	0	0	40	60	100
2.		COMPUTER SCIENCE / Major/6	Object Oriented Programming with Java	UOBJECS203	4	4	0	0	40	60	0	0	100
3.			Computer Science Lab IV	UCOMPCS204	2	0	0	4	0	0	40	60	100
4.		PHYSICS/Minor/6	Wave and Optics	UWAVEPH203	4	4	0	0	40	60	0	0	100
5.			Physics Lab IV	UPHYSPH204	2	0	0	4	0	0	40	60	100
6.		MATHEMATICS /GE/4	Advanced Calculus and Partial differential equation	UADVAMA202	4	4	0	0	40	60	0	0	100
	Total				**22**				**160**	**240**	**120**	**180**	**700**

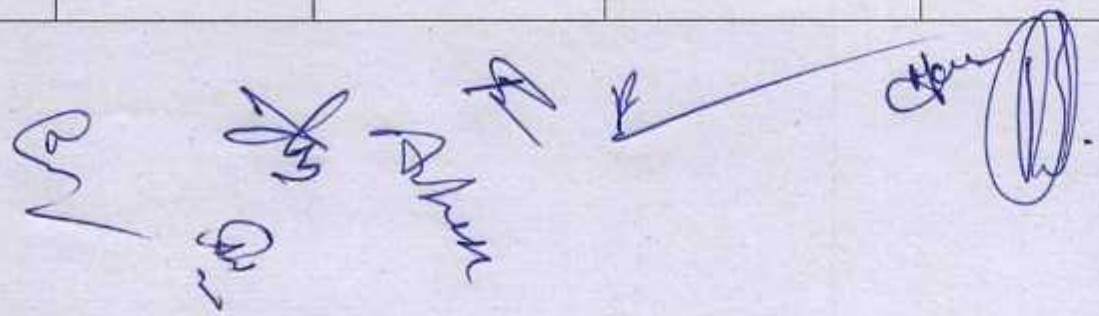
1.	BOTANY	WEB DESIGNING/SEC/4	Web designing	UWEBDCP201	4	4	0	0	40	60	0	0	100
			Web designing Lab I	UWEBDCP202	2	0	0	4	0	0	40	60	100
2.		BOTANY / Major/6	Plant Anatomy and Embryology	UPLANBO203	4	4	0	0	40	60	0	0	100
3.			Botany Lab IV	UBOTABO204	2	0	0	4	0	0	40	60	100
4.		ZOOLOGY /Minor/6	Physiology and Biochemistry	UPHYSZO203	4	4	0	0	40	60	0	0	100
5.			Zoology Lab IV	UZOOLZO204	2	0	0	4	0	0	40	60	100
6.		CHEMISTRY/GE/4	Reactions, Reagents and Mechanisms in Organic Chemistry	UREACCH203	3	3	0	0	40	60	0	0	100
7.			Chemistry Lab IV	UCHEMCH204	1	0	0	2	0	0	0	100	100
	Total				**22**				**160**	**240**	**120**	**280**	**800**
1.	ZOOLOGY	WEB DESIGNING/SEC/4	Web designing	UWEBDCP201	4	4	0	0	40	60	0	0	100
			Web designing Lab I	UWEBDCP202	2	0	0	4	0	0	40	60	100
2.		ZOOLOGY / Major/6	Physiology and Biochemistry	UPHYSZO203	4	4	0	0	40	60	0	0	100
3.			Zoology Lab IV	UZOOLZO204	2	0	0	4	0	0	40	60	100
4.		BOTANY /Minor/6	Plant Anatomy and Embryology	UPLANBO203	4	4	0	0	40	60	0	0	100
5.			Botany Lab IV	UBOTABO204	2	0	0	4	0	0	40	60	100
6.		CHEMISTRY/GE/4	Reactions, Reagents and Mechanisms in Organic Chemistry	UREACCH203	3	3	0	0	40	60	0	0	100
7.			Chemistry Lab IV	UCHEMCH204	1	0	0	2	0	0	0	100	100
	Total				**22**				**160**	**240**	**120**	**280**	**800**

1.	CHEMISTRY	WEB DESIGNING/SEC/4	Web designing	UWEBDCP201	4	4	0	0	40	60	0	0	100
			Web designing Lab I	UWEBDCP202	2	0	0	4	0	0	40	60	100
2.		CHEMISTRY / Major/6	Reactions, Reagents and Mechanisms in Organic Chemistry	UREACCH203	4	4	0	0	40	60	0	0	100
3.			Chemistry Lab IV	UCHEMCH204	2	0	0	4	0	0	40	60	100
4.		BOTANY /Minor/6	Plant Anatomy and Embryology	UPLANBO203	4	4	0	0	40	60	0	0	100
5.			Botany Lab IV	UBOTABO204	2	0	0	4	0	0	40	60	100
6.		ZOOLOGY /GE/4	Physiology and Biochemistry	UPHYSZO203	3	3	0	0	40	60	0	0	100
7.			Zoology Lab IV	UZOOLZO204	1	0	0	2	0	0	0	100	100
	Total				**22**				**160**	**240**	**120**	**280**	**800**
1.	BIOTECHNOLOGY	WEB DESIGNING/SEC/4	Web designing	UWEBDCP201	4	4	0	0	40	60	0	0	100
			Web designing Lab I	UWEBDCP202	2	0	0	4	0	0	40	60	100
2.		BIOTECHNOLOGY / Major/6	Recombinant DNA Technology	URECOBT203	4	4	0	0	40	60	0	0	100
3.			Biotechnology Lab IV	UBIOTBT204	2	0	0	4	0	0	40	60	100
4.		BIOCHEMISTRY /Minor/6	Intermediary Metabolism	UINTEBC203	4	4	0	0	40	60	0	0	100
5.			Biochemistry Lab IV	UBIOCBC204	2	0	0	4	0	0	40	60	100
6.		FOOD TECHNOLOGY /GE/4	Food Microbiology	UFOODFT203	3	3	0	0	40	60	0	0	100
7.			Food technology Lab IV	UFOODFT204	1	0	0	2	0	0	0	100	100
	Total				**22**				**160**	**240**	**120**	**280**	**800**

1.	MICROBIOLOGY	WEB DESIGNING/SEC/4	Web designing	UWEBDCP201	4	4	0	0	40	60	0	0	100
			Web designing Lab I	UWEBDCP202	2	0	0	4	0	0	40	60	100
2.		MICROBIOLOGY / Major/6	Microbial Diversity and Growth	UMICRMB203	4	4	0	0	40	60	0	0	100
3.			Microbiology Lab IV	UMICRMB204	2	0	0	4	0	0	40	60	100
4.		BIOTECHNOLOGY /Minor/6	Recombinant DNA Technology	URECOBT203	4	4	0	0	40	60	0	0	100
5.			Biotechnology Lab IV	UBIOTBT204	2	0	0	4	0	0	40	60	100
6.		FOOD TECHNOLOGY /GE/4	Food Microbiology	UFOODFT203	3	3	0	0	40	60	0	0	100
7.			Food technology Lab IV	UFOODFT204	1	0	0	2	0	0	0	100	100
	Total				**22**				**160**	**240**	**120**	**280**	**800**
1.	BIOCHEMISTRY	WEB DESIGNING/SEC/4	Web designing	UWEBDCP201	4	4	0	0	40	60	0	0	100
			Web designing Lab I	UWEBDCP202	2	0	0	4	0	0	40	60	100
2.		BIOCHEMISTRY / Major/6	Intermediary Metabolism	UINTEBC203	4	4	0	0	40	60	0	0	100
3.			Biochemistry Lab IV	UBIOCBC204	2	0	0	4	0	0	40	60	100
4.		BIOTECHNOLOGY /Minor/6	Recombinant DNA Technology	URECOBT203	4	4	0	0	40	60	0	0	100
5.			Biotechnology Lab IV	UBIOTBT204	2	0	0	4	0	0	40	60	100
6.		FOOD TECHNOLOGY /GE/4	Food Microbiology	UFOODFT203	3	3	0	0	40	60	0	0	100
7.			Food technology Lab IV	UFOODFT204	1	0	0	2	0	0	0	100	100
	Total				**22**				**160**	**240**	**120**	**280**	**800**



1.	FOOD TECHNOLOGY	WEB DESIGNING/SEC/4	Web designing	UWEBDCP201	4	4	0	0	40	60	0	0	100
			Web designing Lab I	UWEBDCP202	2	0	0	4	0	0	40	60	100
2.		FOOD TECHNOLOGY / Major/6	Food Microbiology	UFOODFT203	4	4	0	0	40	60	0	0	100
3.			Food technology Lab IV	UFOODFT204	2	0	0	4	0	0	40	60	100
4.		BIOTECHNOLOGY /Minor/6	Recombinant DNA Technology	URECOBT203	4	4	0	0	40	60	0	0	100
5.			Biotechnology Lab IV	UBIOTBT204	2	0	0	4	0	0	40	60	100
6.		MICROBIOLOGY /GE/4	Microbial Diversity and Growth	UMICRMB203	3	3	0	0	40	60	0	0	100
7.			Microbiology Lab IV	UMICRMB204	1	0	0	2	0	0	0	100	100
	Total				**22**				**160**	**240**	**120**	**280**	**800**



P.K.University
Shivpuri (M.P.)

Faculty of Science

Syllabus

For

B.Sc.

(IV Semester Course)

W.E.F. - Session 2024 - 2025

P.K.UNIVERSITY SHIVPURI (M.P.)

P.K.University
Shivpuri (M.P.)

B.Sc. 4th Semester

S. No.	Subject	Subject Code	Paper Title	Paper Code
1.	Web Designing	CP	Web designing	UWEBDCP201
			Web designing Lab I	UWEBDCP202
2.	Physics	PH	Wave and Optics	UWAVEPH203
			PhysicsLab IV	UPHYSPH204
3.	Chemistry	CH	Reactions, Reagents and Mechanisms in Organic Chemistry	UREACCH203
			Chemistry Lab IV	UCHEMCH204
4.	Mathematics	MA	Advanced Calculus and Partial differential equation	UADVAMA202
5.	Computer Science	CS	Object Oriented Programming with Java	UOBJECS203
			Computer Science Lab IV	UCOMPCS204
6.	Botany	BO	Plant Anatomy and Embryology	UPLANBO203
			Botany Lab IV	UBOTABO204
7.	Zoology	ZO	Physiology and Biochemistry	UPHYSZO203
			Zoology Lab IV	UZOOLZO204
8.	Biochemistry	BC	Intermediary Metabolism	UINTEBC203
			Biochemistry Lab IV	UBIOCBC204
9.	Microbiology	MB	Microbial Diversity and Growth	UMICRMB203
			Microbiology LabIV	UMICRMB204
10.	Biotechnology	BT	Recombinant DNA Technology	URECOBT203
			Biotechnology LabIV	UBIOTBT204
11.	Food Technology	FT	Food Microbiology	UFOODFT203
			Food technology Lab IV	UFOODFT204

B.Sc. 4th Semester

Syllabus

Subject- Web Designing
Course Title: Web Development using PHP & MySQL
Subject code: UWEBDCP201

Unit: I Basics of PHP (No. of Lectures: 6)
Introduction to PHP, PHP features installation of XAMPP/WAMP, Benefits of using PHP MYSQL, Server Client Environment, Web Browser, and Web Server Installation & Configuration Files.
OOPs with PHP, language basics, syntax, comments, variables, constants and data types, expressions and operators, flow control statements, looping structures, Arrays
Including html code in PHP, Embedding PHP in web pages.
Unit: II Functions & Strings in PHP (No. of Lectures: 6)
Defining a function, Calling a function, variable scope, function parameters, return values, User Defined Function, System Defined Function, Parameterized Function, Date & Time Function, Hash Function, Mail Function, predefined functions.
Strings: Creating & accessing string, searching and replacing strings, encoding and escaping, comparing strings, formatting strings, regular expression.
Unit: III Data & File Handling (No. of Lectures: 6)
PHP Forms: $_GET, $_ POST, $_REQUEST, $_ FILES, $_SERVER, $GLOBAL, $_ENV, input/output controls, validation, cookies and Sessions.
File Handling: File and directory, open, close, read, write, append, delete, uploading and downloading files. File exists, File Size, Rename. Reading and display all/selected tiles present in a directory.
Unit: IV MySQL an Overview (No. of Lectures: 6)
Introduction, what is a Database, Understanding an RDBMS, Tables, Record & Fields, SQL Language.
Working with phpmyadmin: Creating and using a database, Selecting a database, creating I dropping a table, loading data into a table, Retrieving information from a table, selecting all data, selecting particular rows, selecting particular columns, writing queries, sorting, date, calculations, working with NULL values, pattern matching, counting rows, using more than one tables, using table and column aliases.
Unit: V MySQL, DATABASES IN PHP (No. of Lectures: 6)
Introduction, connecting to a MySQL database, querying the database, Retrieving and displaying the results, modifying data and deleting data through front end. Designing applications using PHP & MySQL.

Web designing Lab I
UWEBDCP202

- Create a simple HTML form and accept the user name and display the name through PHP echo statement.
- Write a PHP script to demonstrate arithmetic operators, comparison operator, and logical operator.
- Write PHP Script to input marks, generate result and display grade.
- Write PHP Script for addition of two 2x2 matrices.
- Write PHP script to obtain factorial of a number using function.
- Write PHP script to demonstrate string, date and math function.
- Create student registration form using text box, check box, radio button, select, submit button. And display user inserted value in new PHP page.
- Write two different PHP script to demonstrate passing variables through a URL
- Write two different PHP script to demonstrate passing variables with sessions.
- Write PHP script to demonstrate passing variables with cookies.
- Write a program to keep track of how many times a visitor has loaded the page.
- Write PHP script to demonstrate exceptional handling.
- Write a P1-IF script to connect MySQL server from your website.
- Create EMP table with emp_no, emp_name, designation and salary. Write a program to read employee information from EMP table and display all this information in PHP page.
- Create customer table in MySQL with cust_no, cust_name, item purchased, and mob no, insert 10 records into it.
- Write a program to read customer information from customer table and display all these information in table format on PHP page.
- Deigns a web form in PHP to input values for the customer record and insert the record in customer table as a tuple.
- Design an "update- web form to edit name of customer to "Bob" with cust_no 1
- Design a "delete web form to delete record with custno=3.
- Create a dynamic web site using PHP and MySQL.

Learning Resources
Text Books, Reference Books, Other resources
Suggested Readings:

- Head First PHP & MySQL, Lynn Beighley & Michael Morrison, O'Reilly
- PHP: A Beginner's Guide, Vikram Vaswani, McGraw-Hill Edition
- Learning PUP, MySQL, JavaScript, & CSS: A Step-by-Step Guide to Creating Dynamic Websites, Robin Nixon, O'Reilly
- PHP and MySQL Web Development, Luke Welling, Addison-Wesley
- The Joy of PHP, Alan Forbes, BeakCheck LLC
- Learning PHP, MySQL, JavaScript, & CSS: A Step-by-Step Guide to Creating Dynamic Websites, Robin Nixon, O'Reilly

Subject- Physics
Course Title: Wave and Optics
UWAVEPH203

Unit: I Waves (No. of Lectures: 12)

Superposition of Two Collinear Harmonic oscillations: Linearity and Superposition Principle: (1) Oscillations having equal frequencies and (2) Oscillations having different frequencies (Beats).

Superposition of Two Perpendicular Harmonic Oscillations: Graphical and Analytical Methods; Lissajous Figures (1:1 and 1:2) and their uses.

Wave Motion: Transverse waves on a stretched string; Travelling and standing waves; Normal Modes of a string; Phase velocity; Group velocity; Plane and Spherical waves; Wave intensity.

Keywords/Tags: Harmonic Oscillation, Superposition Principle, Wave Motion.

Unit: II Sound and light wave (No. of Lectures: 12)

Sound: Simple harmonic motion; Forced vibrations and resonance; Fourier's Theorem; Application to saw tooth wave and square wave; Intensity and loudness of sound; Decibels, Intensity levels; Musical notes; Musical scale.

Acoustics of buildings:Reverberation and time of reverberation; Absorption coefficient; Sabine's formula; Measurement of reverberation time; Acoustic aspects of halls and auditoria.

Wave optics: Electromagnetic nature of light; Wave front; Huygens Principle.

Electro-optic, Magneto-optic and acousto-optic effects (elementary idea).

Keywords/Tags: Sound, Musical notes, Acoustics of buildings, Wave optics.

Unit: III Interference of Light (No. of Lectures: 12)

Interference: Interference by Division of amplitude and division of wave front; Young's Double Slit experiment; Lloyd's Mirror and Fresnel's Bi prism.

Interference in Thin Films: Stokes' Law; Interference in parallel and wedge-shaped films; Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes); Applications of thin films interference: Antireflection coating; Dielectric Mirrors; Interference filter.

Newton's Ring: Measurement of wavelength and refractive index.

Michelson's Interferometer: (I) formation of fringes, (2) Determination of wavelength, (3) Wavelength difference, (4) Refractive index, (5) Visibility of fringes.

Keywords/Tags: Interference, Thin films interference, Michelson's Interferometer

Unit: IV Diffraction (No. of Lectures: 12)

Introduction; Distinction between interference and diffraction; Types of diffraction; Distinction between Fresnel and Fraunhofer diffraction.

Fresnel's diffraction: Fresnel's Assumptions; Huygens — Fresnel's Theory; Half period zone; Construction and theory of Zone plate; Diffraction at straight edge; Diffraction at a circular aperture.

Fraunhofer diffraction: Diffraction due to single, double

and N slits; Plane diffraction grating.
Resolving and dispersive power: Rayleigh's criterion;
Limit of resolution of the eye; resolving power of Grating and Telescope; Expression for dispersive power of prism.
Keywords/Tags: Diffraction, Zone plate, Plane diffraction grating, Resolving power
Unit: V Polarisation (No. of Lectures: 12)
Introduction: Polarized light and its representation; Difference in Polarized and polarized light; Types of Polarization; Application of polarization: Sunglasses; Three-dimensional movies; Photography.
Production of polarized light: Production of polarized light by reflection, refraction, scattering and selective absorption; Brewster's Law; Polaroid sheets; Polarizer and analyzer; Malus law.
Anisotropic Crystals: Doubly refracting crystals (Uniaxial); Extra-ordinary rays and Ordinary rays; Polarization by double refraction and Huygens theory; Nicol prism; Retardation plates: Quarter-wave plate and Half- wave plate.
Optical Activity: Optical rotation; Specific rotation; half shade & Biquartz polarimeter.
Keywords/Tags: Polarized light, Anisotropic Crystals, Optical Activity.

Learning Resources
Text Books, Reference Books, Other resources
Suggested Readings:

- Bajaj N. K., "The Physics of Waves and Oscillations", Tata McGraw Hill, 1998.
- Pain H. J., "The Physics of Vibrations and Waves", John Wiley and Sons, 2013.
- Ghatak Ajoy, "Optics", Tata McGraw Hill, 2008.
- Kumar A., Gulati H. R. and Khanna D. R., "Fundamental of Optics", R. Chand Publications.
- Subrahmaniyam N. & et Al, "A Text Book of Optics", S Chand.

Physics Lab IV
UPHYSPH204

- To study Lissajous Figures with the help of CRO.
- To determine the Frequency of an Electrically Maintained Tuning Fork by Melde's experiment.
- To determine the angle of minimum deviation using i- δ curve by spectrometer.
- To determine the Refractive Index of the Material of a given prism using Sodium Light.
- To determine Dispersive Power of the Material of a given Prism using Mercury Light.
- To determine Cauchy constant for the material of a prism using the spectrometer.
- To determine wavelength of sodium light using Fresnel Biprism.
- Determine the radius of curvature of a Plano - convex lens by Newton's rings.
- To determine the refractive index of a liquid using Newton's ring.
- To determine wavelength of Sodium light (D1 and D2 lines)using plane diffraction Grating.
- To determine the Resolving power of a plane Diffraction Grating.
- Determination of specific rotation of sugar solution by polarimeter.
- Determination of resolving power of a telescope.
- To determine diameter/thickness of a thin wire by diffraction method.
- To determine the wavelength of sodium source using Mischelson's interferometer.
- Study of diffraction at straight edge.
- Verification of Brewster's law with the help of spectrometer.
- To determine the wavelength of laser light with the help of plane transmission grating.
- Calculation of height of a object with the help of Sextant.
- Calculation of μo and μe of calcite/ quartz with the help of spectrometer.

Learning Resources
Text Books, Reference Books, Other resources
Suggested Readings:

- Prakash I. & Ramakrishna, "A Text Book of Practical Physics", Kitab Mahal, 2011, 11/e.
- Squires G.L., "Practical Physics", Cambridge University Press, 2015, 4/e.
- Chattopadhyay D. & Rakshit P. C., "An Advanced Course in Practical Physics", New Central Book Agency.
- Srivastava J.P., "Elements of Solid state Physic", PHI Publication.

Subject- Chemistry

Course Title: Reactions, Reagents and Mechanisms in Organic Chemistry

UREACCH203

Unit: I Substitution reactions (No. of Lectures: 12)

Aliphatic Nucleophilic Substitution: Introduction, the SN1, SN2 and SNi mechanisms, neighboring group participation, effect of substrate, nucleophile, leaving group and reaction medium.

Aliphatic Electrophilic Substitution: Elementary treatment.

Aromatic Nucleophilic Substitution: the SNAr, SN1 and Benzene mechanisms, effect of substrate, nucleophile, leaving group and reaction medium.

Aromatic Electrophilic Substitution: Arenium ion mechanism, orientation/ directive influence (electronic explanation only) and reactivity, diazonium coupling, Vilsmeir reaction.

Keywords/Tags: Nucleophilic Substitution, Electrophilic Substitution, Benzene, SN1, SN2, SNi, SNAr.

Unit: II Addition and Elimination Reactions (No. of Lectures: 12)

Addition Reactions: Introduction, reactions involving addition of nucleophile, electrophile and free radicals, regio-selectivity and chemo-selectivity, orientation and reactivity, Markovnikov and Anti, Markovnikov's addition.

Elimination Reactions: Introduction, E1, E2 and E1cB mechanism, effect of substrate, attacking species, leaving group and reaction medium, orientation- Saytzeff and Horimann rule.

Keywords/Tags: Addition Reactions, Elimination,, Reactions ,Saytzeff Rule, Markovnikov addition, regio-selectivity, chemo-selectivity.

Unit: III Reagents, Catalysts and Rearrangements (Mechanism and Application)s (No. of Lectures: 12)

Reagents and Catalysts: Preparation, properties and applications of important reagents and catalysts 'in, Organic synthesis with mechanistic details: Grignard reagent, Nc bromo succanimide (NBS), diazomethane, anhydrous aluminum chloride (AlC13), sod amide (NaNH2), Ziegle-Natta catalyst.

Rearrangements,(Reaction, Mechanism &Applications):

Introduction, Types of Rearrangements, Rearrangement to Electron Deficient Carbon (Pinacol--pinacolone, benzilic acid & Wagner-Meerwein), Rearrangement to Electron Deficient Nitrogen (Hofinann- Lossen-Cuitius & Beckmann), Rearrangement to Electron Deficient Oxygen (Baeyer-Villiger & Dakin), Rearrangement to Electron-Rich Carbon (Wittig), Aromatic Rearrangements (Fries & Claisen).

Key words/Tags: Rearrangement, Reagent, catalyst, NBS, sodamide, 'G.rignard.

Unit: IV Oxidation & Reduction Reactions (No. of Lectures: 12)

Oxidation Reactions: Introduction, metal based and non-metal based oxidations, oxidation of alcohols to carbonyls (chromium, manganese, and silver based reagents), alkenes to epoxides (peroxides / per acids based, alkenes to diols (manganese and osmium based), alkenes to carbonyls with bond cleavage (manganese and lead based), and Oppenauer oxidation. Oxidation of amino groups to nitro groups: oxidation by alkaline KmnO4, oxidation of aliphatic and aromatic amines by per acids, oxidation of primary and secondary amines to hydroxyl amine by hydrogen peroxide.

Reduction Reactions: Introduction, Reduction of carbon- carbon multiple bonds, carbonyl groups and nitro compounds: catalytic hydrogenation: heterogeneous (palladium- carbon & Raney Nickel), homogeneous (Wilkinson's catalyst)
Hydride transfer reagent: Sodium borohydride and Lithium aluminum hydride, Metal based reduction: Birch reduction Clemmensen Reduction.
Reduction of nitro compounds by catalytic hydrogenation and metals (with mechanism).
Keywords/ Tags: oxidation, reduction, hydrogenation, Wilkinson's catalyst, Metal- based reduction.

Unit: IV Photochemical and pericyclic reactions (No. of Lectures: 12)
Photochemical reactions: Introduction to photochemistry, electronic excitations, Jablonski diagram, Norrish type I and II reactions and cis-trans isomerization.
Pericyclic reactions: Introduction of pericyclic reaction and their classification (Electrocyclic, Sigmatropic rearrangement and cycloadditions), 2+2 and 4+2 cycloadditions, Claisen and Cope rearrangement.
Keywords/Tags: Photochemistry, Pericyclic Reactions, Norrish reactions, Cycloadditions reaction.

Learning Resources
Text Books, Reference Books, Other resources
Suggested Readings:

- Ahluwalia, V. K. and Parashar R. K., "Organic Reaction Mechanisms", Narosa. Publication, India, 2010, Fourth Edition.
- Goswami, C., "Snatkottar Prakash Rasayan evm Thos Avastha Rasayan", Hindi Granth Academy, Bhopal, Madhya Pradesh, 2019.
- Singh, J. and Singh, J., "Photochemistry and Pericyclic Reactions", New Academic Science, UK, 2012, Third Edition.
- Wardle, B., "Principles and Applications of Photochemistry", Jolui Wiley & Sons, UK, 2009.
- Dhinda, B., "Essentials of Pericyclic and Photochemical Reactions", Springer
- International Publishing Switzerland, 2017.
- Books published by M.P. Hindi Granth Academy, Bhopal

Chemistry Lab IV
UCHEMCH204

Part – A Qualitative Analysis (No. of Lectures: 20)
Separation of binary organic mixture (by solvent and chemical separation method), systematic identification of separated organic compounds and preparation of their derivatives.
Keywords/Tags: Qualitative Analysis, Separation, binary organic mixture, organic derivative.
Part – B Organic Reactions and Reagents: (No. of Lectures: 20)
Oxidation reactions: Synthesis, monitoring of the reaction using TLC, purification of product and determination of melting point.
Oxidation of benzaldehyde to benzoic acid by potassium permanganate.
Oxidation of cyclohexane to adipic acid by nitric acid
Reduction Reactions: Synthesis, monitoring of the reaction using TLC, purification of product and determination of melting point.
Reduction of benzophenone to benzhydrol by sodium borohydride.
Reduction of acetophenone to ethyl benzene (Wolff- Kishner reduction).
Photochemical and Pericyclic reactions:
(4+2) Cycloadditions reaction of anthracene and maleic anhydride (Diels- Alder reaction).
Photochemical synthesis of benzpinnacol from benzophenone.
Rearrangement Reactions:
Pinacol- pinacolone Rearrangement (benzpinnacol →benzpinacolone).
Benzil- benzilic acid Rearrangement.
Keywords/ tags: Oxidation, Reduction, Rearrangement, TLC, Cycloadditions, Photochemical Reaction, Pericyclic Reaction.
Part – C Two step Organic Preparations, purification of product and determination of melting point.
Acetanilide→ Para- bromo acetanilide → Para- bromo aniline.
Acetanilide → Para- nitro acetanilide → Para- nitroaniline.
Keywords/Tags: Organic preparation, Acetanilide, Bromination, Nitration, Hydrolysis.

Learning Resources
Text Books, Reference Books, Other resources
Suggested Readings:

- Tatchell A.R., Furnis B.S., Hannaford A.J., Smith P.W.G., "Vogel's Textbook of Practical Organic Chemistry", Pearson Education, India, 2003, Fifth Edition.
- Ahluwalia V. K., Dhingra S., "Comprehensive Practical Organic Chemistry: Qualitative Analysis, Universities Press, India, 2000.
- Book published by M.P. Hindi Granth Academy, Bhopal

Subject- Mathematics
Course Title: Advanced Calculus and Partial differential equation
UADVAMA202

Unit: I (No. of Lectures: 18)
1.1 Historical background
1.1.1 A brief historical background of Calculus and partial differential equations in the context of India and Indian heritage and culture
1.1.2 A brief biography of Bodhayana
1.2 Field structure and ordered structure of R, intervals, bounded and unbounded sets, supremum and infimum, completeness in R, absolute value of a real number.
1.3 Sequence of real numbers
1.4 Limit of a sequence
1.5 Bounded and monotonic sequences
1.6 Cauchy's general principle of convergence
1.7 Algebra of sequence and some important theorems
Unit: II (No. of Lectures: 18)
2.1 Series of non-negative terms
2.2 Convergence of positive term series
2.3 Alternating series and Leibnitz's test
2.4 Absolute and Conditional Convergence of Series of real terms
2.5 Uniform continuity
2.6 Chain rule of differentiability
2.7 Mean value theorems and their geometrical interpretations
Unit: III (No. of Lectures: 18)
3.1 Limit and continuity of functions of two variables
3.2 Change of variables
3.3 Euler's theorem on homogeneous functions
3.4 Taylor's theorem for functions of two variables
3.5 Jacobians
3.6 Maxima and Minima of functions of two variables
3.7 Lagrange's multiplier method
3.8 Beta and Gamma Functions
Unit: IV (No. of Lectures: 18)
4.1 Partial differential equations of the first order
4.2 Lagrange's solution
4.3 Some special types of equations which can be solved easily by methods other than the general method
4.4 Charpit's general method
4.5 Partial differential equations of second and higher orders
Unit: V (No. of Lectures: 18)
5.1 Classification of partial differential equations of second order
5.2 Homogeneous and non-homogeneous partial differential equations of constant coefficients
5.3 Partial differential equations reducible to equations with constant coefficients
Keywords/Tags:
Bodhayana, Sequence, Series, Jacobians, Maxima and Minima, Beta and Gamma functions,

Partial differential equations.

Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

- Devi Prasad: Advanced Calculus, Prentice Hall India Learning Private Limited, 2009
- S C Malik and Savita Arora: Mathematical Analysis, New Age International Private Limited, 1st edition, 2017.
- M. D. Raysinghania: Ordinary and Partial Differential Equations, S. Chand & Company, New Delhi, 2017.
- Gerard G. Emch, R. Sridharan and M. D. Srinivas: Contributions to the History of Indian Mathematics. Hindustan Book Agency, Vol. 3, 2005.
- R. R. Gold beg: Methods of Real Analysis, Oxford & I.B.H. Publishing co. New Delhi, 2020.
- T. M. Apostol: Mathematical Analysis, Narosa Publishing House. New Delhi. 1985.
- D. Soma Sundaram and B. Choudhary: A first Course in mathematical Analysis, Narosa Publishing, House, New Delhi, 1997.

Subject- Computer Science
Course Title: Object Oriented Programming with Java
UOBJECS203

Unit: I (No. of Lectures: 12)
OOPS - Object Oriented Paradigm, Benefits of 00P, and Applications of OOP.
Java - History, Java Features, How Java Differs from C and C++, Java and interne, Java and World Wide Web, Web Browsers, Hardware and Software Requirements, Java Supports Systems, Java Environment.
Java Program Structure - Java Tokens, Java Statements, Implementing a Java Program, Java Virtual Machine, Command Line Arguments, and Programming Style.
Keywords: OOPS, JVC, WWW, Java Environment

Unit: II (No. of Lectures: 12)
Java Basics -Constants, Variables, Data Types, Declaration of Variables, Giving Values to Variables, Scope of Variable, Symbolic Constants, Type Casting, Getting Values of Variables, Standard Default Values.
Operators - Arithmetic Operator, Relational Operators, Logical Operators, Assignment Operators, Increment and `Decrement Operators, Conditional Operators, Bitwise Operators, Special Operators,
Arithmetic Expressions - Evaluation of Expressions, Precedence of Arithmetic Operators, Type Conversions in Expressions, Operator Precedence and Associativity, Mathematical Functions.Decision Making with if Statement, Simple if Statement, if…Else Statement, Nesting of if ...else Statement, if-else Ladder, The Switch Statement, The Operator.
Loops - While Statement, Do Statement, For Statement, Jump in Loops, Labeled Loops.
Keywords: Operators Arithmetic Expressions, Decision Making, Loops

Unit: III (No. of Lectures: 12)
Class - Defming a Class, Adding Variables, Adding Methods, Creating Objects, Accessing Class Members.
Constructors — definition and types, Methods Overloading, Static Members, Nesting of Methods.
Inheritance - Extending a Class, Overloading Methods, Final Variables and Methods, Final Classes, Finalize Methods, Abstract Methods and Classes, Visibility Control Arrays, One Dimensional Array, Strings, Vectors, Wrapper Classes. Defining Interfaces, Extending Interfaces, Implementing Interfaces, Accessing Interface Variables.
Keywords: Class, Constructors, Inheritance, Final, Abstract Methods, Overloading

Unit: IV (No. of Lectures: 12)
Java API Packages - Using System Packages, Naming Conventions, Creating Packages, Accessing a Package, Using a Package, Adding a Class to a Package, and Hiding Classes.
Creating Threads, Extending the Thread Class, Stopping and Blocking a Threads, Life Cycle of a Thread, Using Threads Methods, Threads Exceptions, Threads Priority, Synchronization, Implementing the 'Runnable' interface.
Types of Errors - Exceptions, Syntax of Exception Handling Code, Multiple Catch Statements, Using Finally Statements, Throwing Our Own Exceptions, Using Exceptions for Debugging.
Preparing to Write Applets - Building Applet Code, Applet Life Cycle, Creating an Executable Applet, Designing a Web Page, Applet Tag, Adding Applet to HTML File, Running the Applet.
Keywords: API, threads, synchronization, errors, Applets, debugging

Unit: V (No. of Lectures: 12)
More About the Applet tag - Passing Parameters to Applets, Aligning the Display, More about HTML Tags, Displaying Numbering Values, Getting Input from the user.
The Graphics Class - Lines and Rectangles, Circles and Ellipses, Drawing Arcs, Drawing Polygons, Line Graphs, Using Control Loops in Applets, Drawing Bar Charts.
Concept of Stream - Stream Classes, Byte Stream Classes, Character Stream Classes, Using Streams,
Other Useful I/O. Classes - Using the File Class, Input / Output Exceptions, Creation of Files, Reading / Writing Characters, Reading / Writing Bytes, Handing Primitive Data Types, Concatenating and Buffering Files, Random Access, Files, Interactive Input and Output, other Stream Classes.
Keywords: Stream, files, Graphics class, buffering, HTML tags

Learning Resources
Text Books, Reference Books, Other resources
Suggested Readings:

- E Balguruswami, Programming with Java, Tata McGraw-Hill Publication.
- Bruce Eckel, Thinking in Java.
- Herbert Schildt, Java: The Complete Reference.
- Y. Daniel Liang, Introduction to Java Programming.
- Paul Deitel, Harvey Deitel, Java: How To Program.
- Cay S. Horsttnann, Core Java Volume I —Fundamentals.
- Java Projects, BPB Publication.
- Dr. S.S. Kandare, Programming in Java, S Chand Publication.
- Books published by M.P. Hindi Granth Academy, Bhopal

Computer Science Lab IV
UCOMPCS204

- Find greater number between two numbers- using conditional operator.
- Find the factorial of number if number is given by user using command line argument.
- Write a program to check if a number is prime or not.
- Write a program to display tables from 2 to 10.
- Write a program to print Fibonacci series.
- Enter a no. and check whether it is even or odd.
- Write a program to find sum & average of 10 no. using arrays.
- Write a program to display reverse of a digit no. using array.
- Write a program to demonstrate function overloading.
- Write a program to display grade according to the marks obtained by the student.
- Write a program to calculate the salary of an employee if salary is greater than or equal to 20000 and year of service is greater than or equal to 5 years then bonus will be 2000 otherwise 1000 and print grass salary of employee.
- Write a program to convert the given no. of days into months & days using with classes, objects and method.
- Write a program to convert given string into Uppercase and lowercase and get the length of string using array.

- Create a package called "Arithmetic" that contains methods to deal all arithmetic operations. Also write a program to use the package.
- Write a program to demonstrate use of constructor and destructor.
- Define an exception called "Marks out of Bound" exception that is thrown if the entered marks are greater than 100.
- Write a program using application of single inheritance. Find the area of rectangle & volume of cube.
- Develop a simple real life application to illustrate the use of multithreading.
- Write a program using multiple inheritances to calculate area and perimeter of a circle using interface.
- Write an applet program to draw a Rectangle (colour= orange) and a right aligned oval.
- Develop an applet that receives 3 numeric values as inputs from the user and then displays the largest no. on the screen.
- Write a Java Program to read data from the inputted text file name, and print its content on the console.
- Write a Java Program to merge two files into third file.
- Write a Java program to delete duplicate lines in text file.
- Write a Java Program to implement File Input Stream class to read binary data from any image file.

Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

- E. Balguruswami, Programming with Java, Tata McGraw- Hill Publication, 2nd edition.
- Books published by M.P. Hindi Granth Academy, Bhopal
- Herbert Schildt, Java: The Complete Reference (9e)
- Y. Daniel Liang, Introduction to Java Programming (10e)
- Paul Deitel, Harvey Deitel, Java: How to Program (10e)
- Java projects, BPB Publication.

Subject- Botany
Course Title: Plant Anatomy and Embryology
UPLANBO203

Unit: I (No. of Lectures: 12)
Meristematic and permanent tissues
1.1Types of meristems,
1.2 Organization of Root and shoot apex
1.3Simple and complex tissues.
1.4Special type of tissues.
1 .5Structure of dicot and monocot root, stem and leaf Kranz anatomy.
1.6 Pits and plasmodesmata;
1.7 Wall ingrowths and transfer cells.
1.8 Hydathodes, cavities, lithocysts and laticefers
Unit: II (No. of Lectures: 12)
Secondary Growth:
1.1Vascular cambium - structure, function and seasonal activity.
1.2 Secondary growth in root and stem,
1.3 Wood (heartwood and sapwood).
1.4 Anomalous structures.
1. 5Adaptive and protective systems: Epidermis, cuticle, stomata;
1. 6General account of adaptations in xerophytes and hydrophytes.
1.7 Dendrochronology.
Unit: III (No. of Lectures: 12)
Embryology:
1.1 History and Importance of embryology,
1.2 Structure of flower, anther and pollen,
1.3 Micro-sporogenesis and Mega-sporogenesis;
1.4 Structure and types of ovules;
1.5 Types of embryo sacs,
1.6 Organization and ultra-structure of mature embryo sac.
Unit: IV (No. of Lectures: 12)
Pollination and fertilization
1.1 Types of Anthers and pollen,
1.2 Pollination mechanisms and adaptations;
1.3 Pollen pistil interaction,
1.4 Double fertilization;
1.5 Post fertilization changes,
1.6 Seed structure appendages and dispersal mechanisms.
1.7 Palynology and Scope (a brief account)
Unit: V (No. of Lectures: 12)
Endosperm & embryo
1.1 Endosperm types, structure and functions;
1.2 Dicot and monocot embryos;
1.3 Embryo- endosperm relationship,
1.4 Nutrition of Embryo
1.5 Unusual features in Embryo and Endosperm,

1.6 Apomixis and polyembryony, Definition, types and practical applications.
1.7 In- vitro fertilization
Keywords/Tags: Meristematic and permanent tissues, plasmodesmata, Hydathodes, cavities, lithocysts, laticefers, Secondary Growth, Vascular cambium Wood, Xerophytes, hydrophytes, Dendrochronology, Embryology , Embryo-sac, Pollination, Fertilization, Embryo, Endosperm Apomixis ,polyembryony

Learning Resources
Text Books, Reference Books, Other resources
Suggested Readings:

- Bhojwani, S.S. & Bhatnagar, S.P. (2011). Embryology of Angiosperms. Vikas Publication House Pvt. Ltd. New Delhi. 5th edition.
- Dickison, W.C. (2000). Integrative Plant Anatomy. Harcourt Academic Press, USA.
- Palm, A. (1974). Plant Anatomy. Pergmon Press, USA.
- Mauseth, J.D. (1988). Plant Anatomy. The Benjammin/Cummings Publisher, USA.
- Evert, R.F. (2006) Esau's Plant Anatomy: Meristems, Cells, and Tissues of the Plant Body: Their Structure, Function and Development. John Wiley and Sons, Inc.
- Johri, B.M.(1984)Embryology of Angiosperms.Springer-Verlag, Berlin Heidelberg.
- Mahenshwari,P. Indroduction of embryology of Angiospem, Tata magrohill publication corn. (1971)
- Pandey, B.P. plant anatomy S. Chand & company (1986)

Botany Lab IV
UBOTABO204

Unit I-V (No. of Lectures: 30)

- Study of meristems through permanent slides and photographs.
- Study of Tissues (parenchyma, collenchyma and sclerenchyma); Macerated axillary element, Phloem (Permanent slides, photographs)
- Study of Monocot stem: Maize (Zea mays); Dicot stem: Sunflower (Helianthus); Secondary growth: Helianthus.
- Study of Monocot root: Maize (Zea mays); Dicot stem: Sunflower (Helianthus); Secondary growth: Helianthus
- Study of Dicot and Monocot Leaf.
- Study of anomalous structure in Achyranthes, Boerhaavia, Nyctanthes through section cutting.
- Study of Xerophyte (Nerium leaf) and Hydrophyte (Hydrilla stem), Plants.
- Study of anther (young and mature), tapetum (amoeboid and secretory) through Permanent slide/ pictures.
- Study of female gametophyte Polygonum (monosporic) type of embryo sac development through permanent slide/ photographs.
- Study of mature egg apparatus through slides/ photographs.
- Demonstration of different types of Pollination and seed dispersal.
- Study of percentage germination of pollen grain in a given medium.

- Demonstration of pollen germination, types of ovules in plants and placentation through temporary slides/ photographs/ permanent slide.

*section cutting, study of pollen grain and stigma through locally available plant.

Keywords/ Tags: meristems, tissues, Monocot and Dicot root, stem, leaf, Anther, Female, Gametophyte, egg- Apparatus, Pollination, Seed Dispersal, ovules, Placentation.

Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

- Johri B. M Experiment Embryology of Vascular Plants, Springer- Verlag Berlin Heidelberg New York (1982)

Subject- Zoology
Course Title: Physiology and Biochemistry
UPHYSZO203

Unit: I (No. of Lectures: 12)
1. Introduction to Chordates
1.1Traditional Knowledge on Animal Science in ancient Indian Civilization
1. 2Origin of Chordates, General characteristics and outline classification of Phylum Chordata up to orders according to Parker and Haswell, Seventh Edition
2. Protochordata
2.1 General characteristics and classification of Sub- Phylum Urochordata and Cephalochordate.
2.2 Type study of Herd mania and retrogressive metamorphosis in ascidianTadpole.
2.3 Type study of Amphioxus and its Affinities.
3. Agnatha
3.1Comparison of Petromyzon and Myxine.
3.2Chordata, Herd mania, Amphioxus, Cephalochordate

Unit: II (No. of Lectures: 12)
1. Pisces
1.1 General characteristics and classification of Pisces.
1.2 Accessory respiratory organs, Parental care in fishes.
2. Amphibia
2.1General characteristics and classification of Amphibia.
2.2 Parental Care in Amphibia and Paedomorphosis
3. Reptilia
3.1. General Characteristics and classification of Reptilia.
3.2. Difference between Poisonous and Non Poisonous snakes, Venom andAntivenom
3.3. Poison apparatus and biting mechanism in snake.
Keywords/Tags: Pisces, Parental care, Amphibia, Reptiles, and Poison apparatus.

Unit: III (No. of Lectures: 12)
1. Ayes
1.1 Brief Introduction of "Birdman" of India — Dr. Salim Ali
1.2 General characteristics and classification of Ayes.
1.3 Migration of birds, principles and aerodynamics of flight.
1.4 Flight adaptation in birds.
2. Mammalia
2.1 General characteristics and classification of mammals.
2.2 Adaptive radiation in mammals with reference to locomotory appendages.
2.3 Introduction of ZSI (Zoological Survey of India)
Keywords/Tags: Ayes, Aerodynamics, Flight Adaptation, Mammalia, Adaptive Radiation, Locomotory Appendages.

Unit: IV (No. of Lectures: 12)
Comparative Anatomy of Vertebrates
Comparative study of integument and its derivatives of Vertebrates.
Comparative study of appendicular skeleton (Limb and girdles) of Vertebrates.
Comparative study of digestive system of Vertebrates.
Comparative study of respiratory system of Vertebrates
Keywords/Tags: Integument, Derivatives, Girdles, Digestive System, Respiratory System

Unit: V (No. of Lectures: 12)
Comparative Anatomy of Vertebrates.
Comparative study of aortic arches and heart of Vertebrates..
Comparative study of Brain of Vertebrates..
Comparative study of Urinogenital System of Vertebrates Study of Eye and Ear of mammals
Keywords/Tags: Heart, Brain, Kidney, Urinogenital System, Eye, Ear.

Learning Resources
Text Books, Reference Books, Other resources
Suggested Readings:

- Dhami, P.S., and Dhami, J.K. "Chordate Zoology" R.Chand & Co.(2006)
- Young J.Z. "The Life of Vertebrates. III Edition", Oxford University Press. (2004)
- Parker T.J. & Haswell, W.A., "Textbook of Zoology- Vertebrates", VII Edition, Volume II. (1972)
- Hyman, L.H. "Hyman's Comparative Vertebrate Anatomy" Third Edition, Univ. of Chicago Press , Chicago & London
- Kent, G.C., Cart R.K., "Comparative Anatomy of the Vertebrates" 9th Edition, McGraw Hill, Boston, USA. (2015).
- Jordan and Verma; "Chordate Zoology". Revised & enlarged edition, S. Chand & Co. (1965)
- Jordan E.L., " Chordate Zoology" S. Chand & Co., New Delhi (2009 reprint),
- Kotpal, R.L. " Modern Textbook of Zoology- Vertebrates", Rastogi Publications, Meerut (2000)
- Tortara, G.J. 8 Derrickson, B.H. "Principles of Anatomy & Physiology", Global Edition, John Willey & Sons, In. (2017)
- Kotpal, R.L. "Chordate and Comparative Anatomy" Edition-I, Rastogi Publications, Meerut (2017).
- Sinha A.K.,Adhikari S.,Ganguly B.B "Biology of Animals" Vol. II , New Central Book Agency, Calcutta (2012).
- Deoras, P.J., "Snakes of India" National Book Trust of India, (1981)
- Kotpal, R.L, Shastri. Shukla. "Comparative Anatomy and Developmental Biology", Edition-I, Rastogi Publications, Meerut (2019).
- Baneijee, Ananda. "Common Birds of the Indian Subcontinent" A field Guide, II Edition, Rupa & Co., New Delhi (2008).
- Ali, Salim., " The Book of Indian Birds", 12th Edition, Bombay Natural History Society, Mumbai (1968)
- Kulshreshtha, S.K., "Comparative Anatomy of Vertebrates", II revised Edition, Anmol Publications Pvt. Ltd, New Delhi, 2004.

Zoology Lab IV
UZOOLZO204

Unit: I (No. of Lectures: 6)

- Study of museum specimens
- Protochordata: Herdmania, Amphioxus
- Fishes: Scoliodon, Stegostoma, Torpedo, Heteropneustes, labeo, Exocoetus, Hippocampus, Anabas, Eel, Flat fish.
- Amphibia: Necturus, Bufo, Rana, Salamander, Hyla, Axoloti larva, mid wife Toad, Ichthyophis
- Reptilia: Chelone, Trionyx, Hemidactylus, Varanus, Chameleon, Draco, Viper, Naja, Hydrophis.
- Aves: Local Birds, Vulture, Great Indian Bustard, Lesser Florican
- Mammalia: Bat, Funambulus, Platypus, Rat.

Unit: II (No. of Lectures: 2)

- Study of Histological slides-
- T.S. of Duodenum, Stomach, Small Intestine, Liver, Pancreas, Testis, Ovary, V.S. of skin, L.S. of Kidney of vertebrates.

Unit: III (No. of Lectures: 3)

Osteology-

Study of Limb Bone and Girdles of Vertebrates (Amphibia, Reptilia, Aves, Mammalia).

Unit: IV (No. of Lectures: 2)

Study of different types of feathers/ beaks of birds.

Unit: V (No. of Lectures: 8)

Dissection of Local fish (Only demonstration of commercially available local fish/ through computer simulation method/ through you tube videos/ through models and charts.

General viscera, arterial system

Cranial nerves V, VII, IX and X

Unit: VI (No. of Lectures:2)

Mounting of scales of fishes

Unit: VII (No. of Lectures: 2)

Comparative study of heart and brain of vertebrates

Unit: VIII (No. of Lectures: 3)

Study of local bird fauna of surrounding area (College campus/ village/Garden/Ward)

Unit: IX (No. of Lectures: 2)

Collection

Keywords/Tags: Protochordata, Duodenum, Girdles, Feathers, Cranial nerves, Brain, Birds.

Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

- Lal, S.S., "Vertebrate Practical Zoology", 11 revised edition, Rastogi publications, Meerut (2009).
- Verma P.S., "Manual of Practical Zoology- Chordates", S.Chand Co. Ltd. 11th Edition (2010).
- Prakash, M., & Arora, C.K., "Laboratory animals", Anmol Publications, New Delhi (1998).
- Yadav & Varshney, "Practical Zoology", Kedarnath Ramnath (2015)

Subject- Biochemistry
Course Title: Intermediary Metabolism
UINTEBC203

Unit: I (No. of Lectures: 20)
THERMODYNAMICS AND. CARBOHYDRATE METABOLISM:
Introduction, general features of metabolism and its importance. Principles of thermodynamics, free energy, standard free energy.- Biological oxidation reduction reactions, redox potential, ATP and high energy phosphate compounds. Carbohydrate metabolism: Reactions and energetics of Glycolysis and Tricarboxylic acid cycle (TCA), substrate level phosphorylation. Regulation of Glycolysis and TCA cycle.Alcoholic and lactic acid, Fermentation.
Reaction and significance of Gluconeogenesis, Glycogenesis, Glycogenolysis, Pentose Phosphate Pathway.
Keywords: Thermodynamics, redox reaction, ATP, fermentation, Tricarboxylic acid cycle.
Unit: II (No. of Lectures: 16)
ELECTRON TRANSPORT CHAIN AND OXIDATIVE PHOSPHORYLATION:
Structure of mitochondria, electron transport chain (ETC) and its sequence, Site of ATP production in ETC, inhibitors of ETC. Hypothesis of mitochondrial oxidative phosphorylation, inhibitors and uncouples of oxidative phosphorylation. Transport of reducing potential in Mitochondria.
Keywords: Electron transport chain, inhibitors, uncouplers, oxidative phosphorylation
Unit: III (No. of Lectures: 18)
LIPID METABOLISM:
Introduction, hydrolysis of triacylglycerol.
Transport of fatty acid in mitochondria, 13-oxidation of saturated fatty acids, ATP production from fatty acids oxidation:
Biosynthesis of saturated and unsaturated fatty acids.
Metabolism of ketone bodies, oxidation of unsaturated and odd chain
Fatty acids- Outlines of - biosynthesis of triglycerides and important phospholipids; glycolipids, sphingo lipids; and cholesterol.Regulation of cholesterol metabolism.
Key words: -Fatty acids, triacylglycerol, 13-oxidation, ketone bodies, cholesterol.
Unit: IV (No. of Lectures: 18)
AMINO ACID METABOLISM:
General reactions of amino acid metabolism: Transamination, oxidative deamination, decarboxylation.
Outline of degradation and biosynthesis of amino acids (Glycint,
Serine,
• Methibnine, Glutamic acid, Aspartic acid, Arginine, Tyrosine, Proline).
Glycogenic and ketogenic amino acids, Urea cycle.
Key words: Transamination, deamination, glycogenic amino acids, Ketogenic amino acids.
Unit: V (No. of Lectures: 18)
NUCLEOTIDE AND PORPHYRIN METABOLISM:
Sources of atoms in purine and pyrimidine molecules.
Biosynthesis and degradation of purities and pyrimidine:
Regulation of purine and pyrimidine biosynthesis. .
Porphyrin metabolism: Biosynthesis and degradation of Porphyrin.

Production of bile pigments.
Key words: Purine metabolism, pyrimidine metabolism, porphyries Metabolism, bile pigment synthesis.

Learning Resources
Text Books, Reference Books, Other resources
Suggested Readings:

- Nelson D. 4, Michael-M. Cox,"Lehninger Principles of Biochemistry", International Edition, CBS publishers, 2004, 4th Ed. .
- Beig J.M., Tymoczko J.L., Stryer L."Biochemistry", W.H. Freeman,1995, 4th Ed.
- Murray R.K., -Granner DK., Mayes P.A. , Rodwell V.W.,"Harper's Biochemistry", Prentice Hall International Inc., 2009, 28th Ed. .
- Geoffrey L. Zubay, "Biochemistry", McGraw Hill. 1997.
- West R., Todd, B., Mason M., BruggenR.V."Textbook of Biochemistry" Amerind Publishing Co. Pvt. Ltd., 1986, 4th Ed.
- Satyanarayana U., ChakrapaniU. "Biochemistry", Elsevier, 2013, 4th edition.
- Voet, Donald, Voet, Judith &Pratt, Charlotte, "Biochemistry", Wiley& Sons, Inc. (New Jersey), 2013, 4th Ed. .
- Chatterjea M.N. and Shinde R.,"Textbook of Medical Biochemistry, Jaypee Publications, 2012, 8th Ed.
- Books published by M.P. Hindi Granth Academy, Bhopal

Biochemistry Lab IV
UBIOCBC204

Subject- Microbiology
Course Title: Microbial Diversity and Growth
UMICRMB203

Unit: I (No. of Lectures: 15)
Virology
1.1 Discovery of viruses, general properties, concept of viroid's, virusoids, satellite viruses and Prions. Concept of Theories of viral origin- Progressive, Regressive and The Virus-first theory.Structure of Viruses. Salient features of viral nucleic acid and the presence of unusual bases.
Influenza and Hepatitis B virus, HIV, Polio virus, Vaccinia virus, Rabies Virus. TMV, Cauliflower Mosaic Virus, Bacteriophage
1.2Viral taxonomy: Classification and nomenclature of different groups of viruses. Baltimore system of classification.
1.3Modes of viral transmission: Persistent, non- persistent,
1.4 Replication: Assembly, maturation and release of viruses in Lytic and lysogenic cycles.
Key words- virus, classification of virus, replication of virus, Viral Diseases
Unit: II (No. of Lectures: 15)
Archaebacteria and Eubacteria
2.1 General characteristics. Phylogenetic overview of Archaebacteria.Differences between Eubacteria and Archaebactria.Classification of Bacteria - Outline of Bergey's Manual of Systematic Bacteriology.
General accounts of Mycoplasma, Actinomycetes, Rickettsia, Chlamydia and Cyanobacteria.Nutritional requirements in bacteria and nutritional categories.
2.2 Bacterial Growth- Logarithmic representation of bacterial populations, phases of growth, calculation of generation time and specific growth rate. Techniques of Measurement of bacterial growth, Factors affecting Bacterial growth.
Key words- Archaebacteria, Bergey's manual, Bacterial Growth
Unit: III (No. of Lectures: 15)
Mycology
3.1 Fungi: Characteristics and classification. Cellular structure and thallus organization of fungi.
3.2Classes of Fungi: General features, structure, nutrition and reproduction of different fungi groups - Phycomycetes, Ascomycetes, Basidiomycetes and Deuteromycetes.
3.3 Type study of: Phytophthora, Morchella, Claviceps and Cercospora.
3.4 Diversity of fungi - Nutritional, Physiological and Ecological Diversity.
Key words- Phycomycetes, Ascomycetes, Basidiomycetes, Deuteromycetes
Unit: IV (No. of Lectures: 15)
Phycology and Protozoa
4.1 Algae-General characteristics of Algae. Occurrence, thallus organization, algal cell ultra-structure, pigments, food reserves; Vegetative, asexual and sexual reproduction.Outline of Classification of algae with emphasis on Phytoplankton.
4.2 Type study of: Chlorella, Pinnularia and Navicula.
4.2 Lichens- General Account
4.3 Protozoa- General characteristics, classification and economic importance of Protozoa.
Keywords: Algae, phytoplankton, Lichens, Protozoa

Learning Resources
Text Books, Reference Books, Other resources
Suggested Readings:

- Mehrotra, R.S. and Aneja, K.R., "An Introduction to Mycology". New Age Press, New Delhi.
- Kumar, H.D and H.N. Singh, "A Textbook on Algae" (Macmillan international college edition) 1979
- Pelczar M., Chan E.C.S. and Krieg, N.R. "Microbiology". Tata Mc Graw Hill Publishing Co. Ltd., New Delhi.
- Prescott, M.J., Harley, J.P.andKlein, D.A., "Microbiology". 5th Edition WCB Mc GrawHill, New York, (2002).
- Dubey, R.C. and Maheshwari, D.K, D.K., "A Textbook of Microbiology". S. Chand & Company Ltd., New Delhi. (2008).
- Sharma, P.D.,"Microbiology". Rastogi Publications, Meerut. (2014).
- Aneja, K.R., "Laboratory Manual of Microbiology and Biotechnology". 2nd edition. Meditech Scientific International. (2018).
- Patel, Rakesh J. and Patel, Kiran, R., "Experimental Microbiology Vol. I and Vol. II". Aditya Prakashan. (2009).

Microbiology Lab IV
UMICRMB204

- Gram staining
- Acid fast staining
- Isolation of bacteria from soil, water and air.
- Isolation of fungi from soil, water and air.
- Isolation of algae from water.
- Identification of common bacteria, fungi and Phytoplankton.
- Study of common algae and fungi through permanent slides and specimen.
- Study of common protozoan through permanent slides.
- Any other practical (s) based on theory paper.
- Note: Each practical of 2 hours will be continued for 2-3 days.

Learning Resources
Text Books, Reference Books, Other resources
Suggested Readings:

- Aneja, K.R., "Laboratory Manual of Microbiology and Biotechnology". 2nd edition, Meditech Scientific International. (2018).
- Patel, Rakesh J. and Patel, Kiran, R., "Experimental Microbiology Vol. I and Vol. II, Aditya Prakashan. (2009).
- Dubey, R.C. and Maheshwari, D.K., Practical Microbiology". S. Chand & Co. Ltd., New Delhi, (2002).
- Gopal Reddy, M., Reddy, M.N., Saigopal, D.V.R. and Mallaiah K.V., "Laboratory Experiments in Microbiology". Himalaya Publishing House, Mumbai. (2007).

Subject- Biotechnology
Course Title: Recombinant DNA Technology
URECOBT203

Unit: I (No. of Lectures: 12)
The Basic Principles of Gene Cloning and DNA Analysis:-
Introduction, History, The advent and importance of gene cloning and the polymerase chain reaction, Purification of DNA from Living Cells, Manipulation of Purified DNA, Introduction of DNA into Living Cells, Plasmids,

Unit: II(No. of Lectures: 12)
Vectors for Cloning:-
Cloning Vectors: PBR 322, Bacteriophage, Cosmid, Phagemid, Shuttle vectors
Cloning Vectors for E. coli, λ and other high capacity vectors, Cloning Vectors for Eukaryotes, Genomics & cDNA Libraries

Unit: III (No. of Lectures: 12)
Enzymology of genetic manipulation:-
Enzymes useful in molecular cloning: Restriction endonuclease, DNA ligases, polynucleotide kinase, klenow enzyme, DNA Polymerase- I, reverse transcriptase, alkaline phosphatase, terminal nucleotidyl transferase

Unit: IV (No. of Lectures: 12)
Gene editing:-
Gene Recombination and Gene transfer: Bacterial Conjugation, Transformation, Transduction,
Gene transfer techniques: Approaches, gene silencing, Mutagenesis: random, site directed, Knock-in, Knock-out

Unit: V (No. of Lectures: 12)
Applications and Techniques of Gene Cloning:-
Polymerase Chain Reaction and qPCR, Labeling nucleic acids and blotting techniques (Southern, Northern, Western, Zooblot), DNA Sequencing, DNA Fingerprinting, Applications of recombinant DNA technologies- Agriculture, Medicine,health

Learning Resources
Text Books, Reference Books, Other resources
Suggested Readings:

- Text Book of Biotechnology - By H.K. Das (Wiley Publications)
- Test Book of Molecular Biology - By K.S. Sastry, G. Padmanabhan& C. Subramanyan, Publ: Macmillan India
- Genes - By B. Lewin - Oxford Univ. Press
- Molecular Biology & Biotechnol. - By H.D. Kumar, Publ: Vikas
- Molecular Biology - By D. Freifelder, Publ: Narosa
- Gene, Genomics and Genetic Engineering - By Irfan Ali Khan and Atiya Khanum (Ukaaz Publications)
- Advanced Biotechnology- R. C.DubeyBooks published by M.P. Hindi Granth Academy, Bhopal
- Books published by M.P. Hindi Granth Academy, Bhopal

Biotechnology Lab IV
UBIOTBT204

- Isolation of DNA from bacterial/ plant/ animal cells
- Demonstration of Polymerase Chain Reaction
- Bacterial Transformation (Selection of Trans formants with blue white selection).
- Demonstration of southern blotting.
- Demonstration of Restriction digestion of DNA.
- Demonstration of conjugation.
- Demonstration of Transduction.

Learning Resources
Text Books, Reference Books, Other resources
Suggested Readings:

- Molecular Biology and Biotechnology- By H.D. Kumar, Vikas Publication.
- Gene, Genomics and Genetic Engineering- By Irfan Khan and Atiya Khanum, Ukaaz Publication.
- Advanced Biotechnology- By R. C. Dubey
- Introductory Practical Biochemistry - By Sawheny and Singh, Narosa Publication.
- Biochemistry A lab manual- By Farrell and Taylor, Cenage Learning.
- Laboratory manual on Biotechnology- By Swamy, Rastogi Publication.
- Practical Microbiology- By Dubey and Maheshwari, S. Chand and Co.
- Trends in Molecular Biology and Biotechnology, - By Srivastava, Srivastava and Tiwari, CBS Publication, Dehradun.
- Books published by M.P. Hindi Granth Academy, Bhopal

Subject- Food technology
Course Title: Food Microbiology
UFOODFT203

Unit: I (No. of Lectures: 15)
Introduction to Food Microbiology:
History, Development and scope of Food Microbiology
Type of microorganisms associated with food- Bacteria, Mould, Fungi, Yeast and virus their morphology and cultural characteristics in brief.
Intrinsic and Extrinsic factors affecting growth of microorganisms in food.
Bacterial growth curve and microbial growth in food.
Keywords: Microbes, Yeast, Bacteria, Microbial growth curve

Unit: II (No. of Lectures: 15)
Microbial Food Spoilage, Food Borne Diseases and Microbial Safety
Food Spoilage and Food Borne Diseases: Definition and Major Causes of Food spoilage
Spoilage of specific food groups- milk and dairy products, meat, poultry and sea food, cereals and cereal products, fruit and vegetables and canned products.
Bacterial Food borne Diseases caused by Clostridium perfinges, Clostridium botulinum, Vibrio Cholera and E.coli.
Fungal Diseases caused by Alternaria, Aspergillus, Candida, and Fusarium sps.
Keywords: Food spoilage, Bacterial Food borne Diseases, Fungal Food borne Diseases.

Unit: III (No. of Lectures: 10)
Introduction to Microscopy
Organization of Food Microbiology laboratory- Instruments and devices- Importance and significance.
Role, Principle and components of simple and compound microscopes in food Microbiology
Phase contrast microscopy- Principle, applications
Electron microscopy- Types, Principles involved and applications
Keywords: Compound microscope, Phase contrast microscope, Electron microscope

Unit: IV (No. of Lectures: 10)
Introduction to Food Safety:
Importance of food safety and Fundamental Principle of Food Safety and Food Hygiene.
Food safety and Standards Regulations- Outlines
Food safety Indicator Organisms
HACCP System- Principles
Keywords: Food Sanitation and Hygiene, Food Safety, Indicator, HACCP

Unit: V (No. of Lectures: 10)
Food Fermentation
Use of Microbe in food fermentation
Types of Fermented Foods
Health Benefits of Fermented Foods
Introduction to Genetically Modified Foods (GMF): Basic Knowledge of Genetically Modified Foods
Keywords: Fermentation Fermented Dairy Products, Probiotics, and Health Benefits.

Learning Resources
Text Books, Reference Books, Other resources
Suggested Readings:

- Basic of Food Microbiology, G.J. Banwart, CBS Publishers Pvt. Ltd. India, 2004, 2nd Edition
- Food Microbiology, Adams M, Moss M., RCS Publication, 2007, 2nd Edition
- Food Microbiology, Frazier W.C. and Westhoff, D.C., McGraw Hill (India) New Delhi , 1988, Edition 4th.
- Fundamental Food Microbiology, Ray B., Bhunia A.CRC Press, 5th Edition.
- Microbiology, Pelezar MJ, Chan E.C.S and Krleg, Mc Graw Hill Education Pvt. Ltd. (India) New Delhi N.R. 5th Ed., 1998
- Modern Food microbiology James J. M, Loessner M.J, Golden D.A., CBS Publication, New Delhi, 2000 Edition 7.

Food technology Lab IV
UFOODFT204

Unit: Basic Food Microbial techniques, Microbial Safety and Quality Assessment of Foods (No. of Lectures 30)

- Cleaning and sterilization of glassware/ Plastic ware
- Preparation and sterilization of nutrient media, broth for growth study of bacteria and Fungi.
- Handling and maintenance of microscopes
- Preparation of slants, stab and plates using nutrient agar
- Morphological examination of food spoiling bacteria and fungi using permanent slides.
- Simple staining of microbes.
- Gram's staining of microbes
- Enumeration of microbes by standard plate count method
- Microbial analysis of raw foods, vegetables, fruits etc.
- Microbial analysis of spices and canned foods.
- Microbial analysis of processed and cooked foods.
- Yeast and mold count in foods.
- Microbiological testing of milk and milk products.
- Safety measures- Interactive demonstration

Keywords: sterilization, Gram's staining bacteriological analysis, nutrients, Microscope, MBRT test.

Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

- Basic of food Microbiology, G.J. Banwart, CBS Publishers Pvt. Ltd. India, 2004, 2nd Edition.
- Food Microbiology, Adams M, Moss M., RCS Publication, 2007, 2nd Edition
- Food Microbiology, Frazier W.C. and Westhoff , D.C., McGraw Hill (India) New Delhi, 1988, Edition 4th
- Fundamental Food Microbiology, Ray B., Bhunia, A, CRC Press, 5th Edition.
- Microbiology, Pelczar MJ, Chan E.C.S and Krieg, McGraw Hill Education Pvt. Ltd. (India) New Delhi N.R. 5th Ed., 1998
- Modern Food Microbiology James J. M, Loessner M.J, Golden D.A, CBS Publication, New Delhi, 2000 Edition 7.

P.K.University
Shivpuri (M.P.)
University Established Under section 2f of UGC ACT 1956 Vide MP Government Act No 17 of 2015

AGENDA OF THE 5th BOARD OF STUDY OF FACULTY OF SCIENCE

AGENDA NO. 04

Addition of statistics portion in research methodology paper in Ph.D. syllabus.

ADD: VIL: THANARA, TAHSIL KARERA, NH-27, DIST: SHIVPURI, M.P.-473665,
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P.K.University
Shivpuri (M.P.)

Faculty of Science

Syllabus
For
Ph. D.

W.E.F. - Session 2024 - 2025

P.K.UNIVERSITY SHIVPURI (M.P.)

Faculty of Science
Syllabus for Ph.D. Course Work Paper – I
(Research Methodology)

1. **Scientific Process:** Meaning and Definition, a brief history of scientific process.

2. **Introduction of Research Methodology:** Meaning of research, objectives of research, types of research, significance of research, problems encountered by researchers in India.

3. **Research Problem:** Definition, necessity and techniques of defining research problem, Formulation of research problem, Objectives of research problem.

4. **Research Design:** Meaning, need and features of good research design, Types of Research Designs, Basic Principles of Experimental Designs, Design of experiments, Synopsis design for research topic.

5. **Sampling Designs:** Census and Sample surveys, Different types of sample designs, Characteristics of good sample design, Techniques of selecting a random sample.

6. **Editing, Data Collection and Validation:** Primary and secondary data, Methods of collecting primary and secondary data, Importance and methods of editing and data validation.

7. **Hypothesis:** Definition, testing of hypothesis, procedures of hypothesis testing, flow diagram for hypothesis testing, Parametric and non-parametric tests for testing of hypothesis, Limitations of tests of hypothesis.

8. **Paper/Thesis Writing and Report Generation:** Basic concepts of paper their writing and report generation, review of literature, Concepts of Bibliography and References, significance of report writing, steps of report writing, Types of Research reports, Methods of presentation of report.

9. **Computer Applications:** Fundamentals of computers - definition, types of computers. RAM, ROM, CPU, I/O devices. Number system - binary, octal and hexadecimal, base conversion. Logic gates - AND, OR, NOT. Date Structure - array, stack (push, pop), queue (insert, delete), linked list - singly,

doubly, Operating system - definition, types of OS. Use of software - MS Office - Power Point, WORD and EXCEL and ACCESS.

10. **Field and Computer hards:** viruses, misuse of internet, hacking, Field hazards.

11. **Instrumentation:** Description and principles of (i) Electrophoresis (ii) PCR Machine (iii) Laminar Flow (iv) Ultracentrifuge (v) Autoclave and (vi) Light and electron microscopy, Chromatography and HPLC, Handling of instruments and precautions.

12. **Safety Measures:**
    (i) **Lab Safety Measures:** Introduction, Code of conduct - while entering in the lab, while working with the chemicals, while disposal of chemicals, Storage and disposal of chemical wastes - aqueous wastes, organic wastes and radioactive wastes, Human contribution to reduce hazardous wastes.
    (ii) **Field Safety Measures:** Food security during field trip/expedition, safety measures during field trip/expedition - self- care, avoid in fields, care from wild animals, hazard warnings, Safety measures during visit to library and villages, first aid in the fields.

13. Probability Distribution and Hypothesis Testing: Theoretical: binomial, poisson, normal, exponential, hyper geometric, uniform distributions. Type I and II error, testing of mean, proportion, tests for equality of mean and variances of two populations, confidence interval, Z- test T-test and χ 2 tests for goodness of fit, ANOVA (one way classification), Non parametric tests: sign test, U test.

14. Correlation and Regression Analysis: Karl Pearson's and Rank Correlation coefficient, simple linear regression: least squares method, Linear Programming: Graphical solution, simplex method, dual, sensitivity analysis, transportation and assignment problems

Suggested Readings:

1. Blum, Deborah and Mary Knudson, eds. A field guide for science writers: the official guide of the National Association of Science Writers, New York: Oxford University Press, 1997.
2. Booth, Wayne, Gregory G Colomb, Joseph M. Williams. The craft of Research Chicago University of Chicago Press, 1995.

3. Davis, Martha. Scientific Papers and Presentations. San Diego: Academic Press, 1997.
4. Fuscaldo, AA, Erlick, BI, Hindman, B. Laboratory Safety: Theory and Practice. New York: Academic Press, 1980.
5. Bajpai, PK. Biological Instrumentation and Methodology. New Delhi: S. Chand & Co. Ltd. 2006.
6. Rajaraman, V. Fundamentals of Computers.
7. Horowitz & Sahni. Data Structure.
8. Manual of MS Office.

AGENDA OF THE 5th BOARD OF STUDY OF FACULTY OF SCIENCE

AGENDA NO. 05

Any other matter with the permission of Chairman.

ADD: VIL: THANARA, TAHSIL KARERA, NH-27, DIST: SHIVPURI, M.P.-473665,
MOB: 7241115081 to 90, Email:registrar.pkuniversity @gmail.com

P.K. UNIVERSITY
FACULTY OF SCIENCE
Session 2024 – 2025
Tentative Academic Calendar
(For B.Sc. & M.Sc. Semester Wise)

S.No.	Particular	Odd Semester Schedule	Even Semester Schedule
1	Starting of Class	1st July 2024	6th Jan 2025
2	Duration of Session	1st July – 15th Nov 2024	6th Jan 2025– 15th May 2025
3	Admission Process (To be completed)	As Decided by competent Authority	
4	Commencement of class for 1st semester	1st Aug. 2024	
5	Internal Evaluation/(CCE-I)	3rd week of Sept.	2nd week of March .
6	Internal Evaluation/(CCE-II)	3rd week of Oct..	3rd week of April
7	Exam Preparation Leave for Student	20th Nov 2024	22nd April 2025
8	Conduct of Main Examinations for Non Agriculture Faculty	13th Dec 2024- 29th Dec. 2024	3rd June 2025 – 15th May 2025
9	Sessional /internal/ External Evaluation and Award sheet Submission for Courses	30th Dec 2024 –10th Jan 2025	16th June 2025 – 30th June 2025
10	Semester Break for Student	30th Dec 2024– 05th Jan 2025	16th May 2025 – 30th June 2025
11	Result Declaration	15th Jan 2025	30th June 2025

Tentative Academic Calendar
[For B.Sc. 3rd year (Year Wise)]

S.No.	Particular	Schedule
1	Starting of Class	1st July 2024
2	Duration of Session	1st July 2024 – 30th June 2025
3	Admission Process (To be completed)	As decided by competent Authority
4	Internal Evaluation/(CCE-I)	3rd week of Aug
5	Internal Evaluation/(CCE-II)	2nd week of October
6	Internal Evaluation/(CCE-III)	3rd week of January
7	Exam Preparation Leave for Student	22nd April 2025
8	Conduct of Main Examinations for Non Agriculture Faculty	3rd May 2025 – 15th May 2025
9	Sessional /internal/ External Evaluation and Award sheet Submission for Courses	16th May 2025 – 30th June 2025
10	Yearly Break for Student	16th May 2025 – 30th June 2025
11	Result Declaration	30th June 2025

P.K. UNIVERSITY

Calendar of Extra Curriculum Activities for Odd Semester

S.No.	Activities	Date/Month
1	Orientation of Fresher's	July/ Aug. 2024
2	Seminar/ Kisan Mela/ Exhibition	September 2024
3	Sports/ Cultural/ NSS	October 2024
4	Diwali Holidays	Feb/march 2025
5	Celebration of Relevant Day	During Session

Calendar of Extra Curriculum Activities for EvenSemester

S.No.	Activities	Date/Month
1	Tech- Fest	05 April 2025
2	Convocation	Feb./ March 2025
3	Holi Fest	March 2025
4	PTM	During the session
5	Industrial Visit/ Relevant Technical Tour	During the session
6	Farewell	