The ICFAI University, Raipur

Faculty of Science

Second Semester, 2024–2025
Course Handouts

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The ICFAI University, Raipur

Faculty of Science
Second Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
PHC121	**Wave and Optics**	**3**	**2**	**0**	**4**

Instructor-in-charge: Dr.SHRUTIKA TIWARI

Course Description:
This course reviews the concept of Basic Physics learnt at school from the more advanced perspective and goes on the new concepts. It begins with Wave Motion and ends with physical optics. Students will also appreciate the interference, diffraction, and polarization of light. The students will be able to apply the concepts learnt to several real physical world problems.

Text Book (T1)	Optics by Satya Prakash Pragati Prakashan
Text Book (T2)	Physicis for degree Students B.Sc Second Unified (by R.P Goyal)
Reference Book (R1)	Oscillation and waves by Satya Prakash Pragati Prakashan
Reference Book R2	Engineering Physics by Datta Prakash Ramanlal Joshi Mc Graw Hill
Reference Book R3	Physics for degree students B.Sc 1st by CL Arora S Chand Publications

Lecture Wise Plan:

Lecture Nos.	Learning Objective	Topics to be covered	Teaching Learning Strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology Based Learning d. Peer Teaching e. Project Based Learning	Reference
1-4	To Understand the concepts of wave and wave motion.	**Wave motion:** plain and spherical waves, longitudinal and transverse waves, plane progressive waves. wave equation,	Teaching & Group Discussion	T1 184-214

Lecture Nos.	Learning Objective	Topics to be covered	Teaching Learning Strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology Based Learning d. Peer Teaching e. Project Based Learning	Reference
5-8	To Understand the concepts of wave Superposition.	**Superposition:** superposition of two perpendicular harmonic oscillations graphical and analytic method. Lissajous figures (1:1 and 1:2) and their uses.	Teaching & Group Discussion	T1 242-246 390-399
9-15	To Understand the concepts of oscillatory motion and SHM	Oscillatory motion and its types, simple harmonic oscillator and solution of the differential equation. Physical characteristic of SHM. examples of SHM, simple and compound pendulum, measurement of the acceleration due to gravity 'g' using a simple pendulum.	Interactive Demonstrations	T1 1-37

Lecture Nos.	Learning Objective	Topics to be covered	Teaching Learning Strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology Based Learning d. Peer Teaching e. Project Based Learning	Reference
16-24	Understanding the harmonic motion with various application.	Free forced and dumped harmonic oscillator, solution of the differential equation of dumped oscillator. energy consideration, comparison with un-dumped harmonic oscillator, logarithmic decrement, relaxation time, quality factor, differential equation of forced oscillator and its solution, velocity resonance, couple oscillators.	Teaching & Group Discussion	T1 84-92 105-113 117-134
25-26	Understanding the concept of light geometrical optics.	Geometrical optics, Cardinal Points of coaxial optical system, Newton formula.	Teaching & Group Discussion	T2 524-532
27-32	Understanding the concept of light Polarization with their principles	Polarized light polarization by reflection, Brewster's law, malus's law, double refraction, uniaxial and bicycle crystals. Light propagation in uniaxial crystal, principal section, principal plane,	Teaching & Group Discussion	T2 735-763

Lecture Nos.	Learning Objective	Topics to be covered	Teaching Learning Strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology Based Learning d. Peer Teaching e. Project Based Learning	Reference
33-36	Understanding the physical optics with their experimental applications	**Interference:** division of amplitude and wavefront. Young's double slit experiment. fresnel's bi-prism. Phase change on reflection Stokes' treatment. interference in thin films, parallel and wedge-shaped films.	Teaching & Group Discussion	T2 583-591 594-598 602-607
37-38	Understanding the concept of Newton's rings	**Newton's rings:** measurement of wavelength and reflective index.	Experimental & Hands-on Approaches	T2 608-614
39-40	Understanding the concept of Fraunhoffer refraction	**Fraunhoffer refraction:** single slit. Fraunhoffer diffraction: N slit. resolving power of grating.	Teaching & Group Discussion	T2 676-690 711-714

S. No	Name of Experiment
1	To determine the dispersive power of the material of a given prism using a spectrometer.
2	To determine the reflective index of a material of a given prism using a spectrometer.
3	To determine the resolution power of a Prism.
4	To determine the wavelength of sodium light using Fresnel biprism.
5	To determine the wavelength of sodium light using Newton's ring method.
6	To determine the wavelength of Mercury light using plane diffraction grating and spectrometer.
7	To determine the resolving power of plane diffraction grating.
8	Study of the polarization of sugar solution using a polarimeter.
9	Determination of Angle of prism using spectrometer.
10	To determine the thickness of thin paper by measuring the width of interference fringes produced by wedge-shaped film.

Evaluation Scheme:

Student evaluation is based on the series of Tests and Lab Tests conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	10	17-02-2025	1-10	CB
Test 2	60 Minutes	10	07-04-2025	11-20	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	01-05-2025	1- 40	CB

** To be announced in the class CB= Close Book Exam OB= Open Book

Make-up Policy: Make –up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc

Date: 21/01/2025

Dr.Shrutika Tiwari
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
Second Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
CHC122	**Inorganic Chemistry**	**3**	**2**	**0**	**4**

Instructor-in-charge: Dr.Piyush Kumar Thakur

Learning Outcomes:

1. To identify the properties of the noble gases
2. To explain and predict the chemical behaviour and reactivity o organometallic compounds
3. The students will be able to describe the salient features of alkali and alkaline earth metals
4. To understand general trends in the chemistry behind P-Block elements.

Text Books T1	Concise Inorganic Chemistry, J.D Lee, OUP, 5th Edition, Black Will Science 2002
Text Books T2	Advance in Inorganic Chemistry, S.K Agrawal, Keemtilal, Pragati Prakashan 2021
Text Book T3	Organometallic Chemistry A Unified Approach, R.C Mehrotra, A Singh, 2nd Edition, New Age International Publishers 2003
Text Book T4	Chemistry for degree students, R.C Madan, Schand and company limited 2011
Reference Books R1	Inorganic Chemistry, 4th Edition, P.Atkins, T.Overton, J.Rouke, M.Willer, F. Armstrong, Oxford University, Press 2005
Reference Book R2	Inorganic Chemistry, Huheey, Keiter and Keiter, Pearson Education 2002

Lecture-Wise-Plan:

Lecture No.	Learning Objective	Topics to be covered	Teaching Learning Strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference
1-4	To identify the properties of the noble gases.	Chemical properties of the noble gasses, chemistry of xenon, structure & bonding in Xenon compounds.	Group Learning and Teaching	T1 635-649
5-8	To identify oxidizing/reducing agents in chemical reaction.	Use of redox potential, redox stability in water-frost, Latimer and Pourbaix diagram.	Technology based Learning	R1 141-160
9-10	To Explain and predict the chemical behavior and reactivity of organometallic compounds	Definition, nomenclature and classification of organo metallic compounds	Technology based Learning	T3 16-21
11-12		Preparation, properties, bonding and applications of alkyls and aryls of Li, Al, Hg, Sn and Ti.	Technology based Learning	T3 146-194

Lecture No.	Learning Objective	Topics to be covered	Teaching Learning Strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference
13-14		A brief account of metal ethylenic complexes and homogenous hydrogenation	Technology based Learning	R1 684-685
15-16		mononuclear carbonyls and nature of bonding in metal carbonyls.	Group Learning and Teaching	T3 331-346
17-18	To define importance of inorganic elements in vital systems	Essential and trace elements in biological processes	Peer teaching	T4 203-211
19-21	Explain Metal ion binding to biomolecules and their functions	Metalloporphyrins with special reference to haemoglobin and myoglobin	Peer teaching	R2 663-667

Lecture No.	Learning Objective	Topics to be covered	Teaching Learning Strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference
22-24		Biological role of alkali and alkaline earth metals with special reference to Ca^{21}, nitrogen fixation.	Peer teaching	R1 721-722 R2 691-692
25-28	The students will be able to describe the salient features of alkali and alkaline earth metals.	s- Block Elements Salient features of hydrides, Salvation and complexation tendencies including their function in Biosystems and Introduction to Alkyl and Aryls.	Technology based Learning	R1 262,277 R1 253-267 T1 349-350 T1 305-308
29-32	To understand general trends in the chemistry behind p-block elements.	p-Block Elements group 13-17 elements, Compounds like hydrides, Oxides, Oxyacids and Halides of groups 13-16.	Group Learning and Teaching	R1 287-417
33-37	The students will be able to know the important compounds and important applications of compounds of	p-Block Elements Hydrides of Boron-diborane and higher boranes, Borazine, Borohydrides.	Group Learning and Teaching	R1 299-306

Lecture No.	Learning Objective	Topics to be covered	Teaching Learning Strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference
38-40	boron and silicons.	Silicates (Structural principle), Tetra sulfur tetra nitride	Group Learning and Teaching	R1 13.12
41-42	To study the properties of Inter halogens and their complexes.	Basic properties of halogens, Interhalogens and Polyhalides.	Technology based Learning	R1 408-411

Chemistry II- Lab (Including Virtual Lab)

S.No	Name of the Experiment
1	Determination of acetic acid in commercial vinegar using
2	Determination of alkali content - antacid tablet using HCl
3	Estimation of calcium content in chalk as calcium oxalate by permanganometry.
4	To analyses the given mixture for anions (acid radicals) and cations (basic radicals)
5	Preparation of pure sample of potash alum (Fitkari) [K_2SO_4. $Al_2(SO_4)_3$. $24H_2O$] (VL)
6	Preparation of pure sample of the complex potassium trioxalatoferrate (III), $K_3[Fe(C_2O_4)_3]$. $3H_2O$ (VL)
7	Preparation of Tetraamminecopper(I1) Sulphate Monohydrate.
8	Preparation of Hexa (Thiourea) – Plumbus Nitrate

S.No	Name of the Experiment
9	Preparation of Hexammine Nickel(Ii) Chloride
10	To determine the amount of phosphate in soft drinks (VL)

****Experiments may be change based on availability of chemicals**

Evaluation Scheme:

Student evaluation is based on the series of Tests and Lab Tests conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	10	17-02-2025	1-18	CB
Test 2	60 Minutes	10	07-04-2025	19-36	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	05-05-2025	1- 42	CB

** To be announced in the class CB= Close Book Exam OB= Open Book

Make-up Policy: Make –up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc

Date: 07/01/2025

Dr.PIYUSH KUMAR THAKUR
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
Second Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
MAC123	**Multivariative Calculas II**	**3**	**0**	**1**	**4**

Instructor-in-charge: Dr.SHANTI SWARUP DUBEY

Learning Outcomes:

1. Find Partial Derivatives
2. Total differential and differentiability, Jacobians, Change of Variables, Euler's Theorem for homogeneous functions
3. Double and Triple Integrals Double integration over rectangular and nonrectangular regions
4. Green's Stokes and Gauss Divergence Theorem Line Integrals

Text Book R1	A Course in Multivariable Calculus and Analysis by Sudhir R Ghorpade
Text Book R2	Multivariabvle Calculus (Seventh Edition) by James Stewart

Lecture-Wise-Plan:

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology Based Learning d. Peer Teaching e. Project Based Lerning	Reference (Chapter/sec. /Page Nos of Text/Ref. Books)
1-2	Partial Differentiation Functions of several variables	Definition of Partial Differentiation Functions of several variables	a. Group Learning and Teaching.	R1 Ch-3 pp-84
3-4	Chain rule	Definition of Chain rule and their problems	b. Technology based Learning.	R1 Ch-3 pp-116-120

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology Based Learning d. Peer Teaching e. Project Based Lerning	Reference (Chapter/sec. /Page Nos of Text/Ref. Books)
5-6	Euler's theorem	Euler's theorem for homogeneous functions	a. Group Learning and Teaching	R2 Ch pp-901-991
7-9	Taylor's theorem	Taylor's theorem for functions of two variables and more variables.	b. Technology based Learning.	R2 Ch 14 pp-901-991
10-13	Minima and Maxima of a function	Minima and Maxima of a function and problems	a. Group Learning and Teaching	R2 Ch-14 pp-970-981
14-19	Minima and Maxima of functions of two and more variables.	Definition of Minima and Maxima of functions of two variables and its properties	a. Group Learning and Teaching	R1 Ch-4 pp-157-167
20-24	Method of Lagrange multipliers	Method of Lagrange multipliers for finding minima and maxima.	b. Technology based Learning.	R1 Ch-4 pp-157-167
25-30	Double and Triple Integrals	Definition of Double and Triple Integrals and its problem.	a. Group Learning and Teaching	R2 Ch-15 pp-997-1064

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology Based Learning d. Peer Teaching e. Project Based Lerning	Reference (Chapter/sec. /Page Nos of Text/Ref. Books)
31-35	Double integration over rectangular and non rectangular regions.	Double integration over rectangular and nonrectangular regions, Double integrals in polar coordinates	b. Technology based Learning.	R2 Ch-15 pp-997-1064
36-42	Change of variables in double and triple integrals	Change of variables in double and triple integrals and its examples	a. Group Learning and Teaching	R2 Ch-15 pp-997-1064

Evaluation Scheme:

Student evaluation is based on the series of Tests and Lab Tests conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	10	18-02-2025	1-20	CB
Test 2	60 Minutes	10	08-04-2025	21-40	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	09-05-2025	1- 40	CB

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Make-up Policy: Make –up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc

Date: 10/01/2025

Dr.SHANTI SWARUP DUBEY
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
Second Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
CSC124	**Computer Programming II**	**3**	**2**	**0**	**4**

Instructor-in-charge: Dr.NISHA THAKUR

Learning Outcomes:
The learning objective of Python is to equip individuals with the ability to write clear, efficient, and scalable code for a wide range of applications. Python's simplicity and versatility enable learners to develop skills in problem-solving, algorithm design, and software development. The goal is to understand core programming concepts such as data types, control structures, functions, and object-oriented programming while leveraging Python's extensive libraries and frameworks for tasks like data analysis, web development, and automation. By mastering Python, learners gain the tools to build real-world applications, collaborate effectively in teams, and adapt to evolving technological challenges.

Text Book T1	Python Programming by Rao, K. Nageswara Shaikh Akbar, Scitech Publications (India) Pvt. Ltd.
Text Book T2	Learning Python by Lutz, Mark, 5th Edition, O'Reilly Publication.
Reference Book R1	Python Essential Reference by Beazley, David, 4th Edition, Addison-Wesley Professional.
Reference Book R2	Head First Python by Paul, Barry, 2d Edition, O'Reilly Publication.

Lecture-Wise-Plan:

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. e. Project based Learning	Reference (Ch./Sec. /Pg No)
1	Introduction and Syntax of	Features of Python-Interactive, Object-	a. Group Learning and Teaching	T1: Ch-1

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. e. Project based Learning	Reference (Ch./Sec. /Pg No)
	Python Program:	oriented, Interpreted, platform-independent.		
2-3	Introduction and Syntax of Python Program:	Python building blocks - Identifiers, Keywords, Indention, Variables, Comments, Python environment setup Installation and working of IDE	a. Group Learning and Teaching	T2: Ch-1
4-5	Introduction and Syntax of Python Program:	Running Simple Python scripts to display 'welcome' message,	a. Group Learning and Teaching	T1: Ch-2,
6-7	Introduction and Syntax of Python Program:	Python Data Types: Numbers, String, Tuples, Lists, Dictionary.	a. Group Learning and Teaching	T2: Ch-1
8-10	Introduction and Syntax of Python Program:	Declaration and use of data types.	c. Technology based Learning	T1: Ch-3
11-13	Python Operators and Control Flow statements	Basic Operators: Arithmetic, Comparison/ Relational, Assignment, Logical, Bitwise,	c. Technology based Learning	

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. e. Project based Learning	Reference (Ch./Sec. /Pg No)
14-15	Python Operators and Control Flow statements	Membership, Identity operators, Python Operator Precedence,	c. Technology based Learning	T1: Ch-4
16-18	Python Operators and Control Flow statements	Control Flow, Conditional Statements (if, if ... else, nested if)	c. Technology based Learning	T1: Ch-7, T2: Ch-2
19-20	Python Operators and Control Flow statements	Looping in python (while loop, for loop, nested loops), loop manipulation using continue, pass, break, else.	d. Peer teaching	T2: Ch-3
21-24	Data Structures in Python	List: Defining lists, accessing values in list, deleting values in list, updating lists, Basic List Operations, Built-in List functions.	d. Peer teaching	T1: Ch-10,
25-30	Data Structures in Python	Tuples: Accessing values in Tuples, deleting values in Tuples, and updating Tuples, Basic Tuple operations, Built in Tuple functions.	d. Peer teaching	T2: Ch-3

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. e. Project based Learning	Reference (Ch./Sec. /Pg No)
31-33	Python Functions and modules	Use of Python built-in functions (e.g. type/ data conversion functions, math functions etc.), User-defined functions: Function definition, Function calling, function arguments and parameter passing,	d. Peer teaching	T1: Ch-11, T2: Ch-3
34-35	Python Functions and modules	Scope of Variables: Global variable and Local Variable. Modules: Writing modules, importing modules, importing objects from modules,	b. Game Based Learning	T1: Ch-13, T2: Ch-4
36	Python Functions and modules	Python built-in modules (e.g. Numeric and mathematical module, Functional Programming Module) Namespace and Scoping.	b. Game Based Learning	T2: Ch-5
37-38	File I/O Handling	I/O Operations: Reading keyboard input, Printing to screen,	e. Project based Learning	T1: Ch-19, T2: Ch-5

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. e. Project based Learning	Reference (Ch./Sec. /Pg No)
39-40	File I/O Handling	File Handling: Opening file in different modes, accessing file contents using standard library functions, Reading and writing files, closing a file, Renaming and deleting files.	e. Project based Learning	T1: Ch-23, T2: Ch-5
17-18	MAC	Multiple Access Protocols	e. Project based Learning	T1: Ch-13, T2: Ch-4
19	Design of Network Layer	Network Layer Design Issues	e. Project based Learning	T2: Ch-5
20-21	Types of Routing	Routing Algorithms	b. Game Based Learning	T1: Ch-19, T2: Ch-5
22-23	Removing Congestion on Network	Congestion Control Algorithms	b. Game Based Learning	T1: Ch-23, T2: Ch-5
24	Internetworking	Quality Of Service, Internetworking	d. Peer teaching	T1: Ch-23

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. e. Project based Learning	Reference (Ch./Sec. /Pg No)
25	Protocols of Transport Layer	The Transport Service	d. Peer teaching	T1: Ch-22, T2: Ch-6
26-27	Protocols of Transport Layer	Elements of Transport Protocols, A Simple Transport Protocol	d. Peer teaching	T1: Ch-22, T2: Ch-6
28-29	Internet Transport Protocols	The Internet Transport Protocols: UDP, The Internet Transport Protocols: TCP	c. Technology based Learning	T1: Ch-22
30-34	Services of Application Layer	DNS--Domain Name System, Electronic Mail, The World Wide Web	c. Technology based Learning	T1:Ch 25,26, 27,T2:Ch-7
35-38	Security on Networks	Cryptography, Symmetric-Key Algorithms	c. Technology based Learning	T1: Ch-29,31, T2: Ch-8
39-40	Algorithms	Public-Key Algorithms	c. Technology based Learning	T2: Ch-8

Evaluation Scheme:

Student evaluation is based on the series of Tests and Lab Tests conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	10	17-02-2025	1-10	CB
Test 2	60 Minutes	10	07-04-2025	11-20	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	05-05-2025	1- 40	CB

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Make-up Policy: Make –up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc

Date: 03/01/2025

Dr.Nisha Thakur
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
Second Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
BOC125	**Basic Body Plant**	**3**	**2**	**0**	**4**

Instructor-in-charge: Mr.SHUBHUM DEWANGAN

Learning Outcomes:

1. This course is offered in the first semester for the students of bachelor of sciences.
2. To understand the body plan and their growth patterns of flowering plants.
3. To understand the Root system and Shoot system of the plants.
4. To understand the structure, development and varieties of flower.
5. To understand the process of fruit development and maturation.

Text Book T1	Botany for degree students B.Sc. 2nd year Dr. B.P Pandey / S.chand Publications
Text Book T2	Unified Botany, B.Sc. 2nd year Dr. Shailesh Kumar Verma, Dr, N.K. Singh, Dr. N.B. Singh / Navbodh Prakashan
Reference Books	The Embryology of Angiosperms S S Bhojwani, S P Bhatnagar, P K Dantu / Vikas Publishing House pvt. Ltd.

Lecture-Wise-plan:

Lecture No's.	Learning objectives	Topics to be covered	Teaching learning strategies: **a. Group Learning and Teaching** **b. Game Based Learning** **c. Technology** **d. Peer Teaching** e. **Project Based Learning**	Reference (Ch./Sec./ Page Nos.of Text Book)
1-2	To understand the basic body plan of a flowering plant.	General Introduction, the basic body plan of a flowering plant: modular type of growth and factors affecting growth.	a. Group Learning and Teaching	T2: 339-350,

Lecture No's.	Learning objectives	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology d. Peer Teaching e. Project Based Learning	Reference (Ch./Sec./ Page Nos.of Text Book)
3-5		Diversity in plant form in annuals, biennials and perennials.	c. Technology based Learning	T2: 352-372,
6-9	To understand the Root systems.	The root system: the root apical meristem; differentiation of primary and secondary tissues and their roles; structural modification of Roots.	e. Project based Learning.	T2: 458-483
10-12	To understand the shoot system of primary and secondary structures of plants.	General Introduction, Characteristics of Stem, Branching pattern, Tissue of shoot system - apical meristem and its histological organization; Anatomy of primary shoot in monocotyledons (Zea mays) and dicotyledons (Helianthus anus)	a. Group Learning and Teaching c. Technology based Learning	T2: 374-395
13-15		General Introduction of Secondary growth,	c. Technology based Learning	T2: 398-408

Lecture No's.	Learning objectives	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology d. Peer Teaching e. Project Based Learning	Reference (Ch./Sec./ Page Nos.of Text Book)
		cambium and its functions; formation of secondary xylem.		
16-18	To understand the Secondary phloem.	Secondary phloem - structure-function relationships, periderm.	a. Group Learning and Teaching	T2: 408-416
19– 20	To understand the origin, development, arrangement, and internal structure of Leaf.	General Introduction of Leaf: origin, development, arrangement and diversity in size and shape;	d. Peer teaching	T2: 425-443
21-23		Internal structure in relation to photosynthesis and water loss; adaptations to water stress; senescence and abscission in Leaf.	a. Group Learning and Teaching	T2: 443-456
24-26	To understand the structure, development, functions of flowers, the Structure of Anther, process of pollination and fertilization and	General Introduction of Flower: a modified shoot; structure, development and varieties of flower, functions,	a. Group Learning and Teaching	T2: 486-504

Lecture No's.	Learning objectives	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology d. Peer Teaching e. Project Based Learning	Reference (Ch./Sec./ Page Nos.of Text Book)
27-29	formation of embryo	General Introduction, structure of anther and pistil, the male and female gametophytes.	c. Technology based Learning	T2: 506-532
30-32		General Introduction, Types of pollination, Process of pollination.	b. Game Based Learning	T2:534-550
33-35		Fertilization: events of double fertilization, significance, formation of seed-endosperm and embryo.	a. Group Learning and Teaching	T2:551-566
36-38	To understand the development and maturation of fruits.	Fruit development and maturation. Significance of seed.	c. Technology based Learning	T2:568-595
39-42		General Introduction of Vegetative reproduction: vegetative propagation, grafting, economic aspects.	a. Group Learning and Teaching	T2:597-619

Evaluation Scheme:

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Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	10	18-02-2025	1-18	CB
Test 2	60 Minutes	10	08-04-2025	19-42	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	07-05-2025	1- 42	CB

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Make-up Policy: Make –up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc

Date: 02/01/2025

Mr.SHUBHUM DEWANGAN
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
Second Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
ZOC121	**Animal Systematics**	**3**	**2**	**0**	**4**

Instructor-in-charge: Dr.AMENA KHANANI

Learning Outcomes:
This course is offered in the First Year second semester students of bachelor of sciences.

1. Define terms related to multicellularity, animal systematics and outline the various systems of classification.
2. Explain the structure and diversity in Protists, origin of Metazoans, Cnidarians Bilateria, and Acoelomates

Text Book T1	Morden Textbook of Zoology R.L Kotpal / Rastogi Publication.
Text Book T2	Cell Biology P.K Gupta/ Unified Zoology
Text Book T3	Genetics,Evolution and Plant Breeding Dr.Preeti Khare / Navbodh Prakashn
Text Book T4	Unified Zoology J.K Awasthi / Navbodh Prakashn
Text Book T5	Ecology and Environment 3rd Edition P.D Sharma/ Rastogi Publication.

Lecture-Wise-Plan:

Lecture Nos	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology Based Learning d. Peer Teaching e. Project Based Learning	Reference
1	Introduction to Animal kingdom	Introduction to Animal kingdom	a. Group Learning and Teaching.	T3Ch.1 Pg. No.01-16
2	Major and Minor phyla	Major and Minor phyla	a. Group Learning and Teaching.	T3Ch.1 Pg. No.01-16
3	Protozoa	General characters	a. Group Learning and Teaching.	T3Ch.2 Pg. No.17-59

Lecture Nos	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology Based Learning d. Peer Teaching e. Project Based Learning	Reference
4-5		type study: Plasmodium	a. Group Learning and Teaching.	T3Ch.2 Pg. No.17-59
6	Porifera	General characters	b. Technology based Learning.	T3Ch.3 Pg. No.60-85
7-8		type study: Sycon	b. Technology based Learning.	T3Ch.3 Pg. No.60-85
9	Coelenterate	General characters	a. Group Learning and Teaching.	T3Ch.4 Pg. No.86-116
10-11		type study of Obelia	b. Technology based Learning.	T3Ch.4 Pg. No.86-116
12-14	Helminthes	type study: Liver fluke - Structure	b. Technology based Learning.	T3Ch.5 Pg. No.117-147
15-16		Life cycle	b. Technology based Learning.	T3Ch.5 Pg. No.147-175
17	Annelida	General characters	a. Group Learning and Teaching.	T3Ch.7 Pg. No.176-214
18-20		type study of Earthworm	e.Project based Learning	T3Ch.7 Pg. No.176-214
21-23	Arthropoda	General characters, type study of Palaemon	e.Project based Learning	T3Ch.8 Pg. No.215-277
24-25		type study of Palaemon	e.Project based Learning	T4Ch.31 Pg. No.604-625
26-27		External structure, Appendages	e.Project based Learning	T4Ch.31 Pg. No.604-625

Lecture Nos	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology Based Learning d. Peer Teaching e. Project Based Learning	Reference
28	Hemichordate	General characters of Hemichordate	a. Group Learning and Teaching.	T4Ch.11 Pg. No.350-369
29		External structure of Balanoglossus	a. Group Learning and Teaching.	T4Ch.11 Pg. No.350-369
30	Chordate	Origin and classification of chordate	a. Group Learning and Teaching.	T4Ch.12 Pg. No.370-469
31	Protochordates	Origin and classification of chordate	a. Group Learning and Teaching.	T4Ch.12 Pg. No.370-469
32-33	Fishes	General characters, Skin and scales	b. Technology based Learning.	T1Ch.18 Pg. No.221-247
34		Migration, Parental care	b. Technology based Learning.	T1Ch.18 Pg. No.221-247
35-36	Amphibia	General characters parental care, Neoteny	a. Group Learning and Teaching.	T1Ch.19 Pg. No.248-299
37	Reptiles	General characters, Extinct reptiles	a. Group Learning and Teaching.	T1Ch.25 Pg. No.355-373
38		Poisonous and non-poisonous snakes; Poison apparatus and snake venom	a. Group Learning and Teaching.	T1Ch.24 Pg. No.345-354
39-41	Birds	General characters, migration, Flight adaptation	a. Group Learning and Teaching.	T1Ch.28 Pg. No.427-471

Lecture Nos	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology Based Learning d. Peer Teaching e. Project Based Learning	Reference
42		General characters of Mammals	a. Group Learning and Teaching.	T1Ch.28 Pg. No.427-471

Evaluation Scheme:

Student evaluation is based on the series of Tests and Lab Tests conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	10	17-02-2025	1-20	CB
Test 2	60 Minutes	10	07-04-2025	21-40	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	01-05-2025	1- 40	CB

** To be announced in the class CB= Close Book Exam OB= Open Book

Make-up Policy: Make –up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc

Date: 10/01/2025

Dr.AMENA KHANANI
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
Second Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
SCA121	**Hindi Language**	**3**	**0**	**0**	**3**

Instructor-in-charge: Dr.JAYA SINGH

Learning Objectives :

1. भाषा के प्रति रूचि उत्पन्न कराना
2. सम्प्रेषण में विकास कराना
3. भाषा को सुदृढ़ बनाना
4. शब्द्कोश में विकास कराना
5. भाषा में शुध्द्धि, अशुद्धि का ज्ञान कराना

Text Book T1	भारतीयता के अमर स्वर मध्यप्रदेशहिंदी ग्रन्थ अकादमी ,भोपाल
Reference Books R1	हिंदी शब्द -अर्थ- प्रयोग (डॉ.हरदेव बाहरी)अभिव्यक्ति प्रकाशन
Reference BooksR2	नेट/स्लेटहिंदी भाषा
Reference Books R3	हिंदी व्याकरण , डॉ. भोला नाथ तिवारी
Website	https://www.bsakari.com , hi.m.wikipedia.org/wiki/pallavan https://www.learncbse.in, hi.m.wikipedia.org/wiki/pallavan

Lecture-Wise-Plan:

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology Based Learning d. Peer Teaching e. Project Based Learning	Reference (chapter/sec ./Page Nos of Text/Ref. Books)
01	व्याकरण से भाषा प्रवाह सुदृढ़ होगा	संज्ञा,सर्वनाम	Group Learning and Teaching.	T1,P.1/CH-2 PG.10-11
02	मानक भाषा और अमानक भाषा का अर्थ जन सकेंगे	मानक हिंदी भाषा	Group Learning and Teaching	T1, P.2 CH-2 PG 101-136

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology Based Learning d. Peer Teaching e. Project Based Learning	Reference (chapter/sec./Page Nos of Text/Ref. Books)
03	भाषा शब्द शुद्धि वाक्य शुद्धि हिंदी वर्तनी संबंधी अशुद्धियाँ की जानकारी प्राप्त होगी	शुद्धि वाक्य शुद्धि हिंदी वर्तनी संबंधी अशुद्धियाँ	Game Based Learning	T1, P.2 CH-2 PG 101-136
04	पारिभाषिक शब्दावली	मुहावरे और लोकोक्तियाँ	Group Learning and Teaching	T1,P. 2/CH-3 PG No.174 ,180,210, 214
05	संस्कृत और हिंदी में आम बोलचाल के प्रयोग में अन्तर समझ सकेंगे	तत्सम और तद्भव शब्द	Peer teaching	T1,P.1 /CH-1 PG No.12-13
06	पल्लवन में व्याख्या कर सकेंगे i	पल्लवन	Group Learning and Teaching.	T1, P.2/ CH-1 PG No. 31-39
07	शब्दों के अर्थ और विपरीत अर्थ समझ सकेंगे	समानार्थी शब्द, विरुद्धार्थी शब्द	Group Learning and Teaching.	T1,P.1 /CH-1 PG No.121-129
08	विषय के निश्चित क्षेत्र में उपयोग में आने वाले शब्द	पारिभाषिक शब्दावली,	Group Learning and Teaching.	T1,P. 2/CH-3 PG No.69-78
09	पदनाम	हिंदी में पदनाम	Game Based Learning	T1,P. 2/CH-3 PG No.205-209
10	व्याकरण में रस के प्रकार और अलंकार को समझ सकेंगे	रस ,अलंकार	Group Learning and Teaching.+ Game Based Learning	T1, P.1 CH-1 PG No.1 &24
11	समास प्रकार ,और उपयोग के बारे में जानेंगे	समास	Group Learning and Teaching.	T1, P.1 CH-1 PG No.1 &24
12	क्रमशः	समास	Group Learning and Teaching	T1, P.1 CH-1 PG No.1 &24

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology Based Learning d. Peer Teaching e. Project Based Learning	Reference (chapter/sec./Page Nos of Text/Ref. Books)
13	अपठित गद्यांश का महत्त्व समझेंगे	अपठित गद्यांश	Group Learning and Teaching.	T1, P.2/ CH-1 PG No. 211-214\
14	समश्रुत शब्द	समश्रुत शब्द	Group Learning and Teaching	T1, P.2/ CH-1 PG No. 147--158\
15	संधि और संधि के प्रकारों का ज्ञान प्राप्त होगा	संधि	Group Learning and Teaching	T1, P.1 CH-1 PG No.1 &24
	विभिन्न आवेदन पत्र एवं पत्र लिखने की समझ प्राप्त कर सकेंगे	पत्र लेखन पत्राचार (i)	Group Learning and Teaching.	T1-P.3,/CH-3 PG No. 237-242
17	विभिन्न आवेदन पत्र एवं पत्र लिखने की समझ प्राप्त कर सकेंगे	पत्र लेखन पत्राचार (II)	Group Learning and Teaching.	T1-P.3,/CH-3 PG No. 237-242
18	विशेषण,क्रिया विशेषणकी परिभाषा प्रकार , और उपयोग समझ सकेंगे	विशेषण,क्रिया विशेषण	Group Learning and Teaching.	T-1P.3,/CH- 3 PG No. 249-256
19	Doubt Clearing Session	All Course Content	(Group discussion) Group Learning and Teaching.	
20	बाल मनोविज्ञान पर आधारित कहानी से मानवीय संवेग मुखरित होंगे.	ईदगाह-मुंशी प्रेमचंद	Group Learning and Teaching.	T1-P.3,/CH-3 PG No. 49-53
21	Revision	All syllabus	Group Learning and Teaching.	

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology Based Learning d. Peer Teaching e. Project Based Learning	Reference (chapter/sec./Page Nos of Text/Ref. Books)
22	Discussion	Problems	Group Learning and Teaching.	

Evaluation Scheme:

Student evaluation is based on the series of Tests and Lab Tests conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	10	18-02-2025	1-08	CB
Test 2	60 Minutes	10	08-04-2025	09-12	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	13-22	CB
Comprehensive Exam	3 Hours	70	09-05-2025	1-22	CB

** To be announced in the class CB= Close Book Exam OB= Open Book

Make-up Policy: Make –up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc

Date: 07/01/2025

Dr.JAYA SINGH
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
Second Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
SCS122	**Soft Skills**	**3**	**2**	**0**	**4**

Instructor-in-charge: Dr.SHUBHRA TIWARI

Learning Objectives:

After successful completion of the course, the student will be able to:

1. Get an enriching experience with the help of soft skills
2. Develop positive attitude.
3. Learn about communication theories.
4. Learn about the concepts of group discussion and resume writing.
5. Acquire proficiency in public speaking

Text Book T1	K.Alex
Reference Book R1	Personality Development and Soft Skills by Barun.K.Mitra
Reference Book R2	ICFAI institutional Material
Reference Book R3	Enhancing Employability Connecting Campus With Corporate by M S Rao, Dreamtech Press
Website Link	www.slideshare.com, many you-tube channels as per topic

Lecture-Wise-Plan:

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference (Chapter/Sec. /Page Nos. of Text/Ref. Books)
01	Positive Attitude	Introduction to Attitude: Definition, features, and importance of attitude.	a. Group Learning and Teaching.	T1,R1, R2, R3

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference (Chapter/Sec. /Page Nos. of Text/Ref. Books)
02	Positive Attitude	Formation of Attitudes: Factors influencing attitude development.	b. Peer teaching	T1,R1, R2, R3
03	Positive Attitude	Psychological Factors Affecting Attitudes: Understanding mindset and its role.	a. Group Learning and Teaching	T1,R1, R2, R3
04	Positive Attitude	Power of Positive Attitude: Impact on personal and professional life.	Technology based learning	T1,R1, R2, R3
05	Positive Attitude	Benefits of Positive Attitude: Success stories and real-life examples.	a. Group Learning and Teaching	T1,R1, R2, R3
06	Positive Attitude	Activity: Group discussion or case study on the benefits of positive attitude.	a. Group Learning and Teaching	T1,R1, R2, R3

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference (Chapter/Sec. /Page Nos. of Text/Ref. Books)
07	Goal Setting	Introduction to Goal Setting: Definition and significance.	Group Learning and Teaching	T1,R1, R2, R3
08	Goal Setting	Types of Goals: Short-term, long-term, and life goals.	a. Group Learning and Teaching	T1,R1, R2, R3
09	Goal Setting	SMART Goals: Framework and practical examples.	b. Technology based Learning.	T1,R1, R2, R3
10	Goal Setting	Career Goals: Importance and alignment with personal growth.	b. Technology based Learning.	T1,R1, R2, R3
11	Goal Setting	Benefits of Goal Setting: Personal motivation and productivity.	a. Group Learning and Teaching	T1,R1, R2, R3

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference (Chapter/Sec. /Page Nos. of Text/Ref. Books)
12	Goal Setting	Techniques for Setting Goals: Steps to create actionable plans.	Group Learning and Teaching	T1,R1, R2, R3
13	Goal Setting	Common Barriers to Achieving Goals: Challenges and solutions.	a. Group Learning and Teaching	T1,R1, R2, R3
14	Goal Setting	Activity: Workshop on creating SMART career goals.	a. Group Learning and Teaching	T1,R1, R2, R3
15	Communication Skills	Types of Communication: Verbal, non-verbal, and written communication.	Game based learning	T1,R1, R2, R3
16	Communication Skills	Barriers to Effective Communication: Causes and remedies.	Game and technology based	T1,R1, R2, R3

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference (Chapter/Sec. /Page Nos. of Text/Ref. Books)
17	Communication Skills	Listening Skills: Importance and techniques for active listening.	Game and technology based	T1,R1, R2, R3
18	Communication Skills	Tone of Voice: Role in effective communication.	Game and technology based	T1,R1, R2, R3
19	Communication Skills	Effective Speaking: Tips for clarity and confidence.	Technology based	T1,R1, R2, R3
20	Communication Skills	Professional Communication: Workplace-specific communication.	Case based & technology based	T1,R1, R2, R3
21	Communication Skills	Body Language: Role of gestures, posture, and expressions.	b. Technology based Learning.	T1,R1, R2, R3

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference (Chapter/Sec. /Page Nos. of Text/Ref. Books)
22	Communication Skills	Overcoming Barriers: Practice exercises and strategies.	Peer and group learning	T1,R1, R2, R3
23	Communication Skills	Interpersonal Communication: Building relationships through communication.	Game based	T1,R1, R2, R3
24	Communication Skills	Activity: Role-playing scenarios to practice communication skills.	Game based	T1,R1, R2, R3
25	Vocabulary Enrichment	Introduction to Vocabulary: Importance in personal and professional life.	a. Group Learning and Teaching	T1,R1, R2, R3
26	Vocabulary Enrichment	Word Formation: Prefixes and suffixes.		T1,R1, R2, R3

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference (Chapter/Sec. /Page Nos. of Text/Ref. Books)
27	Vocabulary Enrichment	Compound Words: Types and examples.	a. Group Learning and Teaching	T1,R1, R2, R3
28	Vocabulary Enrichment	Oral Presentations: Key techniques and components.		T1,R1, R2, R3
29	Vocabulary Enrichment	Self-Introduction: Structuring and delivering an effective self-introduction.		T1,R1, R2, R3
30	Vocabulary Enrichment	Describing a Person: Using appropriate vocabulary and tone.	a. Group Learning and Teachi	T1,R1, R2, R3
31	Vocabulary Enrichment	Welcome Speech: Structure, examples, and delivery tips.	Technology based Learning	T1,R1, R2, R3

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference (Chapter/Sec. /Page Nos. of Text/Ref. Books)
32	Vocabulary Enrichment	Vote of Thanks: Writing and delivering with impact.	a. Group Learning and Teaching	T1,R1, R2, R3
33	Vocabulary Enrichment	Practice Session: Oral presentation on any topic.	a. Group Learning and Teaching	T1,R1, R2, R3
34	Vocabulary Enrichment	Activity: Group task for vocabulary building and public speaking.	Peer learning	T1,R1, R2, R3
35	Résumé Writing	Introduction to Résumé Writing: Definition, importance, and types of résumés.	b. Technology based Learning.	T1,R1, R2, R3

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference (Chapter/Sec. /Page Nos. of Text/Ref. Books)
36	Résumé Writing	Key Elements of a Résumé: Personal information, objective, and skills.	b. Technology based Learning. Group learning	T1,R1, R2, R3
37	Résumé Writing	How a Résumé Works for You: Its role in employability.	b. Technology based Learning.	T1,R1, R2, R3
38	Résumé Writing	Résumé Writing Tips: Dos and don’ts, tailoring for specific jobs.		T1,R1, R2, R3
39	Résumé Writing	Sample Résumés: Analysis of good and bad examples.	a. Group Learning and Teaching	T1,R1, R2, R3
40	Résumé Writing	Activity: Writing and reviewing a sample résumé.		T1,R1, R2, R3

Evaluation Scheme:

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Date: 10/01/2025

Dr.SHUBHRA TIWARI
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
Second Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
SCG102	**Introduction to Public Administration**	**3**	**0**	**1**	**4**

Instructor-in-charge: Mr.PRAVEEN VAISHANAV (VF)

Learning Objectives:
Students after the completion of the course will be able to-

1. Develop a better understanding of actual working of the public admonition along with its theoretical underpinnings and practices.
2. Demonstrate analytical prowess to grasp the issues and concerns of administration and public
3. Develop skills and aptitude to led and manage the pubic and non-profit organization
4. Discuss, debate and communicate effectively on any issues concerning administration politics and society
5. Be able to contribute/develop/formulate a public policy response to social or economic problems

Text Book T1	B.L Dadia/ Sahitya Bhavan
Reference Book R1	Public Administration M Laxmikant/ Mc Graw Hill
Reference Book R2	Awasthi & Maheshwari/ Lakshmi Narain Agarwal

Lecture-Wise-Plan:

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology d. Peer Teaching e. Project Based Learning	Reference (Chapter/Sec. /Page Nos. of Text/Ref. Books)
1-4	Introduction of Public Administration as a discipline	Nature and scope of Public Administration	Group Learning and Teaching	T l Ch-l 1-5
5-8	Characteristics of Discipline	Characteristics and scope	Technology based Learning	T1 Ch-1 6-9

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology d. Peer Teaching e. Project Based Learning	Reference (Chapter/Sec. /Page Nos. of Text/Ref. Books)
9-10	Different Views of Public Administration	POSDCORB view,Managerial view	Technology based Learning	T1 Ch-1 10-20
11-12	Importance of Public Administration	Role of Public Administration in modern state	Group Learning and Teaching	T1 Ch-2 22-27
13-15	Public and Private Administration	Similarities and dissimilarities	Group Learning and Teaching	T1 Ch-4 38-45
16-19	Organisation and its Structure	Meaning,importance,types of organization,Basis of Organisation	Group Learning and Teaching	T2 ch-2 62-65
20-24	Organisation and its Structure istration	Line,Staff,Auxiliary and Chief Executive	Group Learning and Teaching	T2 ch2 81-90
25-29	Principles of Organisation	Important principles of Organisation like Hierarchy, Unity of Command, span of control ,coordination, supervision etc	Group Learning and Teaching	T3 Ch-13 122-153
30-32	Administrative Approaches	Classical Approach	Technology based Learning	T-3 Ch-12 95-99
33-34	Administrative Approaches	Buraeucratic Approach(Weber)	Group Learning and Teaching	T-3 Ch-12 104-106
35-38	Administrative Approaches	Scientific Management(Taylor)	Group Learning and Teaching	T-3 Ch-12 103-104
39-40	Administrative Approaches	Human Relations (Mayo)	Technology based Learning	T-3 Ch-12 107-110

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology d. Peer Teaching e. Project Based Learning	Reference (Chapter/Sec. /Page Nos. of Text/Ref. Books)
41-42	Administrative Approaches	Behavioural Approach	Group Learning and Teaching	T-3 Ch-12 110-111
43-45	Administrative Approaches	System Approach, Ecological Approach	Technology based Learning	T-3 Ch-12 112-116

Evaluation Scheme:

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Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	10	19-02-2025	1-10	CB
Test 2	60 Minutes	10	09-04-2025	11-20	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	14-05-2025	1- 45	CB

** To be announced in the class CB= Close Book Exam OB= Open Book

Make-up Policy: Make –up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc

Date: 07/01/2025

Mr.PRAVEEN VAISHNAV
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
Second Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
SC220	**Environmental Studies**	**3**	**0**	**0**	**3**

Instructor-in-charge: Ms.YUKTI DEWANGAN

Learning Outcomes:

1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.
2. To describe the challenges of maintaining Soil quality and solid waste Management
3. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.
4. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.
5. Understanding of earth processes, evaluating alternative energy systems, pollution control and mitigation, natural resource management, and the effects of global warming and climate change.

Textbook T1	Principles of Environmental Science and Engineering, P. VenugopalaRao PHI Learning private limited, Publication)
Text Book T2	A Textbook of Environmental Chemistry and Pollution Control by S.S. Dara (S. Chand and Company)
Reference Book R1	Masters, G.M. Introduction to Environment Engineering and Science (Prentice Hall of India)
Reference Book R2	Environmental Chemistry by A.K. Dey (Eastern Ltd.).
Reference Book R3	Environmental Chemistry by B.K. Sharma (Krishna Prakashan).

Lecture-Wise-Plan:

Lecture Nos.	Learning objectives	Topics to be covered	Teaching Learning Strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference (Ch./Sec. / Page Nos.of Text Book)
1-3	Observe and describe habitats within ecosystems	Definition Characteristics of Ecosystem: Structure of Ecosystem	Group Learning and Teaching	T1:40-44
4-6		Function of ecosystem, Food chain, Food web, Trophic level, Energy flow, ecological pyramids.	Technology based Learning	T1: 46-54
7-9		Types of ecosystems: Aquatic ecosystems Terrestrial ecosystems	Technology based Learning	T1:59-71
10-11	To describe the challenges of maintaining Soil quality	Land Pollution, Lithosphere, pollutants	Technology based Learning	T2 110-120
12-18		Pollutants & their origin and effect, collection of solid waste Solid waste management, recycling and reuse of solid waste and their disposal techniques (open dumping, sanitary land filling, thermal, composting).	Peer teaching Peer teaching	T2: 132-147

Lecture Nos.	Learning objectives	Topics to be covered	Teaching Learning Strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference (Ch./Sec. / Page Nos.of Text Book)
19-21	To describe the challenges of maintaining surface and ground water quality.	Aquatic Environment, water pollutants, Eutrophication.	Peer teaching	R2: 201-220
22-25		Chemical Speciation, monitoring techniques and methodology	Technology based Learning	R2: 12.11.1 - 12.11.12
26-27		Determination of temporary and permanent hardness of water	Technology based Learning	T1: 251-252
28-30		Waste water treatment	Technology based Learning	T1: 153-162
31-33	To understand the sources of	Introduction- definition-classification of air pollutants- air quality standards.	Group Learning and Teaching	T1: 125-131

Evaluation Scheme:

Student evaluation is based on the series of Tests and Lab Tests conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	10	17-02-2025	1-18	CB
Test 2	60 Minutes	10	07-04-2025	19-37	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	01-05-2025	1- 40	CB

** To be announced in the class CB= Close Book Exam OB= Open Book

Make-up Policy: Make –up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc

Date: 10/01/2025

Ms.YUKTI DEWANGAN
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
Second Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
SC221	**Magnetism and Electromagnetic Theory**	**3**	**2**	**0**	**4**

Instructor-in-charge: Dr.SHRUTIKA TIWARI

Learning Outcomes:

1. The objective of this course is to make the students understand the basic magnetism and way to analyse them
2. It also introduce the concept of electromagnetic theory and their applications using mathematical treatment.
3. This course forms the basis for understanding the subsequent courses in science stream

Text Book (T1)	Electromagnetic field theory and transmission lines by GNS Raju (personal Publication)
Text Book (T2)	Electricity and Magnetism by R. Murugrshan.
Reference Book(s) R1	Physics for degree students (BSc 1st) by CL Arora and PS Humne (S Chand)
Reference Book(s) R2	Physics for degree students (BSc 1st) Unified (By R. P. Goyal)
Reference Book(s) R3	Element of electromagnetic fields by SP seth

Lecture-Wise-Plan:

Lecture Nos.	**Learning Objective**	**Topics to be covered**	**Teaching Learning Strategies:** **a. Teaching & Group Discussion** **b. Interactive Demonstrations** **c. Experimental & Hands-on Approaches** **d. Peer Assessment**	**Reference**
1-2	To learn basic of magnetic field.	Concept of electromagnetic field, lenz's law.	Teaching & Group Discussion	T2 1-5

Lecture Nos.	Learning Objective	Topics to be covered	Teaching Learning Strategies: a. Teaching & Group Discussion b. Interactive Demonstrations c. Experimental & Hands-on Approaches d. Peer Assessment	Reference
3-6	To cover magnetic field due to current carrying conductor.	Biot savart law and its application to current carrying circular loop. Ampere's circuital law and its application to infantly long straight wire, straight and toroidal solenoids.	Teaching & Group Discussion	T2 237-248 R2 781-791
7-8	Understanding the concept behind force due to magnetic field or moving charge.	Force on a moving charge in uniform magnetic and electric fields.	Peer Assessment	T2 4-5 R2 761
9-10	Learning about various aspects of current carrying conductors.	Current loop as a magnetic dipole and its magnetic dipole moment.	Teaching & Group Discussion	T2 267-273 R2 766-767

Lecture Nos.	Learning Objective	Topics to be covered	Teaching Learning Strategies: a. Teaching & Group Discussion b. Interactive Demonstrations c. Experimental & Hands-on Approaches d. Peer Assessment	Reference
11-15	Understanding magnetic dipole.	Magnetic dipole moment of a revolving electron magnetic field intensity due to magnetic dipole (bar magnet) along its axis and perpendicular to its axis.	Teaching & Group Discussion	Digital Notes
16-18	Learning about the force couple responsible for rotatory motion.	Torque on the magnetic dipole (bar magnet) in a uniform magnetic field; bar magnet is an equivalent solenoid.	Teaching & Group Discussion	Digital Notes
19-21	Covering the properties of magnetic materials.	Magnetic field lines para, dia, and ferro magnetic substance with examples.	Peer Assessment	T2 381-389
22-24	Understanding basics of electrostatics.	Basic concepts of electrostatics, Gauss's law and its application.	Teaching & Group Discussion	T2 30-52

Lecture Nos.	Learning Objective	Topics to be covered	Teaching Learning Strategies: a. Teaching & Group Discussion b. Interactive Demonstrations c. Experimental & Hands-on Approaches d. Peer Assessment	Reference
25-27	Learning basics coordinate system.	Fundamentals of the coordinate system.	Teaching & Group Discussion	Digital Notes
28-29	Understanding basics of vector algebra.	Elementary idea of gradient divergence and curl, electromagnetic waves.	Teaching & Group Discussion	T2 19-27
30-32	Understanding basics of EMF.	Equation of continuity for time varying fields.	Teaching & Group Discussion	Digital Notes
33	Combination variation rules related to EMF.	Maxwell's equation for time varying fields.	Teaching & Group Discussion	T2 415-420 R2 847-851

Lecture Nos.	Learning Objective	Topics to be covered	Teaching Learning Strategies: a. Teaching & Group Discussion b. Interactive Demonstrations c. Experimental & Hands-on Approaches d. Peer Assessment	Reference
34-35	Learning various of Maxwell's equation.	Differential form of Maxwell's equation integral form of Maxwell equations.	Teaching & Group Discussion	
36-37	Convert in Maxwell's equation from one to another.	Conversion form differential form of Maxwell's equation to integral form.	Peer Assessment	
38-40	Covering various situation for Maxwell's equation.	Maxwell equation for static field characteristic of static field and Maxwell equation for static field, Maxwell equation for free space characterized to free space and Maxwell equation for free space and static field.	Teaching & Group Discussion	Digital Notes

Name of Experiment:

S.No	Name of Experiment
1	To study the variation of magnetic field with distance along the axis of circular coil carrying current
2	To determine the hall voltage developed across the sample material (VL)
3	To draw the static current voltage (I-V) characteristics of a junction diode. (VL)
4	To verify Newton's law of cooling of different materials and different liquids (VL)
5	To study magnetic field along the axis of current-carrying coil Stewart and Gee's method.
6	To find the value of Planck's Constant using photocell.
7	To find the value e/m using Thomson's method
8	To study the AC wave from using CRO

Evaluation Scheme:

Student evaluation is based on the series of Tests and Lab Tests conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	10	17-02-2025	1-20	CB
Test 2	60 Minutes	10	07-04-2025	21-40	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	05-05-2025	1- 40	CB

** To be announced in the class CB= Close Book Exam OB= Open Book

Make-up Policy: Make –up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc

Date: 08/01/2025

Dr.SHRUTIKA TIWARI
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
Second Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
SC222	**Organic Chemistry**	**3**	**2**	**0**	**4**

Instructor-in-charge: Dr.PIYUSH KUMAR THAKUR

Learning Outcomes:

1. The students can predict and account for the most commonly encountered reaction mechanisms in organic chemistry.
2. Learn to recognize the alcohol, phenol, and ether functional groups.
3. Recognize the physical and chemical properties of for aldehydes and ketones.
4. Recognize the general structures of carboxylic acids, acyl halides, acid anhydrides, esters and amides.
5. To interpret the concept of aromaticity and the main properties of aromatic compounds.

Text Books T1	Organic chemsirty, R. T. Morrison, R. N. Boyd, sixth edition, pearson education.
Text Book T2	Organic Chemistry Reactions and Reagents, O.P. Agrawal, Goel publishing House.
Reference Book R1	Organic Chemistry, Francis A. Carey, seventh Edition, The McGraw-Hill , 2008.
Reference Book R2	Organic Chemistry, P.Y. Bruice, Third edition, Pearson Education.
Reference Book R3	March's Advanced organic chemistry, M. B. Smith, eighth edition, weily.

Lecture-Wise-Plan:

Lecture No.	Learning Objective	Topics to be covered	Teaching Learning Strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference
1-2		Homolytic & heterolytic bond breaking, types of	Group Learning and Teaching	R3 279-283

Lecture No.	Learning Objective	Topics to be covered	Teaching Learning Strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference
	To understand different types reaction mechanisms in organic chemistry.	reagents-electrophones & nucleophiles. Types of organic reactions.		
3-4		Reactive Intermediates-carbocations, carbanions, free radicals, carbenes, arynes and nitrenes	Technology based Learning	R3 223-276
5-6		Alkyl halides: Methods of preparation, Nucleophilic aliphatic substitution reactions, SN2 Reaction, Stereochemistry, SN1 Reaction	Group Learning and Teaching	R3 404-418
7-8		Relative stability of carbocations, SN2 Vs SN1, Elimination reactions, E2 mechanism, E1 mechanism, Electrophilic addition reaction.	Group Learning and Teaching	T1 330-346
9-10	To Explain and predict the important physical and Chemical properties of the alcohols, phenols, and ethers.	Alcohols: preparation, properties and relative reactivity of 1° , 2°, 3° alcohols, Bouvaelt-Blanc Reduction; Preparation and properties of glycols Pinacol-Pinacolone rearrangement	Group Learning and Teaching	R1 621-640

Lecture No.	Learning Objective	Topics to be covered	Teaching Learning Strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference
11-13		Phenols: Preparation and properties; Acidity and factors effecting it, Ring substitution reactions, Reimer–Tiemann and Kolbe's–Schmidt Reactions, Fries and Claisen rearrangements with mechanism.	Technology based Learning	T1 925-948
14-16		Ethers and Epoxides: Preparation and reactions with acids. Reactions of epoxides with alcohols, ammonia derivatives and LiAlH4	Group Learning and Teaching	R1 602-668
17	To understand the physical and chemical properties of for aldehydes and ketones.	Structure, reactivity and preparation; Nucleophilic additions	Technology based Learning	R1 701-714
18		Nucleophilic addition-elimination reactions with ammonia derivatives with mechanism	Technology based Learning	T1 693-697

Lecture No.	Learning Objective	Topics to be covered	Teaching Learning Strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference
19-24	To understand the specific naming reaction and their mechanism	Aldol and Benzoin condensation, Knoevenagel condensation, Claisan-Schmidt, Perkin, Cannizzaro and Wittig reaction, Beckmann and Benzil-Benzilic acid rearrangements, haloform reaction and Baeyer Villiger oxidation.	Group Learning and Teaching	T2 514-564
25-28	To understand the general structures of carboxylic acids, acyl halides, acid anhydrides, esters and amides.	Preparation, physical properties and reactions of monocarboxylic acids: Typical reactions of dicarboxylic acids, hydroxy acids and unsaturated acids: succinic/phthalic, lactic, malic, tartaric, citric, maleic and fumaric acids	Group Learning and Teaching	R1 791-815
29-32		Preparation and reactions of acid chlorides, anhydrides, esters and amides; Comparative study of nucleophilicsustitution at acyl group - Mechanism of acidic and alkaline hydrolysis of esters, Claisen condensation, Dieckmann and Reformatsky reactions, Hofmannbr	Peer teaching Peer teaching	R1 830-857

Lecture No.	Learning Objective	Topics to be covered	Teaching Learning Strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference
33-37	Know the properties of aromatic and antiaromatic compounds, and the chemical consequences of aromaticity.	Nomenclature of benzene derivatives. structure of benzene: molecular formula and Kekule&Dewar structure. Stability and carbon-carbon bond lengths of benzene, resonance structure, MO picture.	Project based Learning	T1 529-544
38-39		**Aromaticity:** The Huckel rule.	Project based Learning	R2 602-609
40-42		**Aromatic electrophilic substitution**-General reaction mechanism, Mechanism of nitration, halogenation, sulphonation, mercuration and Fiedel-Crafts reaction. Energy profile diagrams. Activating and deactivating substituents, orientation and ortho/para ratio. Side chain reactions of benzene derivatives. Birch reduction.	Technology based Learning	T1 553-581

Chemistry II-Lab (Including Virtual Lab (VL)

S. No	Name of the Experiment
1	Systematically identify the functional groups in the given organic compound and perform the confirmatory tests after identifying the functional groups.
2	Preparation of phenol formaldehyde resin. (Bakelite)
3	Preparing Phenol - Formaldehyde (PF) resin.
4	Preparing Urea-Formaldehyde (UF) resin.
5	Isolation and Quantification of Lycopene from Tomato.
6	Preparation of acetanilide from aniline
7	Preparation of phthalimide from phthalic anhydride.
8	To determine the amount of aspirin in the whole of the given solution (VL)
9	To estimate the amount of glucose in the whole of the given solution. (VL)
10	Preparation of p-nitroacetanilide from acetanilide.

** Experiment may be change based on availability of chemicals

Evaluation Scheme:

Student evaluation is based on the series of Tests and Lab Tests conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	10	18-02-2025	01-15	CB
Test 2	60 Minutes	10	08-04-2025	16-36	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	**	CB
Comprehensive Exam	3 Hours	70	05-05-2025	01-42	CB

** To be announced in the class CB= Close Book Exam OB= Open Book

Make-up Policy: Make –up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc

Date: 10/01/2025

Dr.PIYUSH KUMAR THAKUR
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
Second Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
SC223	**Mathematics IV (Group Theory)**	**3**	**0**	**1**	**4**

Instructor-in-charge: Dr.SHANIT SWARUP DUBEY

Learning Outcomes:
After successful completion of the course student will be able to-

1. Get idea on concept and examples of groups and their properties.
2. Understands cyclic groups, permutation groups, normal subgroups and related results.
3. Opt for courses in ring theory, field theory, commutative algebras, linear classical groups etc. and can be apply this knowledge to problems in physics, computer science, economics and engineering.

Text Book (T)	Joseph A. Gallian (2017). Contemporary Abstract Algebra (9th edition). Cengage.
Reference Book(s)	Ramji Lal (2017). Algebra 1: Groups, Rings, Fields and Arithmetic. Springer.
Reference Book(s)	Abstract Algebra (H.K. Pathak)

Lecture-Wise-Plan:

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference (chapter/sec. /Page Nos of Text/Ref. Books)
1-5	Group structure and Various types of Groups	Groups and its Elementary Properties Symmetries of a square, Definition and examples of groups including	a. Group Learning and Teaching.	Ch-1,2/31-54/T

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference (chapter/sec. /Page Nos of Text/Ref. Books)
		dihedral, permutation and quaternion groups, Elementary properties of groups.		
6-11	Subgroup, Cyclic gruop	Subgroups and Cyclic Groups Subgroups and examples of subgroups, Cyclic groups, Properties of cyclic groups, Lagrange's theorem, Euler phi function, Euler's theorem, Fermat's little theorem.	b. Technology based Learning.	Ch-3,4/60-95/T
12-16	Normal Subgroups , Simple group, Factor group	Normal Subgroups Properties of cosets, Normal subgroups, Simple groups, Factor groups, Cauchy's theorem for finite abelian groups;	a. Group Learning and Teaching	Ch-9/185-200/T

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference (chapter/sec. /Page Nos of Text/Ref. Books)
17-21	Centre of group	Centralizer, Normalizer, Center of a group, Product of two subgroups; Classification of subgroups of cyclic groups.		
22-27	Permutation Groups	Permutation Groups Cycle notation for permutations, Properties of permutations, Even and odd permutations, alternating groups, Cayley's theorem and its applications.	a. Group Learning and Teaching	Ch-5/99-118/T
28-33	Group Homomorphism	Group Homomorphisms, Rings and Fields Group homomorphisms, Properties of homomorphisms,	a. Group Learning and Teaching	Ch-10/208-219/T

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference (chapter/sec. /Page Nos of Text/Ref. Books)
34-40	Group Isomorphism, Ring ,Field.	Group isomorphisms, Properties of isomorphisms; First, second and third isomorphism theorems for groups; Definitions and elementary properties of rings and fields.	b. Technology based Learning.	Ch-6/127-138/T Ch-12/245-250/T Ch-19/349-355/T

Evaluation Scheme:

Student evaluation is based on the series of Tests and Lab Tests conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	10	18-02-2025	1-11	CB
Test 2	60 Minutes	10	08-04-2025	12-27	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	09-05-2025	1- 42	CB

** To be announced in the class CB= Close Book Exam OB= Open Book

Make-up Policy: Make –up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc

Date: 07/01/2025

Dr.SHANTI SWARUP DUBEY
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
Second Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
SC224	**Operating System**	**3**	**2**	**0**	**4**

Instructor-in-charge: Dr.PALAK KESHWANI

Learning Outcomes:
After successful completion of the course student will be able to:

1. To understand the basic concepts and functions of operating systems
2. To understand process and Threads
3. To analyse Scheduling algorithms
4. To understand the concept of Deadlocks
5. To analyse various memory management schemes
6. To understand I/O management and File Systems

Text Book T1	Operating System Concepts, Silberschatz A and Galvin, P.B 7th Edition, Addison, Wesley, 1998
Text Book T2	Operating Systems- A Concept bases approach, Dhamdhere D.M. 2nd Edition TMH? 2006
Reference Book R1	Operating Systems, Stallings W, 4the Edition, PHI, 2001
Reference Book R2	The Design of the Unix Operating System, Bach, M J, PHI, 1986
Reference Book R3	Odern Operating Systems, Tanebaum, A.S. Phi, 1996

Lecture-Wise-Plan:

Lecture No	Learning Objective	Topics to be Covered	Teaching Learning Strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology Based Learning d. Peer Teaching e. Project Based Learning	Reference (Ch./Sec./ Page No. of Text Book)
1	To understand operating system, functions and its types	Overview	a. Group Learning and Teaching	T1 CH-1

Lecture No	Learning Objective	Topics to be Covered	Teaching Learning Strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology Based Learning d. Peer Teaching e. Project Based Learning	Reference (Ch./Sec./ Page No. of Text Book)
2	To understand operating system, functions and its types	Operation System Objectives and functions	a. Group Learning and Teaching	T1 CH-1
3		The Evolution of operating Systems		T1 CH-1
4		Batch, Interactive time sharing and real time sharing and real systems		T1 CH1
5		Operating System Structure, Operating System Service		T1 CH3
6	To understand the concept of Process and its various states	Process overview (State, PCB)		T1 CH4
7-8		Process Scheduling		T1 CH4
9		Threads		T1 CH5
10		Inter Process Communication(IPC)		T1 CH5
11	To know what is scheduling and its importance	CPU Scheduling Overview	a. Group Learning and Teaching	T1 CH6
12-13		Scheduling Algorithms		T1 CH6
14	To understand the problem of Critical Section and its solution	Classical Problems of Synchronization	c. Technology Based Learning	T1 CH7
15		Multi Process Solution		

Lecture No	Learning Objective	Topics to be Covered	Teaching Learning Strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology Based Learning d. Peer Teaching e. Project Based Learning	Reference (Ch./Sec./ Page No. of Text Book)
16		Semaphores		
17		Classical Problems of Synchronization		
18-20	To know what is deadlock and its handling	Deadlock Handling	a. Group Learning and Teaching	T1 CH-8
21	To understand various memory management schemes and their relative advantages and disadvantages	Memory Management Overview	a. Group Learning and Teaching	T1 CH-9
22-23		Paging		T1 CH-9
24		Segmentation		T1 CH-9
25		Segmentation with Paging		T1 CH-9
26		Virtual Memory	a. Group Learning and Teaching	T1 CH-10
27		Demand Paging		T1 CH-10
28		Page Replacement		T1 CH-10
29		Page Replacement Algorithms		T1 CH-10
30		Thrashing		T1 CH-10

Lecture No	Learning Objective	Topics to be Covered	Teaching Learning Strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology Based Learning d. Peer Teaching e. Project Based Learning	Reference (Ch./Sec./ Page No. of Text Book)
31	To understand concept of files and brief introduction to distributive O.S	File Operations	a. Group Learning and Teaching	T1 CH-11
32-33		Directory and File system Structure		T1 CH-11
34-35		Allocation Methods,		T1 CH-12
36-38		Disk Scheduling		T1 CH-12
39-40		Types, features and uses of distributive O.S		T1 CH-12

Evaluation Scheme:

Student evaluation is based on the series of Tests and Lab Tests conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	10	18-02-2025	1-13	CB
Test 2	60 Minutes	10	08-04-2025	14-30	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	07-05-2025	1- 40	CB

** To be announced in the class CB= Close Book Exam OB= Open Book

Make-up Policy: Make –up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc

Date: 07/01/2025

Dr.PALAK KESHWANI
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
Second Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
SC225	**Cell Biology and Development**	**3**	**2**	**0**	**4**

Instructor-in-charge: Ms.KAJAL SAHU

Learning Outcomes:

1. Explain the basic structure and functional unit of life
2. Understand the difference between Prokaryotic and Eukaryotic System
3. Structure and Function of different cell organelles with cell Division
4. Explain the Development of multicellular organism from a single cell Zygote
5. Explain various Embryonic Development of Vertebrates

Text Book T1	Unified Zoology by V. K. Tiwari. Navboadh Publication
Text Book T2	Unified Zoology by H.N. Baijal, Navboadh Publication.
Text Book T3	Developmental biology by P.C. Jain.7th edition, Vishal Publishing Co.
Text Book T4	Cell biology – C.B. Powar, Himalaya Publication.
Reference Book R1	Karp Cell Biology by Gerald Karp, Janet Iwasa, Wallace Marshall, Wiley Publishing.
Reference Book R2	Gilbert S.F. (2016) Developmental Biology (11th edition)

Lecture-Wise-Plan:

Lecture Topic	Learning Objectives	Topics to be Covered	Teaching Learning Strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology Based Learning d. Peer Teaching e. Project Based Learning	Reference (Ch/Sec/Page/ No of Text Book
1-2	Study of Cell Structure organelles and their function	Cell : History of cell biology, Cell theory, Cell Prokaryotic and Eukaryotic Cell	a. Group Learning and Teaching	T 709-812

Lecture Topic	Learning Objectives	Topics to be Covered	Teaching Learning Strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology Based Learning d. Peer Teaching e. Project Based Learning	Reference (Ch/Sec/Page/ No of Text Book
3-4	Study of Cell Structure organelles and their function	Structure and Function of Plasma Membrane.	a. Group Learning and Teaching	T 709-812
5-8		Structure and function of Golgi Body, Endoplasmic Reticulum Structure and function of Ribosome, Nucleus, Nucleus		
9-12	Study of Heredity	Structure and Function Of typical Chromosome, Concept of Chromatin and Heterochromatin.	c. Technology based Learning	T2 62-83
13-15		Cell Cycle, Mitosis and Meiosis.	a. Group Learning and Teaching, c. Technology based Learning	T1 813-859
16-19	Study of Gametogenesis, Fertilization, Regeneration	Gametogenesis, Fertilization	a. Group Learning and Teaching,	T1 914-931
20-21		Parthenogenesis	a. Group Learning and Teaching.	T2 540-544

Lecture Topic	Learning Objectives	Topics to be Covered	Teaching Learning Strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology Based Learning d. Peer Teaching e. Project Based Learning	Reference (Ch/Sec/Page/ No of Text Book
22-23	Study of Gametogenesis, Fertilization, Regeneration	Regeneration	a. Group Learning and Teaching.	T2: 947-981
24-25		Cleavage	a. Group Learning and Teaching.	T1 933-937
26-27	Development of Frog	Fate Map Construction	a. Group Learning and Teaching.	T2 122-124
28-29		Development of Frog Upto Formation of Three Germ Layer.	a. Group Learning and Teaching.	T1 939-946
30-31		Characteristic of Organizer and Types of Organizer	c. Technology Based Learning	T1 958-961
32-34	Development of Chick	Cleavage, Blastulation Fate Map Construction	a. Group Learning and Teaching c. Technology Based Learning	T1: 933-965 T1 80-124
35-37		Development of Chick Embryo up to Formation of Primitive Streak.		

Lecture Topic	Learning Objectives	Topics to be Covered	Teaching Learning Strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology Based Learning d. Peer Teaching e. Project Based Learning	Reference (Ch/Sec/Page/ No of Text Book
38-40	Development of Chick	Extra Embryonic Membrane in Chick.	a. Group Learning Teaching	T1: 933-965 T2: 80-124

Evaluation Scheme:

Student evaluation is based on the series of Tests and Lab Tests conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	10	18-02-2025	1-18	CB
Test 2	60 Minutes	10	08-04-2025	19-36	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	**	CB
Comprehensive Exam	3 Hours	70	09-05-2025	1-40	CB

** To be announced in the class CB= Close Book Exam OB= Open Book

Make-up Policy: Make –up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc

Date: 07/01/2025

Ms.Kajal Sahu
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
Second Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
HSC221	**Physics H2 Basic Material Science**	**3**	**2**	**0**	**4**

Instructor-in-charge: Dr.ARUN KUMAR SINGH

Learning Objectives:

After Successful completion of the course, the student will be able to:

1. The objective of a Materials science is to predict and control material properties through and understanding of atomic, molecular, crystalline, and microscopic structures of engineering materials.
2. They study the properties of materials in order to better understand them, what they can do, and how they interact with their environment
3. The fundamental aim of materials science and engineering is materials selection enduring required functions and application properties of products, which are manufactured out of them
4. The tasks of that field of science in priority spheres of the world development are determined

Text Book T1	Physics for Degree Students (B.Sc. Third Year) CL Arora and Dr. CP Hemne, S. Chand Publication, First edition
Text Book T2	Unified Physics for Degree Students (B.Sc. Final) Dr. R.P. Goyal
Reference Book R1	A textbook of Engineering Physics MN Avadhanulu and PG Kshirsagar, S. Chand Publication, First edition
Reference Book R2	Spectroscopy H Kaur, Pragati Prakashan (2015)

Lecture-Wise-Plan:

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference (Chapter/Sec./Page Nos. of Text/Ref. Books)
1-7	To characterize different materials	Single crystalline, polycrystalline and amorphous materials, Single crystals: unit cell, Crystal systems, Bravais lattices, Miller indices – inter-planar distances	a. Group Learning and Teaching.	R2 411-412, T1 599-602, T1 617-627
8-20	To understand the geometry of solids with different coordination number	Coordination number and packing factor for SC, BCC, FCC, Crystal imperfections: point defects, line defects and Planner, Defects, Voids, tetrahedral void, octahedral voids	a. Group Learning and Teaching.	T1 777-780, T1 803-809, R1 490-492
21-26	To describe the physical characteristics such as electronic structure and optical and transport properties, and current-voltage characteristics of semiconductors.	Electrical Conduction, Band Theory, Conduction Mechanism, Intrinsic & Extrinsic Semiconductor, Effect Temperature in Semiconductor,	c. Technology based Learning	R1 506-519, R1 527-548, R1-547-549

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference (Chapter/Sec./Page Nos. of Text/Ref. Books)
27-32	To study about the magnetic field	Elementary idea about PN junction diode and BJT, Magnetic field, Strength, Magnetic moments, Magnetization, Magnetism, Magnetic Susceptibility, Magnetic Permeability	a. Group Learning and Teaching	R1 556-654 , 589-600, R1 608-612
33-40	Types of magnetic field and superconductivity	Dia-magnetism, Para- magnetism, Ferro-magnetism, Anti-Ferro-magnetism, Ferri-magnetism, Hysteresis, Hard and Soft magnets, Superconductivity, Bardeen-Cooper-Schrieffer (BCS) Theory, The Meissner effect, Types of Superconductors	a. Group Learning and Teaching	R1 613-640, R1 644-660

Physic II Lab (Including Virtual Lab)

S. No	Name of the Experiment
1	To study and measurement of e/m of an electron by Thomson's method
2	To study and determine the dielectric constant of material
3	To study and determine Band gap of a semiconductor by four probe method
4	To study Hall effect in Semiconductor.
5	To Study of P-N Junction characteristics.
6	To Study of BJT Junction Transistor characteristics.
7	To Study of magnetic hysteresis and plot magnetic hysteresis loop
8	To study various crystals structures. (VL)
9	To precipitate nickel from the solution by adding dimethyl glyoxime.(VL)
10	To determine and separate the constituents like Copper, Zinc, Tin, Lead, and Iron in brass (VL)

Evaluation Scheme:

Student evaluation is based on the series of Tests and Lab Tests conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	10	19-02-2025	1-10	CB
Test 2	60 Minutes	10	09-04-2025	21-40	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	25-40	CB
Comprehensive Exam	3 Hours	70	12-05-2025	1- 40	CB

** To be announced in the class CB= Close Book Exam OB= Open Book

Make-up Policy: Make –up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc

Date: 15/01/2025

Dr.ARUN KUMAR SINGH
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
Second Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
HSC222	**Spectroscopy I**	**3**	**2**	**0**	**4**

Instructor-in-charge: Ms.YUKTI DEWANGAN

Learning Outcomes:

1. To understand the basic principle3s of spectroscopy
2. Recognize spectroscop0y in microwave, Rotational spectra of rigid diatomic molecules, selection rules, interaction of spectral lines
3. Explain Vibration of diatomic molecules, the vibrational spectra of diatomic molecules.
4. Explain working principle, taking spectra ad outline of UV spectroscopy device
5. Understand the physical principles under4alying the NMR phenomenon and realizes the possibilities of NMR spectroscopy in analysing the structures of molecules

Text Book T1	Organic Spectroscopy, William Kemp, Third Edition, Palgrave 1991
Text Book T2	Spectroscopy, H. Kaur, Tenth Edition, Pragati Prakashan 2015.
Reference Book R1	Fundamentals of molecular spectroscopy. Colin N. Banwell and Elaine M. Mccash McGraw-Hill , 2016.
Reference Book R2	Applied Electran Spectroscopy for chemical analysis Ed. H. Windawi and F. I. Willey Interscience.2018

Lecture-Wise-Plan:

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference (Chapter/Sec./Page Nos. of Text/Ref. Books)
1-2	To understand the basic principles of spectroscopy	Unifying Principles: Electromagnetic radiation, interaction of electromagnetic radiation with matter absorption, emission, transmission, reflection, dispersion, polarization and scattering	a. Group Learning and Teaching, c. Technology based Learning	
3-5		Natural line width and natural broadening, transition probability, results of the time dependent perturbation theory, transition moment, selection rules,	c. Technology based Learning	**T2:1-29**
6-7		Intensity of spectral lines. Born-Oppenheimer approximation, rotational, vibration & electronic energy levels.	a. Group Learning and Teaching, c. Technology based Learning	

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference (Chapter/Sec./Page Nos. of Text/Ref. Books)
8-12	To understand the Rotational spectra of rigid diatomic molecules, selection rules, interaction of spectral lines	Microwave Spectroscopy: Classification of molecules, rigid rotor model, effect of isotopic substitution on the transition frequencies, non-rigid rotor, stark effect, nuclear & electron spin interaction and effect of external field. Applications	c. Technology Based Learning	R1:31-52
13-15		Photoelectron Spectroscopy: Basic principles, photo- electric effect, ionization process, Photoelectron spectra of simple molecules. Auger electron spectroscopy – basic idea.	a. Group Learning and Teaching, c. Technology based Learning	T2:636-649

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference (Chapter/Sec./Page Nos. of Text/Ref. Books)
16-18	Study of Vibrating diatomic molecule, energy levels of a diatomic molecule, simple harmonic and an harmonic oscillator.	Infrared Spectroscopy: Review of linear harmonic oscillator, vibrational energies of diatomic molecules	a. Group Learning and Teaching, c. Technology based Learning	T1: 19-27
19-20		Force constant and bond strengths, an harmonicity, Vibration rotational spectroscopy, P, Q, R, Branches.	c. Technology based Learning	T2: 120-130
21-23		Selection rules, normal modes of vibration, group frequencies, overtones, hot bands, factors affecting the band	c. Technology based Learning	T2: 132-159
24-25	Understand the Scattering of light and Raman Spectrum	Raman Spectroscopy: Classical and quantum theories of Raman effect, Selection rules.	d. Peer Teaching	R1: 100-124

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference (Chapter/Sec./Page Nos. of Text/Ref. Books)
26-27	Understand the electronic spectra of diatomic molecules	Molecular Spectroscopy: Energy levels, molecular orbital, vibronic transitions, vibrational progressions and geometry of the excited states	d. Peer Teaching	T2: 258-262
28-29		Frank - Condon principle, electronic spectra of poly atomic molecules and spectra of transition metal complexes	d. Peer Teaching	T2: 263-277
30-31		Charge- transfers spectra, Electronic spectra and application	c. Technology Based Learning	T2: 311-314
32-34	Understands the physical principles underlying the NMR phenomenon and realizes the possibilities of NMR spectroscopy in analyzing	Nuclear Magnetic Resonance Spectroscopy: Nuclear spin resonance, saturation, shielding of magnetic nuclei.	a. Group Learning and Teaching, c. Technology based Learning	T1: 101-155

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference (Chapter/Sec./Page Nos. of Text/Ref. Books)
35-37	Understands the physical principles underlying the NMR phenomenon and realizes the possibilities of NMR spectroscopy in analyzing	Chemical shifts and its measurements, factors influencing chemical shifts, Deshielding, spin-spin interactions.	a. Group Learning and Teaching, c. Technology based Learning	
38-40		Factors influencing coupling constant 'J" Classification, basic ideas about instrument.	a. Group Learning and Teaching, c. Technology based Learning	T1: 101-155

Evaluation Scheme:

Student evaluation is based on the series of Tests and Lab Tests conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	10	19-02-2025	1-18	CB
Test 2	60 Minutes	10	09-04-2025	19-36	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	**	CB
Comprehensive Exam	3 Hours	70	12-05-2025	1-40	CB

** To be announced in the class CB= Close Book Exam OB= Open Book

Make-up Policy: Make –up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc

Date: 08/01/2025

Ms.YUKTI DEWANGAN
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
Second Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
HSC223	**Partial Differential Equations and Calculus of Variations**	**3**	**0**	**1**	**4**

Instructor-in-charge: Ms.ARADHNA TIWARI

Learning Outcomes:
To equip students with the concepts of partial differential equations and how to solve linear partial differential with different methods
Students also will be introduced to some physical problems in Engineering models that results in partial differential equations

Text Book (T1)	Ordinary and Partial Differential Equations (Dr. M.D.Raisinghania,S.Chand)
Text Book (T2)	Calculus of Variations with Applications (A.S.Gupta)

Lecture-Wise-Plan:

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology Based Learning d. Peer Teaching e. Project Based Learning	Reference (Chapter/Sec./Page Nos. of Text/Ref. Books)
1-5	First order partial differential equations	Order and Degree of PDE, Concept of linear and non-linear PDE,PDE of 1^{st}order, Lagrange's method, Charpit's general method.	a. Group Learning and Teaching.	Ch-1.2,3/1.3-3.79/T1
6-11	Second order partial differential equations	Classification of linear PDE of 2^{nd}order, Homogeneous	c. Technology based Learning.	Ch-4/4.1-4.34/T1

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology Based Learning d. Peer Teaching e. Project Based Learning	Reference (Chapter/Sec./Page Nos. of Text/Ref. Books)
	with constant coefficients	and Non Homogeneous equations with constants coefficients.		
12-16	Second order partial differential equations with variable coefficients	PDE reducible to equation with constant coefficients, 2^{nd}order PDE with variable coefficients, Classification of 2^{nd} order PDE	a. Group Learning and Teaching	Ch-5/5.1-5.38/T1
17-21	Heat and wave equations	Reduction to canonical or normal form, Monge's Method, Solution of heat and wave equations in one and two dimension by method of separation of variables.	c. Technology based Learning.	Ch-5/5.1-5.38/T1
22-27	Calculus of variations-Variational problems with fixed boundaries	Euler's equation for functional containing 1^{st} order and higher order total derivatives, Functional containing First order partial derivates.	a. Group Learning and Teaching	Ch-1,2/1-30/T2

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology Based Learning d. Peer Teaching e. Project Based Learning	Reference (Chapter/Sec./Page Nos. of Text/Ref. Books)
28-33	Calculus of Variation-Variational problem with moving boundaries.	Variational problem with moving boundaries, Functional depends on one and two variables conditions.	a. Group Learning and Teaching	Ch-1,2/1-30/T2
34-40	Jacobi Method	One sided variations, Sufficient conditions for an extremum Jacobi and Legendre.	c. Technology based Learning.	Ch-3,4/31-67/T2

Evaluation Scheme:

Student evaluation is based on the series of Tests and Lab Tests conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	10	19-02-2025	1-11	CB
Test 2	60 Minutes	10	09-04-2025	12-7	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	**	CB
Comprehensive Exam	3 Hours	70	12-05-2025	1-40	CB

** To be announced in the class CB= Close Book Exam OB= Open Book

Make-up Policy: Make –up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc

Date: 07/01/2025

Ms.ARADHNA TIWARI
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
Second Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
HSC224	**Software Engineering and Project Management**	**3**	**2**	**0**	**4**

Instructor-in-charge: Dr.NISHA THAKUR

Lecture-Wise-Plan:

Lecture No	Learning Objective	Topics to be Covered	Teaching Learning Strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology Based Learning d. Peer Teaching e. Project Based Learning	Reference (Ch/Sec/ Page No of Text/Ref)
1-5	Software Quality Management – An Overview	Software Quality Management An overview This introductory module gives an overview of Software Quality by illustrating its role in Software Engineering Quality a Technical definition Quality Concepts, Tools and Techniques	a. Group Learning and Teaching	T1 Ch1 1.4,1.5 T2 Ch1.6,1.9
6-12	Demystifying Quality Concepts	This module demystifies various terms associated with quality-QA,AC QM, Quality Engineering as well as the role of process frameworks, methodologies and tools adopted for software quality engineering. Also highlights formal definitions of Quality	a. Group Learning c. Technology Based Learning	T1 Ch-2 2.1,2.4, 2.7,2.9

Lecture No	Learning Objective	Topics to be Covered	Teaching Learning Strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology Based Learning d. Peer Teaching e. Project Based Learning	Reference (Ch/Sec/ Page No of Text/Ref)
13-20	SQA Activities	This module highlights the difference between defect prevention and defect detection activities. Presents the big picture of SQA encompassing Quality Planning and Continuous Improvement by giving formal definition of defect, error/bug and the role of defect measurement	a. Group Learning	T1 Ch-3 3.1,3.7 T2 Ch3 5.6,3.8
21-26	Software Testing	This module highlights various Testing strategies White-box and black-box testing introducing usage Based Testing and Coverage Based Testing. Also discussed is the issue of when to stop testing and start delivering	a. Game Based Learning e. Project Based Learning	T2 Ch- 4 4.7, 4.4 T

Lecture No	Learning Objective	Topics to be Covered	Teaching Learning Strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology Based Learning d. Peer Teaching e. Project Based Learning	Reference (Ch/Sec/ Page No of Text/Ref)
27-33	Reviews & Inspection	Prevention of defects is better than Testing for defects later is the spirit behind Reviews,	b. Technology Based Learning	T1 Ch-5 5.5,5.9
34-40	Quality Management Systems	Quality Metrics and Based lining Software Product Metrics and defect Propagation, Quality Management Systems	d. Peer Teaching	T2 Ch5 5.3,5.7

Evaluation Scheme:

Student evaluation is based on the series of Tests and Lab Tests conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	10	19-02-2025	1-12	CB
Test 2	60 Minutes	10	09-04-2025	13-26	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	12-05-2025	1- 40	CB

** To be announced in the class CB= Close Book Exam OB= Open Book

Make-up Policy: Make –up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc

Date: 06/01/2025

Dr.NISHA THAKUR
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
Second Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
HSC225	**Recombinant DNA Technology**	**3**	**2**	**0**	**4**

Instructor-in-charge: Dr.AMENA KHANANI

Learning Outcomes:
This Course is offered in the second Year Second Semester Students of bachelor of Sciences

1. Define and describe different terminology and concepts in genetics
2. Articulate the different types of DNA Technologies

Text Book T1	Biotechnology and Genomics
Text Book T2	Biotechnology B.D Singh/ Kalyani Publication
Text Book T3	R C Dubey/ S.Chand Publication
Text Book T4	P.K Gupta/ Rastogi Publication
Text Book T5	Unified Botany III N.B Singh/ Navbodh Publication

Lecture-Wise-Plan:

Lecture Nos	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference
1	Scope and aim of Biotechnology	Scope and aim of Biotechnology	a. Group Learning and Teaching.	T3Ch.1 Pg. No.03-24
2	Recombinant DNA Technology	Recombinant DNA Technology	a. Group Learning and Teaching.	T3Ch.1 Pg. No.03-24

Lecture Nos	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference
3-4	General concept and Application	General concept and Application	b. Technology based Learning.	T3Ch.13 Pg. No.305-334
5-7	General concept and Application	General concept and Application	b. Technology based Learning.	T3Ch.13 Pg. No.305-334
8	Strategies of Recombinant DNA technology in prokaryotes	Strategies of Recombinant DNA technology in prokaryotes	b. Technology based Learning.	T3Ch.25 Pg. No.550-568
9	Vectors (Animal vectors).	Vectors (Animal vectors).	a. Group Learning and Teaching.	Animal viral based vectors | PPT
10	Vectors (Plant vectors).	Vectors (Plant vectors).	a. Group Learning and Teaching.	Plant expression vectors | PPT
11	Bacteriophage vectors	Bacteriophage vectors	a. Group Learning and Teaching.	Bacteriophage vectors | PPT
12-13	Introduction of vectors into appropriate host	Introduction of vectors into appropriate host	a. Group Learning and Teaching.	Bacteriophage vectors | PPT

Lecture Nos	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference
14	Introduction of vectors into appropriate host	Introduction of vectors into appropriate host	a. Group Learning and Teaching.	Bacteriophage vectors | PPT
15	PCR : Procedure	PCR : Procedure	b. Technology based Learning.	T4Ch.4 Pg. No.61-69
16-18	Denaturation, Annealing, Extension	Denaturation, Annealing, Extension	b. Technology based Learning.	T4Ch.4 Pg. No.61-69
19-21	Types of PCR	Types of PCR	b. Technology based Learning.	T4Ch.4 Pg. No.61-69
22-23	Applications	Applications	b. Technology based Learning.	T4Ch.4 Pg. No.61-69
24	Advantages and Limitation of PCR	Advantages and Limitation of PCR	a. Group Learning and Teaching.	T4Ch.4 Pg. No.61-69
25	Monoclonal Antibodies	Monoclonal Antibodies	a. Group Learning and Teaching.	T4Ch.23 Pg. No.299-311
26-27	Structure	Structure	b. Technology based Learning.	T4Ch.23 Pg. No.299-311

Lecture Nos	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference
28-30	Production and Application	Production and Application	b. Technology based Learning.	T4Ch.23 Pg. No.299-311
31-33	In vitro fertilization	In vitro fertilization	b. Technology based Learning.	T4Ch.18 Pg. No.238-245
34-36	Embryo transfer	Embryo transfer	b. Technology based Learning.	T4Ch.18 Pg. No.238-245
37	Genome map	Genome map	a. Group Learning and Teaching.	T4Ch.24 Pg. No.312-330
38	Genome project.	Genome project.	a. Group Learning and Teaching.	T4Ch.24 Pg. No.312-330
39-40	Stem Cell Technology.	Stem Cell Technology.	b. Technology based Learning.	T4Ch.15 Pg. No.205-217
41	Targeted Gene Transfer	Targeted Gene Transfer	a. Group Learning and Teaching.	T4Ch.20 Pg. No.257-264
42	DNA Fingerprinting.	DNA Fingerprinting.	b. Technology based Learning.	T4Ch.20 Pg. No.257-264

Evaluation Scheme:

Student evaluation is based on the series of Tests and Lab Tests conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	10	19-02-2025	1-11	CB
Test 2	60 Minutes	10	09-04-2025	12-21	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	**	CB
Comprehensive Exam	3 Hours	70	12-05-2025	1-42	CB

** To be announced in the class CB= Close Book Exam OB= Open Book

Make-up Policy: Make –up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc

Date: 08/01/2025

Dr.AMENA KHANANI
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
Second Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
SC320	**Soft Skil**	**3**	**0**	**0**	**3**

Instructor-in-charge: Mr.Tarun

Learning Outcomes:
After Successful completion of the course student will be able to

1. Understand the concept , importance and types of soft skills
2. Learn the usage of effective soft skills and draw benefit from it.
3. Develop listening, Writing and Speaking Skills
4. Personality development and attributes of success
5. Prepare students for interviews, group discussions and make them ready for corporate life

Reference Books R1	Professional Communication by Aruna Koneru (Tata McGraw Hill)
Reference Book R2	You can win by Shiv Khera (Bloomsbury)

Lecture-Wise-Plan:

Lecture Nos	Learning Objective	Topics to Be Covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference
1,2	Learning basic concepts & definitions	Introduction to soft skills, Basics of Communication	a. Group Learning and Teaching	PC-Unit1-chapter1
3,4	Develop effective speaking skills	Speaking skills - Theory & Concept, Practical (Extempore)	a. Group Learning and Teaching	PC-Unit4-chapter26

Lecture Nos	Learning Objective	Topics to Be Covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference
5,6	Develop effective listening skills	Listening - Concept & Techniques, Practical Orientation	a. Group Learning and Teaching	PC-Unit4-chapter22
7,8	Develop effective writing skills	Language Fluency, abstract and summary	a. Group Learning and Teaching	PC-Unit3-chapter17
9,10	Importance and build Positive attitude	Attitude - Concept & Techniques, Positive attitude	a. Group Learning and Teaching	YCW-chapter1,2
11,12	Motivation	Motivation-importance, process, benefits	a. Group Learning and Teaching	YCW-chapter6
13,14,15	Personality development	Grooming, development, positive personality	a. Group Learning and Teaching	YCW-chapter10
16,17,18	Attributes of success	Adaptability, habits-develop and maintain	a. Group Learning and Teaching	YCW-chapter3,4
19,20,21	Written official communication	Office circulars & notices, Report writing	a. Group Learning and Teaching	PC-Unit2-chap10, Unit3-chap13

Lecture Nos	Learning Objective	Topics to Be Covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference
22,23	General awareness-methods to develop	General Awareness - Building & Importance	a. Group Learning and Teaching	NA
24,25,26	Build effective presentation skills	Presentation Skills - Concept, Techniques, Class activity	d. Peer teaching	PC-Unit4-chapter26
27,28	Personal Interview	Professional Self-introduction, Specific Skills for PI	d. Peer teaching	Practical
29,30	Effective interview skills	Mock Interviews & GD	e. Project based Learning.	Practical
31,32	Profile writing and explaining	Role of CV in Selection, Defending & Validating CV	e. Project based Learning.	PC-Unit4-chapter24
33,34	Internships-learning and expectations	Sectoral Interest, Company Updates, Achievements, Learnings	e. Project based Learning.	Practical
35,36	Prepare for interviews and GD	Mock Interviews & GD	e. Project based Learning.	Practical
37,38	Self-awareness	Self-Evaluation, Career Expectations, Goal Setting & Initiatives	a. Group Learning and Teaching	YCW-chapter4

Lecture Nos	Learning Objective	Topics to Be Covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference
39,40	Corporate overview	Corporate Expectations, Demand-Supply Dynamics	a. Group Learning and Teaching	Current state

Class Room Practical:

S.No	Name of the Practical
1	Professional Self-introduction, Specific Skills for PI
2	Presentation and pitch delivery
2	Mock Interviews & GD
3	Sectorial Interest, Company Updates, Achievements and Internship Learnings

Evaluation Scheme:

Student evaluation is based on the series of Tests and Lab Tests conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	10	17-02-2025	1-12	CB
Test 2	60 Minutes	10	07-04-2025	13-23	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	**	CB
Comprehensive Exam	3 Hours	70	01-05-2025	1-40	CB

** To be announced in the class CB= Close Book Exam OB= Open Book

Make-up Policy: Make –up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc

Date: 10/01/2025

Mr.TARUN
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
Second Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
SC321	**Basic Electronics and Electrical**	**3**	**2**	**0**	**4**

Instructor-in-charge: Dr.ARUN KUMAR SINGH

Learning Objectives:
After Successful Completion of the Course, the student will be able to

1. The objective of this course is to make the students understand the basic electric circuits and the techniques of analysing them
2. It also introduces the concepts of basic of semiconductor and electronic devices like Diode and Transistor, with their applications in Rectifier, Amplifier etc.
3. This course forms the basis for understanding the subsequent courses in electrical and electronics Sciences

Text Book T1	Fundamentals of Electrical Engineering, Leonard S. Bobrow, Oxford University Press, 2nd Edition.1996.
Reference Book R1	Engineering circuit analysis, WH. Hayt, J.E. Kemmerly, McGraw Hill company, 6th Edition, 2000.
Reference Book R2	Electronic Devices & Circuits, Millman & Halkias McGraw Hill, 2002.
Reference Book R3	Analog Electronics L.K. Maheshwari and M.M.S. Anand, , 1st Ed., PHI,2005.

Lecture-Wise-Plan:

Lecture Nos.	Learning Objective	Topics to be covered	Teaching Learning Strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference (Ch/Sec. /Page Nos. of Text/Ref. Books)
1-7	To understand the concept of basic circuit elements	Introduction to Basic Circuit theory & Circuit elements, Kirchhoff's Current &	a. Group Learning and Teaching.	1.1, 1.2, 1.3, 1.4, 1.5

Lecture Nos.	Learning Objective	Topics to be covered	Teaching Learning Strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference (Ch/Sec. /Page Nos. of Text/Ref. Books)
		Voltage Laws, Independent & Dependent Sources		
8-14	To understand the methods of circuit Analysis	Mesh & Nodal Analysis, The venin's & Norton's theorem, Linearity, Superposition, Maximum power transfer theorems	c. Technology based Learning.	2.1, 2.3, 2.4, 2.5, 2.6
15-20	Learning characteristics of energy storage elements	Energy storage elements (Inductors & Capacitors) their relationships, Semiconductors: intrinsic and doped: p-n junction, junction Diode & its characteristics	a. Group Learning and Teaching	3.1, 3.2, 3.3, 6.1, 6.2, 6.3, 6.4, 6.6
21-31	Application of diode	Rectifier circuits, filters and their types, Zener Diode & its characteristics, Introducing transistors & their types, PNP and NPN transistors and their characteristics & operation	c. Technology based Learning.	R2 4.8, 4.9, 4.10, 6.6, 7.1, 7.2, 7.3

Lecture Nos.	Learning Objective	Topics to be covered	Teaching Learning Strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference (Ch/Sec. /Page Nos. of Text/Ref. Books)
32-40	To study working and characteristics of BJT	Biasing and Stability of BJTs, BJT amplifier, common emitter configuration, FETs/ MOSFETs with their operations & characteristics	a. Group Learning and Teaching	9.1, 9.2, 8.1

Physic VI Lab:

S.No	Name of the Experiment
1	To study the characteristics of a PN junction diode.
2	To study the characteristics of a Zener diode.
3	To study and verify Half wave rectifier using PN Junction.
4	To study and verify Full wave rectifier using PN Junction.
5	To study the characteristics of a NPN Transistor.
6	To study and verify the Kirchhoff's Law
7	To study and verify The venin's theorem.
8	To study and verify Norton's theorem.
9	To study and verify Maximum Power Transfer theorem.
10	To study and verify Super position theorem.

Evaluation Scheme:

Student evaluation is based on the series of Tests and Lab Tests conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	10	17-02-2025	1-10	CB
Test 2	60 Minutes	10	07-04-2025	11-24	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	25-40	CB
Comprehensive Exam	3 Hours	70	05-05-2025	1- 40	CB

** To be announced in the class CB= Close Book Exam OB= Open Book

Make-up Policy: Make –up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc

Date: 07/01/2025

Dr.ARUN KUMAR SINGH
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
Second Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
SC322	**Instrumental Method of Analysis**	**3**	**2**	**0**	**4**

Instructor-in-charge: Dr.PRATIK KUMAR JAGTAP

Learning Outcomes:

1. Instrumental analysis is a field of analytical chemistry that investigate analyst using scientific instruments.
2. Compared to simple laboratory tests, instrumental methods of analysis may give improved: Speed (they are quick) accuracy (they reliably identify elements and compounds sensitivity)
3. To understand the major categories of instrumental methods suh as the spectral, electro analytical, and separatory.

Text Books T1	Textbook of Quantitative Chemical Analysis by Vogel's, 5th Edition , British Library Cataloguing in Publication Data.
Text Book T2	Instrumental Methods of Chemical Analysis, G.R. Chatwal, S.K. Anand, 5th Edition, Himalaya publication House.
Text Book T3	College Analytical Chemistry, S.A. Zauri, D. Yogesh, V. Ghalsai,P. Sathe, S.S. Mangeskar, 4th Edition, Himaliyan Publication House.
Reference Books R1	The Essence of Chromatography by Colin F. Poole
Reference Book R2	Spectroscopy by H. Kaur, Pragati Prakashan.

Lecture-Wise-Plan:

Lecture Nos.	Learning Objective	Topics to be Covered	Teaching Learning Strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference (Ch/Sec. /Page Nos. of Text/Ref. Books)
1-2	To understand the working of basic instrument for analysis	Principle and instrumentation of PH meter, Conduct meter Potentiometer	d. Peer Teaching	T2 2.487, 2.488 2.511-2.517
3-4		Optical Methods General Design Sources of radiation Wave Length Selectors	c. Technology Based Learning	T1 616-623
5-6		Sample Containers- Radiation transducers, types of optical instruments	c. Technology Based Learning	T3 86-118
7-9	Study of the emission, absorption and scattering of electromagnetic radiation accompanying transitions among atomic or molecular energy levels.	MOLECULAR SPECTROSCOPY: Measurement of transmittance and absorbance – beer's law	a. Group Learning and Teaching	T1 198-200
10-15		spectrophotometer analysis – qualitative and quantitative absorption measurements	d. Peer teaching	T1 5-6

Lecture Nos.	Learning Objective	Topics to be Covered	Teaching Learning Strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference (Ch/Sec. /Page Nos. of Text/Ref. Books)
16-19		Types of Spectrometers-IR Raman Spectroscopy instrumentation Theory	Group Learning and Teaching	R2 238-250
20-21	To understand the separation, identification, and purification of the components of a mixture for qualitative and quantitative analysis.	Chromatography: Solvent extraction – principles of ion exchange, paper, thin layer	Peer teaching	T1 213, 234
22-23		Chromatography techniques – Columns, adsorbents, methods, Rf values,	Project based Learning.	T1 198-200
24-25	To identify, quantify and purify a particular analyte or compound.	HPLC techniques – Adsorbents, columns, detection methods, estimations,	Group Learning and Teaching	R1 860-883
26-27		Application of chromatographic analysis	Project based Learning.	T1 232

Lecture Nos.	Learning Objective	Topics to be Covered	Teaching Learning Strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference (Ch/Sec. /Page Nos. of Text/Ref. Books)
28-29	To determination of trace metals in many types of samples composed of organic or inorganic matrices.	Atomic Absorption Spectroscopy-Introduction, Principle	Group Learning and Teaching	R2 565
30-31		Classification of atomic spectroscopic method, Instrumentation for AAS	Peer Teaching	R2 566, 568
32-33		Interferences in AAS, applications of AAS, Some typical analysis	Technology based Learning	R2 573-577
34-35	To determine and quantify the elemental composition of a material	Atomic Emission spectroscopy Introduction, advantages and disadvantages	Peer Teaching	R2 582
36-37		Principle and instrumentation of AES	Group Learning and Teaching	R2 584

Lecture Nos.	Learning Objective	Topics to be Covered	Teaching Learning Strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference (Ch/Sec. /Page Nos. of Text/Ref. Books)
38-39		Measurement of light intensity	Project based Learning	R2 589
40		Application of emission spectroscopy	Peer Teaching	R2 591

Chemistry VI- Lab (including Virtual Lab VL)

S.No	Name of the Experiment
1	To determine the pH of waste water collected from different water sources (VL)
2	To determine the pH value of given solution using pH meter. (VL)
3	Titration of Mixture of Weak Acid and Strong Acid with Strong Base Using Conductometer.
4	Determination of Dissociation Constant of Weak Acid (Acetic Acid) using PH - Meter
5	Titration of Mixture of Weak Acid and Strong Acid with Strong Base Using Potentiometer.
6	To Determine Maximum Wavelength of Absorption of FeSO4, to Verify Beer's Law and to Find Unknown Concentration of Ferrous ions (Fe2+) in Given Sample by Spectrophotomety / colorimetry
7	Determination of Fluoride Ion in Groundwater and Toothpaste.

Evaluation Scheme:

Student evaluation is based on the series of Tests and Lab Tests conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	10	18-02-2025	1-18	CB
Test 2	60 Minutes	10	08-04-2025	19-35	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	07-05-2025	1- 40	CB

** To be announced in the class CB= Close Book Exam OB= Open Book

Make-up Policy: Make –up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc

Date: 05/01/2025

Dr.PRATIK KUMAR JAGTAP
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
Second Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
SC323	**Advanced Abstract Algebra**	**3**	**0**	**1**	**4**

Instructor-in-charge: Ms.ARADHNA TIWARI

Learning Outcomes:
After successful completion of the course student will be able to

1. The knowledge of automorphism helps to study more on field theory.
2. Students learn on direct products, group actions, class equations and their applications with proof of all results.
3. This course helps to opt for more advanced courses in algebra and linear classical groups.
4. Ring theory-Ring homomorphism
5. Unique factorization domain

Text Book (T)	Abstract Algebra (Dr. H. K. Pathak)
Reference Book R1	Ramji Lal (2017). Algebra 1: Groups, Rings, Fields and Arithmetic. Springer.
Reference Book R2	Algebra & Trigonometry by Dr H K Pathak

Lecture-Wise-Plan:

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference (chapter/sec./Page Nos of Text/Ref. Books)
1-5	Group	Definition of group, groupoid, semi-group, monoid	a. Group Learning and Teaching.	Ch-1/1-156/T

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference (chapter/sec./Page Nos of Text/Ref. Books)
6-11	Automorphim, Inner automorphim, automorphim groups	Definition of automorphism, inner automorphism, automorphism groups problems, Applications of factor groups to automorphism groups and its theorems	c. Technology based Learning.	Ch-1/157-172/T
12-16	Characteristic Subgroups. Conjugacy relation, Normaliser Counting principle	Characteristic Subgroups. Conjugacy relation, and their properties and theorems , Definition of Normalizer and Counting principle. Normalizer of an elements	a. Group Learning and Teaching	Ch-1/173-178/T
17-21	Center for Group, Sylow subgroup, Sylow's theorem	Definition of Center for Group, Center for Group of prime-order. Abelianizing of a group and its universal property, Definition of Sylow subgroup, and Proof of Sylow's theorem	c. Technology based Learning.	Ch-1/179-243/T

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference (chapter/sec./Page Nos of Text/Ref. Books)
22-27	Commutator subgroup, Properties of external direct products	Definition of Commutator subgroup and its theorems, Properties of external direct products, the group of units modulo n as an external direct product, internal direct products, Fundamental Theorem of finite abelian groups	a. Group Learning and Teaching	Ch-1/242-254/T
28-33	Ring theory	Definition of Ring theory and examples, Ring homomorphism	a. Group Learning and Teaching	Ch-1/255-266/T
34-40	Ideals and Quotient Rings, Unique factorization domain	Ideals and Quotient Rings. Field of Quotients of an Integral Domain. Euclidean rings. Polynomial Rings. Polynomials over the Rational Field	c. Technology based Learning.	Ch-1/267-356/T

Evaluation Scheme:

Student evaluation is based on the series of Tests and Lab Tests conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	10	18-02-2025	1-11	CB
Test 2	60 Minutes	10	08-04-2025	12+27	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	09-05-2025	1- 40	CB

** To be announced in the class CB= Close Book Exam OB= Open Book

Make-up Policy: Make –up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc

Date: 09/01/2025

Ms.ARADHNA TIWARI
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
Second Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
SC324	**Computer Networks**	**3**	**2**	**0**	**4**

Instructor-in-charge: Dr.NISHA THAKUR

Learning Outcomes:
Data communication and networking are changing the way we live and do the things today. They rely on computer networks and internet works. This course focuses on networking fundamentals, standards and various underlying protocols to make the network connected for text, audio, video. The security aspect of network is also emphasized. As a result, the technology advances make it possible to communicate faster and offer more services thru IEEE standards and TCI/IP and other protocols

Text Book T1	Data Communication and Computer Networking,B.A.Forouzan,TMH,2006
Text Book T2	Computer Networks, A.S.Tanenbaum, Pearson Education/Prentice Hall of India, 4th Edition, 2004.
Reference Book R1	Data Communications, Computer Networks and Open Systems, Halsall Fred, Addition-Wesley, 4th Edition, 2004
Reference Book R2	An Engineering Approach to Computer Networks, S.Kesha, Pearson Education, (2004)

Lecture-Wise-Plan:

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. e. Project based Learning.	Reference (Ch./Sec. /Pg No)
1	Introduction to Computer Networking	Introduction to Networks, Computer Networking	a. Group Learning and Teaching	T1: Ch-1

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. e. Project based Learning.	Reference (Ch./Sec. /Pg No)
2-3	Use of Hardware and Software	Uses of computer networks, network hardware, network software	a. Group Learning and Teaching	T2: Ch-1
4-5	Introduction to OSI, TCP/IP	Introduction to Reference Models OSI, TCP/IP Layers	a. Group Learning and Teaching	T1: Ch-2, T2: Ch-1
6	Analog and digital Transmissions	Types of Signals: Analog and digital, Analog signals, Digital signals, Transmission impairment	a. Group Learning and Teaching	T1: Ch-3
7-8	Coding and Sampling in Transmission	Line coding, block coding, sampling, transmission mode	c. Technology based Learning	T1: Ch-4
9-10	Transmission in Physical Layer	Types of Transmission media: Guided media and Unguided media	c. Technology based Learning	T1: Ch-7, T2: Ch-2
11	Data Link Layer	Data Link Layer Design Issues	c. Technology based Learning	T2: Ch-3
12-13	Errors and their significance	Error Detection And Correction	c. Technology based Learning	T1: Ch-10, T2: Ch-3
14-16	Data Link Layer Protocols	Data link Control and Protocols: Elementary Data Link Protocols, Sliding Window Protocols.	d. Peer teaching	T1: Ch-11, T2: Ch-3

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. e. Project based Learning.	Reference (Ch./Sec. /Pg No)
17-18	MAC	Multiple Access Protocols	d. Peer teaching	T1: Ch-13, T2: Ch-4
19	Design of Network Layer	Network Layer Design Issues	d. Peer teaching	T2: Ch-5
20-21	Types of Routing	Routing Algorithms	e. Project based Learning	T1: Ch-19, T2: Ch-5
22-23	Removing Congestion on Network	Congestion Control Algorithms	e. Project based Learning	T1: Ch-23, T2: Ch-5
24	Internetworking	Quality Of Service, Internetworking	a. Game Based Learning	T1: Ch-23
25	Protocols of Transport Layer	The Transport Service	a. Game Based Learning	T1: Ch-22, T2: Ch-6
26-27	Protocols of Transport Layer	Elements of Transport Protocols, A Simple Transport Protocol	c. Technology based Learning	T1: Ch-22, T2: Ch-6
28-29	Internet Transport Protocols	The Internet Transport Protocols: UDP, The Internet Transport Protocols: TCP	c. Technology based Learning	T1: Ch-22
30-34	Services of Application Layer	DNS--Domain Name System, Electronic Mail, The World Wide Web	d. Peer teaching	T1:Ch-25,26, 27,T2:Ch-7
35-38	Security on Networks	Cryptography, Symmetric-Key Algorithms	d. Peer teaching	T1: Ch-29,31, T2: Ch-8

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. e. Project based Learning.	Reference (Ch./Sec. /Pg No)
39-40	Algorithms	Public-Key Algorithms	e. Project based Learning	T2: Ch-8

Evaluation Scheme:

Student evaluation is based on the series of Tests and Lab Tests conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	10	18-02-2025	1-20	CB
Test 2	60 Minutes	10	08-04-2025	21-40	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	07-05-2025	1- 40	CB

** To be announced in the class CB= Close Book Exam OB= Open Book

Make-up Policy: Make –up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc

Date: 07/01/2025

Dr.NISHA THAKUR
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
Second Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
SC325	**Plant Taxonomy and Ecology**	**3**	**2**	**0**	**4**

Instructor-in-charge: Mr.SHUBHAM DEWANGAN

Learning Outcomes:

1. To understand plant classification systems and accurately identify species
2. Know major plant groups, their evolution, and ecological roles
3. Grasp concepts like population dynamics, community structure, and ecosystem function.
4. To develop skills in plant identification, sampling and data collection in the field
5. To present scientific finding clearly through writing and presentations.

Text Book T1	Botany for degree students – 3rd year B.P. Pandey, S. chand Publication
Text Book T2	Navbodh Unified Botany – Part II Dr. N.B. Singh / Navbodh Prakashan
Text Book T3	Ecology. Blackwell Science, Cambridge, USA Begon, M; Harper, J. L. And Townsend, C. R. (1996)
Reference Book R1	Odum the Basic of Ecology Eugene P. Odum 2nd edition / W.B. Saunders Company

Lecture-Wise-Plan:

Lecture No's.	Learning objectives	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching, b. Game Based Learning, c. Technology based Learning, d. Peer teaching, e. Project based Learning.	Reference (Ch./Sec./ Page No's. of Text Book)
1-4	To understand identifying, classifying and naming plant species.	Introduction, Bentham and Hooker system of classification. Binomial Nomenclature, International	a. Group Learning and teaching a. Group Learning and teaching	T2:1-20

Lecture No's.	Learning objectives	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching, b. Game Based Learning, c. Technology based Learning, d. Peer teaching, e. Project based Learning.	Reference (Ch./Sec./ Page No's. of Text Book)
		Code of Nomenclature for Algae, Fungi and Plant (IUCN)		
5-6		Typification, Numerical taxonomy and Chemotaxonomy.	a. Group Learning and teaching	T2:21-34
7-9	To understand the preservation techniques of plants and important botanical gardens.	Preservation of plant material and Herbarium techniques.	e. Project based Learning.	T2:36-50
10-12		Important botanical gardens and Herbaria of India, Kew Botanical Garden, England.	d. Peer teaching	
13-14	To understand the origin, history and scope of ecology and ecological factors.	Introduction, origin and history, Scope of ecology, application of ecology	a. Group Learning and teaching	T2:519-525
15-16		Environmental and Ecological factors	d. Peer teaching	T2:527-546
17– 20	To understand the origin and development of soil formation and soil profile	Soil Formation origin and development, classification of soil and soil profile, composition of soil, Limiting Factors and law of tolerance	a. Group Learning and teaching	T2:548-555

Lecture No's.	Learning objectives	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching, b. Game Based Learning, c. Technology based Learning, d. Peer teaching, e. Project based Learning.	Reference (Ch./Sec./ Page No's. of Text Book)
21-23		Adaptation in Plants (Hydrophytic, Xerophytic, Epiphytic)	c. Technology based Learning	T2:557-576
24-26	To understand the populations and their ecological niche concept.	Introduction, Populations characteristics, genecology, ecological niche concept, keystone species.	c. Technology based Learning	T2:579-589
27-31		Characteristics of a community, size and structure, analytical character, classification of community, ecotone and edge effect, biological spectrum.	a. Group Learning and teaching	T2:591-606
32-33		Population interaction among plants (positive and negative interactions)	d. Peer teaching	T2:608-617
34-36	To understand the components, structure and productivity of ecosystems.	Introduction, components and structure of ecosystem, Main ecosystem, productivity of ecosystem.	a. Group Learning and teaching	T2:631-640

Lecture No's.	Learning objectives	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching, b. Game Based Learning, c. Technology based Learning, d. Peer teaching, e. Project based Learning.	Reference (Ch./Sec./ Page No's. of Text Book)
37-40		Function of ecosystem, food chains and food webs in ecosystem, energy flow in ecosystem, ecological pyramids	c. Technology based Learning, d. Peer teaching	T2:641-651
41-42	To understand the Biogeochemical cycles	Introduction, Types of Biogeochemical cycles, Carbon and Nitrogen Cycles in details.	c. Technology based Learning	T2:654-659

Evaluation Scheme:

Student evaluation is based on the series of Tests and Lab Tests conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	10	17-02-2025	1-20	CB
Test 2	60 Minutes	10	07-04-2025	21-42	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	05-05-2025	1- 42	CB

** To be announced in the class CB= Close Book Exam OB= Open Book

Make-up Policy: Make –up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc

Date: 08/01/2025

Mr.SHUBHAM DEWANGAN
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
Second Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
SC326	**Applied Zoology**	**3**	**2**	**0**	**4**

Instructor-in-charge: Dr.AMENA KHANANI

Learning Outcomes:
This course is offered in the Third Year Second semester students of bachelor of sciences

1. Tell and explain different terms and processes in animal culture
2. Articulate behaviour patterns of different systems in human body

Text Book T1	R.L Kotpal/ Rastogi Publication Moden Text Book of Zoology
Text Book T2	Modern Text Book of Zoology S.M Saxena/ Ram Prasad & Sons
Text Book T3	Unified Zoology Dr.Preeti Khare/ Navbodh Prakashn
Text Book T4	P.D Sharma/ Rastogi Publication

Lecture-Wise-Plan:

Lecture Nos	Learning Objective	Topics to Be Covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference
1	Ecology and Environment	Aims and scope of environment	a. Group Learning and Teaching	T4Ch.9 Pg. No.169-212
2	Ecology and Environment	Aims and scope of environment	a. Group Learning and Teaching	T4Ch.9 Pg. No.169-212
3	Ecology and Environment	Major Ecosystem of the world	a. Group Learning and Teaching	T4Ch.9 Pg. No.169-212

Lecture Nos	Learning Objective	Topics to Be Covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference
4-5	Ecology and Environment	Major Ecosystem of the world	a. Group Learning and Teaching	T4Ch.9 Pg. No.169-212
6-8	Ecology and Environment	Population Ecology	a. Group Learning and Teaching	T4Ch.7 Pg. No.115-132
9-11	Ecology and Environment	Communities	c.Technology based Learning	T4Ch.8 Pg. No.133-168
12	Applied Microbiology	Basic and Applied microbiology	a. Group Learning and Teaching	Introduction to microbiology | PPT
13-15	Applied Microbiology	Microbiology of domestic water and sewage	c.Technology based Learning	Microbiology of sewage and sewage treatment | PPT
16-18	Applied Microbiology	Microbiology of Milk and milk product	c.Technology based Learning	lecture 10 Microbiology of milk.pptx
19	Applied Microbiology	Industrial microbiology	c.Technology based Learning	Industrial microbiology | PPT
20	Applied Microbiology	Fermentation process	c.Technology based Learning	Industrial microbiology | PPT
21	Applied Microbiology	Alcoholic beverage	c.Technology based Learning	Alcoholic beverage by indianchefrecipe @

Lecture Nos	Learning Objective	Topics to Be Covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference
22-23	Animal Culture	Prawn culture	c.Technology based Learning	T3Ch.5 Pg. No.420-496
24-26	Animal Culture	Sericulture	c.Technology based Learning	T3Ch.5 Pg. No.420-496
27-29	Animal Culture	Apiculture	c.Technology based Learning	T3Ch.5 Pg. No.420-496
30-32	Animal Culture	Pisciculture	c.Technology based Learning	T3Ch.5 Pg. No.420-496
33-34	Applied Physiology	Structure and function of Thyroid glands	a. Group Learning and Teaching	T3Ch.1 Pg. No.193-200
35	Applied Physiology	Endocrine Disorder of thyroid.	a. Group Learning and Teaching	T3Ch.1 Pg. No.193-200
36	Applied Physiology	Muscle Contraction.	a. Group Learning and Teaching	T3Ch.15 Pg. No.180-185
37-38	Behaviour and Evolution	Patterns of Behaviour	a. Group Learning and Teaching	T3Ch.17 Pg. No.398-419
39-40	Behaviour and Evolution	Drugs and Behaviour	a. Group Learning and Teaching	T3Ch.17 Pg. No.398-419

Lecture Nos	Learning Objective	Topics to Be Covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference
41	Behaviour and Evolution	Theory of organic evolution	a. Group Learning and Teaching	T3Ch.9 Pg. No.262-276
42	Behaviour and Evolution	Evolution of Horse	a. Group Learning and Teaching	T3Ch.14 Pg. No.299-307

Evaluation Scheme:

Student evaluation is based on the series of Tests and Lab Tests conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	10	18-02-2025	1-11	CB
Test 2	60 Minutes	10	08-04-2025	12-21	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	09-05-2025	1- 42	CB

** To be announced in the class CB= Close Book Exam OB= Open Book

Make-up Policy: Make –up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc

Date: 07/01/2025

Dr.AMENA KHANANI
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
Second Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
HSC322	**Chemistry Stereo Chemistry and Heteroyclic**	**3**	**2**	**0**	**4**

Instructor-in-charge: Dr.PRATIK KUMAR JAGTAP

Learning Outcomes:

This course is offered in the second semester of the Third Year students of Bachelor of Science (Chemistry Honors)

1. Designed to understand stereochemistry of organic compounds.
2. To learn and apply various concepts of stereochemistry and fundamental principles of stereoselectivity in organic chemistry.
3. Comprehend and Predict the role of reaction intermediates in organic reactions and heterocyclic reaction mechanisms
4. Evaluate the stability of various conformers of acyclic and cyclic systems using steric, electronic and stereoelectronic effects
5. Correlate various Heterocyclic compounds in organic transformations and to learn their applications

Text Book T1	Kalsi, P. S. Stereochemistry Conformation and Mechanism; New Age International, 2005.
Text Book T2	Stereochemistry of Organic compounds by D. Nasipuri.
Text Book T3	Heterocyclic chemistry vol. II by R. R. Gupta, M. Kumar and V. Gupta.
Reference Book R1	Stereochemistry of Organic compounds by E L Eliel
Reference Book R2	Advanced Organic Chemistry by F A Carey and R J Sundberg
Reference Book R3	Organic Chemistry by Morrison and Boyd, 6th ed.
Reference Book R4	Acheson, R.M. Introduction to the Chemistry of Heterocyclic compounds, John Welly & Sons ` 1976).

Lecture-Wise-Plan:

Lecture Nos.	Learning Objectives	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference (Ch./Sec. /Page Nos. of Text Book
1	Stereochemistry: To understand the basics principles of Stereochemistry	Stereochemistry and stereoisomerism	Peer teaching	T1:10 – 21
2-3		Optical activity, Plane-polarized light, the polarimeter	Technology based Learning	T1:4 – 10
4		Specific rotation, Production of Enantiomerism	Technology based Learning	T1: 21 – 24
5-6		Chirality, the chiral centre, enantiomers, the racemic modification	Group Learning and Teaching	T3:656 – 678
7		Configuration, Specification of configuration: R and S	Peer teaching	T1: 81 – 89
8		Sequence rules, Diastereomers, Meso structures	Group Learning and Teaching	T2: 15 – 29
9-10		Molecular representations-Wedge, Fischer, Newman and Saw-Horse formulae.	Peer teaching	T2: 81 – 94
11	Stereochemistry:To understand the concept of Chirality and Stereoisomers	Optical isomerism: Optical activity	Project based Learning.	T2: 32 – 59
12-		wave nature of light, plane polarised light,	Group Learning and Teaching	R1: 64-76

Lecture Nos.	Learning Objectives	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference (Ch./Sec. /Page Nos. of Text Book
13		Specification of configuration, Synthesis and optical activity	Project based Learning.	R1: 80-82
14-15		Chiral molecules-definition and criteria(Symmetry elements)	Group Learning and Teaching	R1: 77-78 R1: 80-82
16		Definition of enantiomers and diastereomers Explanation of optical isomerism with examples Glyceraldehyde, Lactic acid,	Peer teaching	R1: 111-112
17		Reaction of chiral molecules: Bond-breaking	Technology based Learning	R1: 182-188
18		Generation of second chiral center, Reaction of chiral molecules with optically active reagent. Resolution.	Peer teaching	R1: 189-205
19	Stereochemistry: To analyse the structure and geometry of stereoisomers	D,L and R,S configuration methods and E,Z-configuration with examples.	Group Learning and Teaching	R1: 355-359
20		Mechanism of free radical chlorination. Free	Project based Learning.	R1: 364-372

Lecture Nos.	Learning Objectives	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference (Ch./Sec. /Page Nos. of Text Book
	Heterocyclic Chemistry-I	rotation about C-C single bond		
21		Conformation. Torsional strain Conformation of n-butane Vander Waals repulsion	Peer teaching	T1: 81 – 89
22		Factors affecting stability of conformation, Conformation of cycloalkanes	Group Learning and Teaching	T2: 15 – 29
23	Heterocyclic Chemistry-II	Stereoisomerism of cyclic compounds: Cis- and trans- isomers Stereoisomerism of cyclic compounds. Conformational analysis.	Peer teaching	T2: 81 – 94
24	Heterocyclic Compounds-Fundamental concepts	Classification and nomenclature	Group Learning and Teaching	T2: 32 – 59
25		Structure, aromaticity in 5-numbered and 6-membered rings containing one heteroatom	Technology based Learning	R1: 64-76

Lecture Nos.	Learning Objectives	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference (Ch./Sec. /Page Nos. of Text Book
26-30		Synthesis, reactions and mechanism of substitution reactions of: Furan, Pyrrole (Paal-Knorr synthesis, Knorr pyrrole synthesis, Hantzsch synthesis), Thiophene, Pyridine (Hantzsch synthesis),	Peer teaching	R1: 80-82
31	Heterocyclic Compounds: Reaction mechanism and Name reactions	Structure of pyridine, Sources of pyridine compounds	Technology based Learning	R1: 77-78 R1: 80-82
32-33		Reactions of pyridine, Electrophilic substitution in pyridine	Group Learning and Teaching	R1: 111-112
34-35		Nucleophilic substitution in pyridine, Basicity of pyridine	Peer teaching	T1: 81 – 89
36-37		Reduction of pyridine, Quinoline. The skraup synthesis	Technology based Learning	T2: 15 – 29
38		Isoquinoline. The Bischler–	Group Learning and Teaching	T2: 81 – 94

Lecture Nos.	Learning Objectives	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference (Ch./Sec. /Page Nos. of Text Book
		Napieralski synthesis.		
39		Knorr pyrrole synthesis, Vilsmeier- Haack reaction, Feist-Benary synthesis	Group Learning and Teaching	T2: 32 – 59
40		Structure of furan, Reactivity and orientation effect.	Technology based Learning	R1: 64-76

Chemistry Lab:

S. No.	Name of Experiment
1	Two steps preparations 1. Acetophenone → Acetophenone phenyl hydrazine → 2-phenyl indole. 2. 2-naphthol → 1-phenyl azo-2-naphthol → 1-amino-2-naphthol
2	1. Preparation of acetanilide from aniline and acetic acid using Zn dust. (Purification by column chromatography)
3	2. Preparation of 1-nitronaphthalene from naphthalene. (Purification by steam distillation)
4	Separation of a ternary mixture (S-S-S, S-S-L, S-L-L and L-L-L) (for solid mixture: water insoluble/ soluble including carbohydrates) based upon differences in the physical and the chemical properties of the components.
5	Identification of the two components (indicated by the examiner) using micro-scale technique.
6	Preparation of derivatives (any one of separated compound)
7	Combined spectral identification: Interpretation of spectral data of organic compounds (UV, IR, PMR, CMR and Mass spectra).

Evaluation Scheme:

Student evaluation is based on the series of Tests and Lab Tests conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	10	19-02-2025	1-15	CB
Test 2	60 Minutes	10	09-04-2025	16-30	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	12-05-2025	1- 40	CB

** To be announced in the class CB= Close Book Exam OB= Open Book

Make-up Policy: Make –up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc

Date: 03/01/2025

Dr.PRATIK KUMAR JAGTAP
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
Second Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
HSC323	**Numerical Analysis**	**3**	**0**	**1**	**4**

Instructor-in-charge: Dr.SHANTI SWARUP DUBEY

Scope and Objective of the Course:

1. In reality "Solving a Math problem" generally involves finding an answer rather than exact answer.
2. NUMERICAL ANALYSIS is the study of algorithms that use numerical approximation for the problems of mathematical analysis.
3. A numerical method is a complete and definite set of procedures for the solution of a problem, together with computable error estimates. The study and implementation of such methods is the field of numerical analysis/numerical methods.
4. A trick that lets you get closer and closer to an exact answer is a NUMERICAL METHOD

Text Book	Numerical Methods (M. K. Jain , S. R. K. Iyengar , R. K. Jain)
Reference Book R1	Mathematics Numerical Analysis (G Shanker Rao)
Reference Book R2	Numerical Analysis (Schaum's outlines -2nd Edition)

Lecture-Wise-Plan:

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference (chapter/sec./Page Nos of Text/Ref. Books)
1-5	Transcendental and Polynomial equations	Introduction ,Bisection method, Iteration methods based on first degree equation, Method of False Position,	a. Group Learning and Teaching.	Ch-1/1-13/T

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference (chapter/sec./Page Nos of Text/Ref. Books)
		Newton-Raphson Method, Secant Method		
6-11	Linear algebraic equations and Eigen value problems	Introduction, Direct methods, Iteration methods, Eigen values and Eigen vectors , Bounds on Eigen values, Jacobi method for symmetric matrices.	b. Technology based Learning.	Ch-2/71-86/T
12-16	Interpolation and Approximation	Introduction, Lagrange and Newton Interpolations, Finite difference operators, Interpolating polynomials using finite difference ,Gregory-Newton interpolations	a. Group Learning and Teaching	Ch-3/144-158/T
17-21	Differentiation and integration	Introduction , Numerical differentiation, Newton Forward and Backward Interpolation differentiation first and second order differentiation ,	b. Technology based Learning.	Ch-4/212-231/T
22-27	Differentiation and integration	Method based on Interpolation (For unequal intervals),	a. Group Learning and Teaching	Ch-4/212-231/T

Lecture Nos.	Learning Objective	Topics to be covered	Teaching learning strategies: a. Group Learning and Teaching b. Game Based Learning c. Technology based Learning d. Peer teaching e. Project based Learning.	Reference (chapter/sec./Page Nos of Text/Ref. Books)
		Numerical Integration, Newton Cote Quadrature formula, Simpson's $1/3^{rd}$ and $3/8^{th}$ rule, Weddle's rule		
28-33	Numerical solution of ordinary differential equations	Introduction, Euler's method, Picard's Method	a. Group Learning and Teaching	
34-40	Numerical solution of ordinary differential equations	Taylor's Series Method, Runge-Kutta's Fourth order method.	b. Technology based Learning.	Ch-272-296/T

Evaluation Scheme:

Student evaluation is based on the series of Tests and Lab Tests conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	10	19-02-2025	1-11	CB
Test 2	60 Minutes	10	09-04-2025	12-27	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	12-05-2025	1- 40	CB

** To be announced in the class CB= Close Book Exam OB= Open Book

Make-up Policy: Make –up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc

Date: 05/01/2025

Dr.SHANTI SWARUP DUBEY
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
Second Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
HSC324	**Data Science Using Python**	**3**	**2**	**0**	**4**

Instructor-in-charge: Dr.B RAVI KIRAN

Learning Outcomes:
Data Science Using Python is an application oriented course which forms the first half of a two semester comprehensive course on core level to be taught to all the students B.Tech. The Course Aims at:

1. Developing and understanding of the basic principles of Data Science and tis implementation in research work
2. Developing the application of concepts to problems of practical interest using Python
3. Improving the concepts and improving the problem solving skills of students

Text Book T1	Statistics (wikibooks.org)
Reference Book R1	Lecture Series from Youtube (Channel-Code basics) (YouTube links are provided)

Lecture-Wise-Plan:

Lecture Nos.	Learning objectives	Topics to be covered	Teaching Learning Strategic a. Group Learning and Teaching b. Game Based Learning c. Technology Based Learning d. Peer Teaching e. Project Based Learning	Reference (Ch./Sec./ Page Nos. of Text Book)
1-3	Learn about the Basics Statistical Methods and related information	Statistical Methods: Definition and scope of Statistics, concepts of statistical population and sample. Data:	a. Group Learning and Teaching	https://nptel.ac.in/courses/110/106/110106064/ (Module-01)

Lecture Nos.	Learning objectives	Topics to be covered	Teaching Learning Strategic a. Group Learning and Teaching b. Game Based Learning c. Technology Based Learning d. Peer Teaching e. Project Based Learning	Reference (Ch./Sec./ Page Nos. of Text Book)
		quantitative and qualitative, attributes variables		
4-5		Scales of measurement nominal, ordinal, interval and ratio. Presentation: tabular and graphical.	a. Group Learning and Teaching	13-16
6-8	Understanding the use of basic statistical techniques for preprocessing of a dataset.	Descriptive vs Inferential Statistics, Statistics for data science, Log normal distribution Math	a. Group Learning and Teaching	https://www.investopedia.com/terms/l/log-normal-distribution.asp & https://www.youtube.com/watch?v=dX5pw_sQUmc
9-12		Statistics for data science, machine learning, Median, Mean, Mode, Percentile Math	a. Group Learning and Teaching	23-32 & https://www.youtube.com/watch?v=t4LOv9h-FJM
13-15		Statistics for data science, machine learning, Normal Distribution, Z Score, t Score	a. Group Learning and Teaching	https://www.youtube.com/watch?v=okhrFgaUwio

Lecture Nos.	Learning objectives	Topics to be covered	Teaching Learning Strategic a. Group Learning and Teaching b. Game Based Learning c. Technology Based Learning d. Peer Teaching e. Project Based Learning	Reference (Ch./Sec./ Page Nos. of Text Book)
16-17		Z test and t test for interpretation of Math, Statistics for data science, machine learning	a. Group Learning and Teaching	
18-19	Understanding prediction for univariate and multivariate dataset	Introduction to Machine Learning, Linear Regression Single Variable	a. Group Learning and Teaching	https://www.youtube.com/watch?v=8jazNUpO3lQ&list=PLeo1K3hjS3uvCeTYTeyfe0-rN5r8zn9rw&index=2
20-21		Linear Regression Multiple Variables, Gradient Descent and Cost Function	a. Group Learning and Teaching	https://www.youtube.com/watch?v=J_LnPL3Qg70&list=PLeo1K3hjS3uvCeTYTeyfe0-rN5r8zn9rw&index=3 & https://www.youtube.com/watch?v=vsWrXfO3wWw&list=PLeo1K3hjS3uvCeTYTeyfe0-rN5r8zn9rw&index=4

Lecture Nos.	Learning objectives	Topics to be covered	Teaching Learning Strategic a. Group Learning and Teaching b. Game Based Learning c. Technology Based Learning d. Peer Teaching e. Project Based Learning	Reference (Ch./Sec./ Page Nos. of Text Book)
21-23		Training and Testing Data	a. Group Learning and Teaching	https://www.youtube.com/watch?v=fwY9Qv96DJY&list=PLeo1K3hjS3uvCeTYTeyfe0-rN5r8zn9rw&index=7
24-27		Logistic Regression (Binary Classification), Decision Tree	a. Group Learning and Teaching	https://www.youtube.com/watch?v=zM4VZR0px8E&list=PLeo1K3hjS3uvCeTYTeyfe0-rN5r8zn9rw&index=8 & https://www.youtube.com/watch?v=PHxYNGo8NcI&list=PLeo1K3hjS3uvCeTYTeyfe0-rN5r8zn9rw&index=10
28-33		Support Vector Machine (SVM)	a. Group Learning and Teaching	https://www.youtube.com/watch?v=FB5EdxAGxQg&list=PLeo1K3hjS3uvCeTYTeyfe0-

Lecture Nos.	Learning objectives	Topics to be covered	Teaching Learning Strategic a. Group Learning and Teaching b. Game Based Learning c. Technology Based Learning d. Peer Teaching e. Project Based Learning	Reference (Ch./Sec./ Page Nos. of Text Book)
				rN5r8zn9rw&index=11
34-35	Learning about the minimization of factors for effective predictions	Eigen Systems, Factor Analysis, Notation	a. Group Learning and Teaching	Printed Notes Contents
36-42		Principal Components Analysis (PCA) Exploratory Factor Analysis	a. Group Learning and Teaching	Printed Notes Contents
40-42	Understanding the	Hypothesis Testing, P-value, using one & two sample Z-test and one & two sample T-test	a. Group Learning and Teaching	Printed Notes Contents

Evaluation Scheme:

Student evaluation is based on the series of Tests and Lab Tests conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	10	19-02-2025	1-12	CB
Test 2	60 Minutes	10	09-04-2025	13-26	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	**	CB
Comprehensive Exam	3 Hours	70	12-05-2025	1-42	CB

** To be announced in the class CB= Close Book Exam OB= Open Book

Make-up Policy: Make –up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc

Date: 08/01/2025

Dr.B RAVI KIRAN
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
Second Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
HSC325	**Toxicology and Immunology**	**3**	**2**	**0**	**4**

Instructor-in-charge: Ms.KAJAL SAHU

Learning Outcomes:

1. To understand the concept of Toxicology
2. Explain toxicity of different organ
3. Understand the fundamental Concept of Immunology
4. Gain Knowledge of various Immune cells Antigen and Cytokines
5. Analyze the Pathogenesis, Therapeutic approach of Various Immune Disorder an Diseases

Text Book T1	R.P. Unified Zoology by Dr. S.M. Saxena by Agrawal Publication.
Text Book T2	N. Arumugam, Immunology, Saras Publication 2014.
Reference Book R1	Toxicology -Modern Toxicology, third Edition, by Ernest Hodgson, John Wiley & Sons Inc . Publication
Reference Book R2	Immunology- Janis Cuby Immunology, 2nd Edition, W.H. Freeman and Company, New York .1993

Lecture-Wise-Plan:

Lecture Topic	Learning Objective	Topics to be Covered	Teaching Learning Strategies: a. Group Learning Teaching b. Game Based Learning c. Technology Based Learning d. Peer Teaching e. Project Based Learning	Reference)Ch./Sec/ Page No of Text Book)
1-2	Introduction of Toxicology	Definition of Toxicity, classification of Toxicants	Group Learning and Teaching	T130-166

Lecture Topic	Learning Objective	Topics to be Covered	Teaching Learning Strategies: a. Group Learning Teaching b. Game Based Learning c. Technology Based Learning d. Peer Teaching e. Project Based Learning	Reference)Ch./Sec/ Page No of Text Book)
3-4	Introduction of Toxicology	Principle of Systemic Toxicology, Toxic Agent and their Action Metallic and Inorganic agent	Group Learning and Teaching	T130-166
5-7		Animal Poisons-Snake Venom Scorpion and Bee Poisoning Food Poisoning	Group Learning and Teaching, Peer Teaching	
9-11	Organ Toxicity	Hepatotoxicity Introduction susceptibility of the liver types of Liver Injury, Mechanism of Hepatotoxicity, example of hepatotoxicants	Group Learning and Teaching	
12-13		Respiratory toxicants susceptibility of the respiratory system, Types of Toxic Resoponse, ex of lung toxicants	Group Learning and Teaching	
13-16		Toxicology of Nervous System introduction the Nervous System, Toxicant effect of Nervous System Nephrotoxicity	Group Learning and Teaching	R2 273-297

Lecture Topic	Learning Objective	Topics to be Covered	Teaching Learning Strategies: a. Group Learning Teaching b. Game Based Learning c. Technology Based Learning d. Peer Teaching e. Project Based Learning	Reference)Ch./Sec/ Page No of Text Book)
17-19	Introduction of immunology	A brief introductioin of immunology, history of immunity types of immunity (innate and acquired)	Group Learning and Teaching	R2 1-20
20-22		Introduction of immune System, primary and secondary lymphoid organ	Group learning and Teaching	R2 32-46
23-24		Hematopoiesis, Inflammation	Group Learning and Teaching	R2 -25 -32
25-26	Study of B-Cell T- Cell, MHC molecule, Cytokines	Antigen and Antibody	Group Learning and Teaching	R2 58-100
27-29		B Cell and T Cell	Group Learning and Teaching	R2 247-275 R2 200-224
30-32		Major Histocompatibility Complex (MHC)-General Organization and inheritance of the MHC, Cellular Distribution, Regulation, Immue Response Disease Susceptibility Cytokines	Group Learning Teaching Technology Based Learning	R2 162-182 R2 277-297

Lecture Topic	Learning Objective	Topics to be Covered	Teaching Learning Strategies: a. Group Learning Teaching b. Game Based Learning c. Technology Based Learning d. Peer Teaching e. Project Based Learning	Reference)Ch./Sec/ Page No of Text Book)
33-34	Study of Autoimmunity, Immune deficiencies and types of vaccines.	Auroimmunity, Auto Recognition, Class of Autoimmune Disease (Hasimoto Diease) Systemic Lupus, Erythematosus, Rheumatoid arthritis	Group Learning and Teaching	R2 463-479 R2 432-459 R2 412-429
35-37		Primary and Secondary Immune Deficiencies (T cell and B cell, AIDS)		
38-40		Types of Vaccines and Vaccination (1st ,2nd and 3rd Generation Vaccines).		

Evaluation Scheme:

Student evaluation is based on the series of Tests and Lab Tests conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	10	19-02-2025	1-20	CB
Test 2	60 Minutes	10	09-04-2025	21-40	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	12-05-2025	1- 40	CB

** To be announced in the class CB= Close Book Exam OB= Open Book

Make-up Policy: Make –up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc

Date: 08/01/2025

Ms.KAJAL SAHU
Instructor-in-charge