The ICFAI University, Raipur

Faculty of Science

First Semester, 2024–2025
Course Handouts

Table of Content

The ICFAI University, Raipur

Faculty of Science
First Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
PHC111	**Mechanics and Properties of Matter**	**3**	**2**	**0**	**4**

Instructor-in-charge: Dr.ANIL KUMAR VERMA

Learning Outcomes:

Physics I form the first half of a two-semester comprehensive course on core level physics to be taught to all engineering students. The course aims at:-

1. Developing an understanding of the basic principles of physics of Mechanics & Waves motion.
2. Developing the application of concepts to problems of practical interest in Mechanics & Waves motion
3. Improving the concepts and improving the Physics problem solving skills of students.

Textbook (s) T1	Mechanics by JC Upadhyaya, Himalaya Publishing House
Text Book T2	Unified Physics B.Sc. Part-I, Navbodh Prakashan, Raipur
Text Book T3	Waves and Oscillation by JC Upadhyaya, Himalaya Publishing House
Reference Book (s) R1	Mechanics by Prof. DS Mathur, S.Chand Publication
Reference Book R2	Handbook of Physics by Walter Beneson et al. Springer Publication
Reference Book R3	D. Haliday, R. Resnick, J. Walker, Fundamentals of Physics, Sixth Edition, John Wiley & Sons, 2001

Lecture-Wise-Plan:

Lecture Nos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./Page Nos. of Text Book)
1-5	Origin of the Mechanics of particle.	Newton law of motion, Principle of conservation of linear momentum, angular momentum and energy.	T1 (1.4, 2.6, 3.7,3.8,3.9,310,3.11, 3.12) R1 (2.5, 2.6, 2.7, 5, 6)

Lecture Nos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./Page Nos. of Text Book)
6-11	Behaviours of the Dynamics of Rigid Bodies	Moment of inertia and its physical significance, Equation of motion, concept of radius of gyration, Theorem of parallel and perpendicular axes, Fly Wheels.	T1 (5.1, 5.2,5.3,5.4, 5.8, 5.11) R1 (11.1, 11.4, 11.5, 11.12, 11.13, 11.14)
12-18	Concept of the Properties of the matters	Elasticity and elastic constant, Stress and Strain, Hooks law, Types of elastic constant and relation among them.	T1(6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7) R1 (13.1, 13.2, 13.3, 13.4, 13.5, 13.6, 13.7, 13.11, 13.12, 13.13, 13.14, 13.15)
19-31	To understand the fundamentals surface tension	Definition of surface tension. Surface energy, relation between surface tension and surface energy, pressure difference across curved surface example, excess pressure inside spherical liquid drop, angle of contact. Determination of surface tension. Effect of temperature, impurity on surface tension. Applications.	T2 (4.13, 4.14, 4.16, 4.17, 4.18,)
32-42	To understand the characteristics of Viscosity.	Definition of viscous force and Viscosity. Streamline flow, turbulent flow, equation of continuity, determination of coefficient of viscosity by Poisulle's method, Stoke's method (with derivation). Effect of temperature and pressure on viscosity. Applications.	T2 (4.20, 4.21, 4.23, 4.24, 4.25, 4.26)

Experiment- Physics I (Mechanics) Lab

Sr. No.	Name of the Experiments
1.	To study and observe the Sinusoidal wave using CRO with Function generator.
2.	To study and observe the Triangular wave using CRO with Function generator.
3.	To study and observe the Square wave using CRO with Function generator.

Sr. No.	Name of the Experiments
4.	To study of Small Oscillation using a Simple/ Bar Pendulum.
5.	To study and calculate the moment of inertia using Fly Wheel.
6.	To study and Getting Familiar with Exp EYES17/ SEE lab 3.0
7.	To study ac voltage (Sinusoidal, Triangular, Square) signal using SEE lab 3.0
8.	To study the behavior of light dependent resistor (LDR) using SEE lab 3.0
9.	To study and measure the velocity of sound waves using SEE lab 3.0
10.	To Study the beats produced by two Piezo buzzers are excited by two nearby frequencies using SEE lab 3.0

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	50 Minutes	10	07-10-2024	1-11	CB
Test 2	50 Minutes	10	18-11-2024	12-31	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	**	CB
Comprehensive Exam	3 Hours	70	09-12-2024	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: 02/08/2024

Dr.ANIL KUMAR VERMA
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
First Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
CHC111	**Basic Chemistry**	**3**	**2**	**0**	**4**

Instructor-in-charge: Dr.PIYUSH KUMAR THAKUR

Learning Outcomes:
This first level course is offered in the first semester for the students of bachelor of sciences.

1. Chemical reactions and strategies to balance them.
2. The fundamental properties of atoms, molecules, and the various states of matter.
3. The electronic structure of atoms and its influence on chemical properties.
4. Predict and explain patterns in shape, structure, bonding and hybridization of molecules.
5. Understand the reactivity for hydrocarbons, halocarbons, alkenes, dienes, and arenes.

Textbook (s) T1	Concise Inorganic Chemistry, J.D.Lee, Black Well Science, OUP, 5th Edition, 1996
Text Book T2	Organic Chemistry, Reactions and Reagents, O.P. Agrawal, Krishna's Educational publishers, fifty fourth edition, 2016.
Text Book T3	University Chemistry, Bruce M. Mahan and Rollie J. Meyers, AWL publication, fourth edition, 1998.
Reference Book (s) R1	Organic Chemistry, Francis A. Carey, seventh Edition, The McGraw-Hill, 2008.
Reference Book R2	Physical Chemistry, Ira N. Levine, Fifth Edition, Tata McGraw-Hill , 2002
Reference Book R3	Ernest L Eliel, Stereochemistry of Carbon Compounds, Tata McGraw-Hill Edition, 2002.
Reference Book R4	Huheey, Keiter&Keiter, Inorganic Chemistry, Pearson Education, 2003.

Lecture-Wise-Plan:

Lecture Nos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./ Page Nos.of Text Book)
1-3	The fundamental properties of atoms, molecules, and the various states of matter.	Atomic models, subatomic particles. Electronic Configuration of elements. Idea of de-Broglie matter waves, Heisenberg uncertainty principle , Radial and angular wave functions and probability distribution curves	T1:10 – 21
4-5		Atomic orbitals, Bohr theory	T1:4 – 10
6-8		Aufbau and Pauli exclusion principles, Hund's multiplicity rule, effective nuclear charge.	T1: 21 – 24
9-14	To understand the periodic behavior of elements	**Periodic Properties** Atomic and ionic radii, ionization energy, electron affinity and electronegativity definition, methods of determination or evaluation, trends in periodic table and applications in predicting and explaining the chemical behavior	T3:656 – 678
15–16	Predict and explain patterns in shape, structure, bonding and hybridization of molecules.	Hybridization,	T1: 81 – 89
17-18		Bond Parameters and factors effecting bond parameters	T2: 15 – 29
19-20		Hydrogen bonding , Van der Waals interactions.	T2: 81 – 94
21-24		Resonance in chemical bonding	T2: 32 – 59
25-28	Understand the physical properties and chemical reactions of alkanes	IUPAC nomenclature of branched and unbranched alkanes, Isomerism in alkanes	R1: 64-76
		physical properties and chemical reactions of alkanes,	R1: 80-82
29-31		Cycloalkanes – Nomenclature, methods of formation, chemical reactions	R1: 77-78 R1: 80-82

Lecture Nos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./ Page Nos.of Text Book)
32-34		Ring strain in small rings (cyclopropane and cyclobutane)	R1: 111-112
35-36	Understand the physical properties and chemical reactions of dienes, and arenes	Nomenclature of alkenes, Structure and Bonding in alkenes	R1: 182-188
37-38		Physical and Chemical reactions of alkenes	R1: 189-205
39-40		Nomenclature, structure and bonding in alkynes	R1: 355-359
		Chemical reactions of alkynes, acidity of alkynes. E1 and E2 Mechanisms	R1: 364-372

Chemistry-I Lab:

S. No.	Name of Experiment
	Qualitative analysis of mixture containing 08 radicals including two less common metals from among the following by semi micro method
Basic radicals:	AgI, PbII, BiIII, CuII, CdII, AsIII, SbIII, SnII, FeIII, AlIII, CrIII, ZnII, MnII, CoII, NiII, BaII, CaII, MgII, NaI, KI, CeIV, ThIV, ZrIV, WVI, TeIV, TiI, MoVI, UVI, VV,BeII, LiI, AuI, PtIV,
Acid radicals:	Carbonate, sulphide, sulphate, nitrite, nitrate, acetate, chloride, fluoride, bromide, iodide, borate, sulphonate, oxalate, phosphate, silicate, thiosulphate,
2	To detect the presence of functional groups in the given organic compound.
3	To detect the presence of elements in the given organic compound.
4	To determine the strength of given HCl solution by titrating it against NaOH solution.
5	To verify the Beers-Lambert Law

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	50 Minutes	10	09-10-2024	1-18	CB
Test 2	50 Minutes	10	20-11-2024	19-32	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	**	CB
Comprehensive Exam	3 Hours	70	20-12-2024	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: 02/08/2024

Dr.PIYUSH KUMAR THAKUR
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
First Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
MAC111	**Mathematics I**	**3**	**0**	**1**	**4**

Instructor-in-charge: Dr.SHANTI SWARUP DUBEY

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

1. Recognize consistent and inconsistent systems of linear equations by the row echelon form of the augmented matrix, using the rank of matrix.
2. To find the Eigen values and corresponding Eigen vectors for a square matrix.
3. Enhance the knowledge of basic Calculus.
4. Using the knowledge of vector calculus in geometry.

Text Book T1	Differential Calculus,By Shanti Narayan& P K Mittal, S Chand & Com Ltd.
Text Book T2	Engineering Mathematics, Dr Hari Arora, S K Kataria & Sons
Text Book R1	Multivariable Calculus (Seventh Edition) by James stewart

Lecture-Wise-Plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page Nos of Text/Ref. Books)
1-2	Definition of Matrix	Types of Matrix, Systems of linear equations, Row reduction and echelon forms, Linear independence, The rank of a matrix and applications.	T 2 Ch-12 441-560
3-4	Introduction to linear transformations,	Introduction to linear transformations, The matrix of a linear transformation, Matrix operations, Determinants.	T 2 Ch-12 441-560
5-6	Inverse of a matrix	The inverse of a matrix, Characterizations of invertible matrices	T 2 Ch-12 441-560

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page Nos of Text/Ref. Books)
7-9	Eigen values and Eigen vectors	Eigen vectors and eigen values of a linear transformation, Characteristic polynomial and Cayley–Hamilton theorem, Minimal polynomial.	T 2 Ch-12 441-560
10-13	Concept of Limit and Continuity	Limit and Continuity ε-δ definition of limit of a real valued function, Limit at infinity and infinite limits;.	T1 Ch-2 69-117
14-19	Types of discontinuity; Uniform continuity.	Continuity of a real valued function, Properties of continuous functions, Intermediate value theorem, Geometrical interpretation of continuity, Types of discontinuity; Uniform continuity.	T1 Ch-2 114-117
20-24	Differentiability of a real valued function	Differentiability of a real valued function, Geometrical interpretation of differentiability, Relation between differentiability and continuity	T1 Ch-4 134-194
25-27	Differentiability of a real valued function	Rolle's theorem, Lagrange's mean value theorem, Cauchy's mean value theorem	T1 Ch-4 134-194
28-32	Differential Calculus	Successive differentiations, Leibnitz's theorem, Maclaurin's and Taylor's theorem.	T l Ch-5 204-246
33-35	Line integrals	Line integrals, Line Integrals in Space, Line Integrals of Vector Fields	R 1 Ch-16 1087-1097
36-38	Applications of line integrals	Applications of line integrals and problems	R 1 Ch-16.2 pp-1087-1097

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page Nos of Text/Ref. Books)
39-40	Green's, Stokes' and Gauss Divergence Theorem	Examples on Green's, Stokes' and Gauss Divergence Theorem	R 1 Ch-16 pp-1087-1097

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Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	50 Minutes	10	07-10-2024	1-20	CB
Test 2	50 Minutes	10	18-11-2024	21-40	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	11-12-2024	1- 40	CB

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

Date: 03/08/2024

Dr.SHANTI SWARUP DUBEY
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
First Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
SCA111	**English Language**	**2**	**0**	**0**	**2**

Instructor-in-charge: Dr.RITU ATUL BENJAMIN

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

1. Enhance comprehension skills and enrich vocabulary through the reading of short and simple passages
2. Enhance comprehension skills and enrich vocabulary through the reading of short and simple passages
3. Enhance communication skills
4. Acquaint students with social formulae used to perform various everyday functions so that they can converse in English in simple situations

Reference Books R1	English at the Workplace. Delhi: Macmillan, 2006
Reference Books R2	Everyday English. Delhi: Pearson, 2005.
Reference Books R3	Developing Language Skills 2, Delhi: Doaba House, 1995
Reference Books R4	Effective Technical communication, Ashraf Rizvi, McGraw Hill, 2005
Reference Books R5	Essentials of Business Communication, Rajendra Pal, S Chand Publication

Lecture-Wise-Plan:

Lecture Nos	Learning Objective	Topics to be covered	Reference
1-2	To develop reading skills	Reading strategies	R1
3-4	To develop reading skills	Reading newspaper articles	R1
5-6	Develop recitation skills	Reciting poems	R2
7-8	Develop narrative skills	Reading and narrating novels	R2

Lecture Nos	Learning Objective	Topics to be covered	Reference
9-10	Evaluating reading skills	Exercises based on reading	R2
11	Develop summarizing skills	Summarizing the text	R3
12	Develop paraphrasing skills	Paraphrasing the text	R4
13-14	Develop communication skills	Communication: Definition, forms, types	R5
15	Develop communication skills	Principles and barriers to communication	R5
16-20	Develop speaking skills	Socializing, Expression, greeting others, Introduction of self and others, Apologizing, excusing, Asking and giving information	R2

Classroom Practical:

S.No	Name of the Practical
1	Group Discussion & Presentation
2	Quiz based on syllabus

Evaluation Scheme:

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Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	50 Minutes	10	08-10-2024	1-12	CB
Test 2	50 Minutes	10	19-11-2024	13-20	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	16-12-2024	1- 20	CB

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

Date: 04/08/2024

Dr.RITU BENJAMIN
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
First Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
SCV111	**Quantitative Aptitude and MS Excel**	**2**	**0**	**0**	**2**

Instructor-in-charge: Mr.HEMANT KUMAR DEWANGAN

Learning Outcomes:

After completion of the course the students will be able to:

1. Understand the basic concepts of quantitative ability.
2. Acquire satisfactory competency in use of reasoning.
3. Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning Ability.
4. Compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.

Text Book T1	Quantitative aptitude for Competitive examination by R S Agarwal
Text Book T2	Magical Book on Quicker Maths by M. Tyra, Fifth Edition
Reference Book R1	A Modern Approach to Verbal & Non-Verbal Reasoning by R S Agarwal
Reference Book R2	Quantitative Aptitude by Competitive Examinations by Abhijit Guha 4th edition

Lecture-Wise-Plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference (Ch./Sec./ Page Nos. of Text
1-2	Unit – I: Quantitative Ability (Basic Mathematics)	Number Systems, LCM and HCF, Decimal Fractions	T 1
3-4		Simplification, Square Roots and Cube Roots	T 1
5-6		Average, Problems on Ages, Surds & Indices	T 1
7		Percentages, Problems on Numbers	T 1
8	Unit – II: Numerical Ability	Logarithm, Permutation and Combinations, Probability	T 1

Lecture Nos.	Learning Objective	Topics to be covered	Reference (Ch./Sec./ Page Nos. of Text
9-10		Profit and Loss	T 1
11-12		Simple and Compound Interest	T 1
13-14		Time, Speed and Distance	T 1
15-16		Time & Work, Ratio and Proportion	T 1
17-18		Area, Mixtures and Allegation	T 1
19-20	Unit – III: Data Interpretation	Data Interpretation, Tables	T 1
21		Column Graphs, Bar Graphs	T 1
22		Line Charts, Pie Chart, Venn Diagrams	T 1
23	Unit – IV: Logical Reasoning	Analogy, Blood Relation, Directional Sense	T 1
24		Number and Letter Series, Coding – Decoding	T 1
25		Calendars, Clocks	T 1
26		Seating Arrangement	T 1
27		Syllogism, Mathematical Operations.	T 1
28	Unit – V: MS Excel	Introduction to MS Excel, Manage workbook options and settings	NA
29		Apply Custom Data Formats and Layouts, Create Tables	NA
30		Perform Operations with Formulas and Functions, Create Charts and Objects	NA

Evaluation Scheme:

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Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	50 Minutes	10	09-10-2024	1-18	CB
Test 2	50 Minutes	10	20-11-2024	19-30	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	18-12-2024	1-30	CB

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Date: 03/08/2024

Mr.HEMANT KUMAR DEWANGAN
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
First Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
CAC112	**Computer Fundamental and MS Office**	**3**	**0**	**1**	**4**

Instructor-in-charge: Mrs.NISHA THAKUR

Learning Outcomes:
The learning objectives of this course are to:
After the completion of the course, the student will be able to:

1. Study and use of basic concepts and terminology of Information Technology
2. Organize files and documents in storage devices
3. Acquire knowledge of ICT and Internet Applications
4. Acquire knowledge of MS-Excel, MS PowerPoint and MS-Access
5. Develop information technology solutions by evaluating user requirements in advance

Text Book T1	P.K. Sinha, Priti Sinha —Computer fundamentals, BPB Publication
Text Book T2	Chetan Shrivastava, Fundamentals of Information Technology, Kalyan Publishers
Reference book(s) R1	M.N. Doja - Fundamentals Of Computers And Information Technology, Deep & Deep publication
Reference book(s) R2	V. Rajaraman, Introduction to Information Technology, PHI Publication

Lecture-Wise-Plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page Nos of Text/Ref. Books)
1-7	Overview of Blockchain Technology	Defining Blockchain and Distributed Ledger, Blockchain Properties Decentralized, Transparent, Immutable and secure. Blockchain Applications. Types of Blockchain: Public, private, and consortium based blockchain, Why to use Blockchain, History of Blockchain.	T l Ch-l 1.4,1.5,1.6,1.9 Notes/PDF

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page Nos of Text/Ref. Books)
8-13	Introduction to computing models and P2P networking	Centralized, Decentralized and Distributed Systems, Decentralization vs distributed, P2P systems, propertied of P2P systems, P2P communication architecture. P2P network applications: File sharing, P2P network for blockchain	T2 Ch-2 2.1,2.2,2.3,2.9 Notes/PDF
14-19	Foundational Concepts Blockchain Data Structure	Cryptographic Hash Functions, Digital Signatures, Public Keys as Identities, Decentralized Identity management, Hash Pointers, Hash chain and Merkel tree.	T1 Ch-3 3.2,3.4 T2 Ch3 3.6,3.8 Notes/PDF
20-25	Consensus Mechanisms	Consensus Mechanisms – POW, POS and other Consensus Mechanisms - Proof of storage and so on. Transactions incentivizing and mining.	T1 Ch-5 5.7,5.8 Notes/PDF
26-30	Blockchain & Cryptocurrency	Cryptocurrency as the first blockchain application. Mechanics of Bitcoin, Storing and Using Bitcoins, Mining in Bitcoin, Limitations of Bitcoin and alternative cryptocurrencies.	T1 Ch-4 4.5, 4.6 T2 Ch4 4.8,4.10 Notes/PDF
31-36	Smart Contracts and Ethereum	History, Purpose and types of smart contracts, Introduction to Ethereum, bitcoin vs Ethereum stack. P2P network in Ethereum, consensus in Ethereum, Concept - Smart contracts, Developing and executing smart contracts in Ethereum. State and data structure in Ethereum. Ethereum Virtual Machine.	T2 Ch-5 5.4,5.8 Notes/PDF
37-40	Private and Consortium based Blockchain: Hyperledger	Need for the consortium. Hyperledger stack, Multichain blockchain. Innovation in Hyperledger, distributed applications in hyperledger.	T1 Ch-5,Ch6 5.9, 6.4,7.1 T2 Ch6 6.8,7.4,7.9 Notes/PDF

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Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	50 Minutes	10	08-10-2024	1-13	CB
Test 2	50 Minutes	10	19-11-2024	14-25	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	**	CB
Comprehensive Exam	3 Hours	70	13-12-2024	1- 40	CB

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

Date: 03/08/2024

Mrs.NISHA THAKUR
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
First Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
CSC111	**Computer Programming I**	**3**	**0**	**1**	**4**

Instructor-in-charge: Mr.ASHISH KUMBHARE

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

1. Isolate and fix common errors in C++ programs
2. Manipulate various C/C++ Data types, such as arrays, strings, and pointers
3. Use memory appropriately, including proper allocation/deallocation procedures
4. Apply object-oriented approaches to software problems in C++
5. Understand and use the basic programming constructs of C/C++
6. Write small-scale C++ programs using the above skills

Text Book T1 Text Book T2	The C++ Programming Language by Bjarne Stroustrup, 3rd Edition, Pearson Publication. Programming with C++ by by John Hubbard, Atul Kahate , McGraw Hill Publication
Reference Book(s) R1	Let Us C++ by Yashwant Kanetkar, BPB publication

Lecture-Wise-Plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page Nos of Text/Ref. Books)R1
1	To learn the fundamentals of Programming	Types of Languages, Evolution of Programming Language	32-35
2-4	To learn the fundamentals of C++ Programming	Structure of a 'C++' Program, 'C++' Program development life cycle, Executing and Debugging a 'C++' Program	41-46
5-7	To learn the fundamentals of C++ Programming	Keywords and Identifiers, Operators, Constants, Variables, Data Types	61-68
8-9	To learn the fundamentals of C++ Programming	Precedence of Operators, Scope and Lifetime of Variables.	70-88

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page Nos of Text/Ref. Books)R1
10-13	To learn the Control Structures in C++	Decision Making using if statements, Types of if …else blocks	113-129
14-16	To learn the Control Structures in C++	Switch case Block, and GOTO statements	135-149
17-19	To learn the Control Structures in C++	Concept of Loop, For loop, While loop, Do while loop Jumping in Loop break and continue statement.	153-177
20-23	To learn the Arrays in C++	Introduction of Array, One-D Array, Two-D Array	231-258
24-25	To learn the Arrays in C++	Implementing String Variables, String handling Functions	266-282
26-29	To learn the Function in C++	Concept of Function, User-defined Function, System Defined Function, Types of parameter passing in function.	304-348
30-32	To learn the Pointers in C++	Need of Pointers, Types of Pointers,	356-370
33-34	To learn the Pointers in C++	Pointer Expression, Arrays of Pointers, Pointers and Functions	372-386
35-36	To learn the Structures in C++	Need of Structure, Implementing Structure Variable	401-421
37-38	To learn the Structures in C++	Arrays of Structure, Structure within Structure	423-433
39-42	To learn about Dynamic Memory Allocation	Concept of Dynamic Allocation, Implementing Malloc and Calloc Functions, Releasing the free space	506-515

Objected Oriented Programming Lab:

SN	List of Practical
1	Write a C++ program to demonstrate basic input output statements.
2	Write a C++ program to demonstrate operators.
3	Write a C++ program to demonstrate if else statement.
4	Write a C++ program to demonstrate nested if else statement.
5	Write a C++ program to demonstrate switch statement.
6	Write a C++ program to demonstrate looping statements
7	Write a C++ program to demonstrate 1D Array
8	Write a C++ program to demonstrate 2D Array
9	Write a C++ program to demonstrate Functions
10	Write a C++ program to demonstrate Pointers
11	Write a C++ program to demonstrate Structures.

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	50 Minutes	10	09-10-2024	1-12	CB
Test 2	50 Minutes	10	20-11-2024	13-28	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	20-12-2024	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: 04/08/2024

Mr.ASHISH KUMBHARE
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
First Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
BOC111	**Microbial diversity (Viruses, Bacteria, Algae, Fungi and Lichens)**	**3**	**2**	**0**	**4**

Instructor-in-charge: Mr.SHUBHUM DEWANGAN

Learning Outcomes:

1. The course aims at making the students understand the diversity among viruses, bacteria, algae, fungi and Lichens.
2. To impart an insight into the modern classifications in lower forms of plants
3. Students would have understanding of the classification, characteristics features, cell structure and growth and reproduction in viruses, bacteria, and various groups of marine and fresh water algae and their ecological and economic importance.
4. To impart basic knowledge of plant diversity.

Text Book (s) T1	Microbial diversity (Viruses, Bacteria, Algae, Fungi and Lichens) Unified Botany – 3rd year
Text Book T2	Diversity of Microbes and Cryptogams, B.P. Pandey, Botany for degree students – I Year
Reference Book R3	Introduction to botany – Bendre & Kumar

Lecture-Wise-Plan:

Lecture Nos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./ Page Nos.of Text Book)
1-2	To understand the historical background, characteristics, structures of viruses.	General Introduction of Virus and their historical background and general characteristics	T1: 96-112
3-5		Nature of viruses, Types of Viruses, Ultrastructure of Viruses, Examples of some important Viruses.	
6-8		Structure with special reference to viroid and prions; replication (general account), DNA virus (T-phage), lytic and lysogenic cycle; RNA virus (TMV).	

Lecture Nos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./ Page Nos.of Text Book)
9-11	To understand the discovery, characteristics and reproduction of Bacteria	Introduction, Discovery, General characteristics and structure of Bacterial cell.	T1: 74-95
12-15		Reproduction – vegetative, asexual and recombination (conjugation, transformation and transduction); Economic importance.	
16– 17	To Understand Characteristics, thallus organization, reproduction, life cycle pattern and classification of algae.	General Introduction, General characters, range of thallus organization, pigments of Algae.	T1:143-150
18-20		Reproduction in Algae, life cycle patterns and economic importance.	T1: 151-159 T1: 232-237
21-25		Classification, Systematic position, occurrence, structure and life cycle of following genera; volvox, Oedogonium, Chara, Voucheria, Ectocarpus, Polysiphonia	T1: 161-230
26-28	To Understand Characteristics, thallus organization, the concept of anamorph and teleomorph, and diff. groups of Fungi.	General Introduction, General characters, Range of thallus organization and structure of Fungi, Growth & Reproduction in Fungi.	T1:247-261
29-33		General characters, distribution, and biology of the following groups of fungi - a) Mastigomycotina. Type: Pythium, b) Zygomycotina. Type: Rhizopus, c) Ascomycotina. Type: Xylaria, Aspergillus d) Basidiomycotina. Types: Agaricus, Puccinia	T1:271-339
34-35		Economic importance of fungi, and Ecological importance of fungi, different modes of nutrition (pathogenic/parasitic, saprobic, symbiotic)	T1:251-253 T1:262-265

Lecture Nos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./ Page Nos.of Text Book)
36-37	To understand the classification, nutrition, reproduction and economic importance of Lichens	General Characteristics, Introduction: Type of Intahberaction between the component's symbiosis – mutualism	T1:373-379 https://tgc.ac.in/pdf/study-material/botany/Sem2_Unit7_Symbiotic_Relationships.pdf
38-40		Classification, growth forms, structure, reproduction, economic importance.	

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	50 Minutes	10	07-10-2024	1-20	CB
Test 2	50 Minutes	10	18-11-2024	21-40	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	11-12-2024	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: 04/08/2024

Mr.SHUBHUM DEWANGAN
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
First Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
ZOC111	**Systematics Diversity of Life**	**3**	**2**	**0**	**4**

Instructor-in-charge: Dr.AMENA KHANANI

Learning Outcomes:
This Course is offered in the First Year First Semester Students of Bachelor of Science

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

Lecture-Wise-Plan:

Lecture Nos	Learning Objective	Topics to be covered	Reference
1	Multicellularity	from simple collections of poorly differentiated cells to complex body plans	T4Ch.1 Pg. No.03-22
2-5	Biological diversity	Biological diversity	T5Ch.9 Pg. No.252-289
6	Animal Systematics and taxonomy	Animal Systematics and taxonomy	T3Ch.1 Pg. No.01-85
7-9	Species concept	Species concept	T2Ch.7 Pg. No.104-111

Lecture Nos	Learning Objective	Topics to be covered	Reference
10-12	Nomenclature and utility of scientific names. Classification: morphological and evolutionary	Nomenclature and utility of scientific names. Classification: morphological and evolutionary	T3Ch.1 Pg. No.01-85
13	Structure and diversity in Protists	Structure and diversity in Protists	Kingdom Protista - Characteristics and Classification of Protists (byjus.com)
14	Structure and diversity in Protists	Structure and diversity in Protists	T4Ch.16 Pg. No.264-291
15	Origin of Metazoans	Diploblastic and triploblastic organization; symmetries	Unit-3.pdf (egyankosh.ac.in)
16	body cavities	protostomes and deuterostomes	Protostomes and Deuterostomes (unacademy.com)
17		Special features and structural diversity in sponges	T3Ch.1 Pg. No.01-85
18	Cnidarians	Special features	T3Ch.4 Pg. No.86-116
19		polymorphism and division of labour	zol138.pdf (gdcollegebegusarai.com)
20	Bilateria	Basic characteristics	Bilateria - Wikipedia
21	Acoelomates	Basic organization and adaptive radiations in flatworms.	T3Ch.5 Pg. No.117-147 Microsoft Word - MSCZO501 Invertebrates final Book (uou.ac.in)
22-25	Ecdysozoa	characteristics of the representative taxa	Ecdysozoa - Wikipedia

Lecture Nos	Learning Objective	Topics to be covered	Reference
26-28	Pseudo coelomates	Basic organization and adaptive radiations in roundworms.	T3Ch.6 Pg. No.148-175
29-31	coelomates	Basic organization and diversity in Annelids	Annelid | Definition, Characteristics, Habitat, Reproduction, Diet, & Facts | Britannica
30		Basic organization of Arthropods and its diversity	Phylum Arthropoda - Characteristics & Classification Of Arthropoda (byjus.com)
31		Basic organization and diversity in Mollusca	T4Ch.31 Pg. No.604-625
32		Basic organization of Echinoderms, their affinity to Chordates	T4Ch.33 Pg. No.655-670
33	Diversity in Protochordates and Chordates	Primitive Chordates and their affinities	BSCZO 201 Book.pdf (uou.ac.in)
34		Hemichordates, Urochordates and Cephalochordates	T1Ch.02 Pg. No.16-114
35-36	Basic organization and diversity of fishes	Basic organization and diversity of fishes	T1Ch.09 Pg. No.115-220
37	Amphibian's diversity and adaptability to dual mode of life. Amniotes	Amphibian's diversity and adaptability to dual mode of life. Amniotes	Amphibian - Evolution, Classification, Adaptation | Britannica
38	Structure of amniotic egg. Birds: Adaptation from terrestrial to aerial mode of life	Structure of amniotic egg. Birds: Adaptation from terrestrial to aerial mode of life	MSc-Zoology-02Sem-Dr. Desh Deepak Chaudhary-Chordates - Structure, Function and Evolutionary Significance.pdf (igntu.ac.in)
39	Origin of Mammals	Special features of Monotremes and Marsupials	

Lecture Nos	Learning Objective	Topics to be covered	Reference
40-41		Characteristics of other mammalian groups with special reference to primates.	Characteristics of Primates (unacademy.com)
42		Characteristics of other mammalian groups with special reference to primates.	T1Ch.31 Pg. No.544-571

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	50 Minutes	10	07-10-2024	1-13	CB
Test 2	50 Minutes	10	18-11-2024	13-21	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	09-12-2024	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: 03/08/2024

Dr.AMENA KHANANI
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
First Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
SC210	**English Language II**	**3**	**0**	**0**	**3**

Instructor-in-charge: Mr.MD ZAFIR KHAN

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

1. Understand and speak English
2. Write correct English.
3. Write effective formal letters and emails
4. Participate in Group discussion and put their points effectively.
5. Understand and develop a liking for learning English.

Text Books T1	English at the Workplace II Oxford University Press
Text Books T2	Developing Language Skills I, Manohar 1997
Reference Books R1	English Language Skills-i by Aruna Koneru
Reference Books R2	English Language Skills-ii by Aruna Koneru
Reference Books R3	Soft Skills- K.Alex

Lecture-Wise-Plan:

Lecture Nos	Learning Objective	Topics to be covered	Reference
1-5	To develop efficient reading ability	Reading Novel	Novel
6-7	To prepare a presentation	Based on the novel discussed in previous class	-
7-9	Learning to write formal Letters	Business Letter	T1 R1
10-12	Learning to write report	Report Writing	T1 R1
13	Learning to send formal emails	Email Writing	T1 R1
14-16	Develop essential communication skill	English Pronunciation	T2 R1
17-20	Understanding Stress pattern	Word Stress and Rhyth	T2 R1

Lecture Nos	Learning Objective	Topics to be covered	Reference
21-22	Developing fluency in speaking	Speaking on the telephone	T2
23	Develop listening skills	Use of expressions	T2

Classroom Practical:

S.No	Name of the Practical
1	Group Discussion
2	Preparation and presentation on subject based and current topic
3	Writing practice for formal communication

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	50 Minutes	10	24-09-2024	1-20	CB
Test 2	50 Minutes	10	12-11-2024	21-40	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	06-12-2024	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: 01/08/2024

Mr.MD ZAFIR KHAN
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
First Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
SC211	**Wave and Optics (Physics III)**	**4**	**2**	**0**	**5**

Instructor-in-charge: Dr.ANIL KUMAR VERMA

Learning Outcomes:
Physics III form the first half of a two-semester comprehensive course on core level physics to be taught to all Bachelor of Science (Mathematics) Students.

Textbook (s) T1	Unified Physics for B.Sc. 1st by R.P. Goyal, Shivlal Agrawal & Company
Textbook T2	Engineering Physics by Dattu Prasad Ramanlal Joshi, McGraw Hill (Seventh Reprint) 2016
Reference book (s) R1	Physics for Degree Students B.Sc. First Year by C.L. Arora, S. Chand Publication
Reference Book R2	A Textbook of Engineering Physics, by Avadhanulu M.N. & K shirsagar P.G., 2010 Edition

Lecture Nos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./ Page Nos. of Text Book)
1-3	To learn Basics of Waves and Interference	Wave Motion: Plane and Spherical Waves. Longitudinal and Transverse Waves	T1 (5.1)
4-5		Plane Progressive (Travelling) Waves. Wave Equation.	T1 (5.2)
6-8		Particle and Wave Velocities. Superposition of two perpendicular Harmonic Oscillations	T1 (5.5, 6.1, 6.2)
9-12		Graphical and Analytical Methods. Lissajous Figures (1:1 and 1:2) and their uses.	T1 (6.4, 6.5)
13-15		Interference: Division of amplitude and wave front. Young's double slit experiment	T2 (1.1 – 1.9)

Lecture Nos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./ Page Nos. of Text Book)
16-17	Understanding formation of interference patterns and its application	Fresnel's Bi-prism. Phase change on reflection	T2 (1.10)
18-19		Stokes' treatment. Interference in Thin Films, parallel and wedge-shaped films	T2 (1.12-1.13)
20-21		Newton's Rings: Measurement of wavelength and refractive index.	T2 (1.16)
22-23	Understanding formation of Diffraction patterns and its application	Fraunhoffer diffraction: Single slit.	T2 (2.1-2.5)
24-27		Fraunhoffer diffraction: N slit.	T2 (2.6)
28-33		Resolving power of grating	T2 (2.7)
34-35	Understanding ray optics for a system of lenses	Geometrical Optics, Cardinal points of an coaxial optical system, Newton formula	R2 (40.1-40.9)
36-39	Learning about the Polarization and its application	Polarized light, Polarization by Reflection, Brewster's law, Malus Law, Double refraction, Uniaxial and Biaxial Crystals	T2 (4.1-4.6)
40-42		Light propagation in Uniaxial Crystals, Principal Section, Principal Plane, Nicole Prism, Types of Polarized light, Phase Retardation	T2 (4.7-4.9)

Evaluation Scheme: Physics I (Lab)

S.No	Name of Experiment
1	To find the refractive index of the material of prism using spectrometer.
2	To determine the dispersive power of prism using spectrometer
3	To determine the grating element of a grating using spectrometer
4	To verify Kirchhoff's Law of Voltage and Current
5	Resonance in LCR circuit

S.No	Name of Experiment
6	I-V Characteristic of a Solar Cell
7	I-V Characteristic of PN Junction Diode.
8	To find the frequency of a wave inputted from a function generator using Cathode Ray Oscilloscope (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	50 Minutes	10	23-09-2024	1-17	CB
Test 2	50 Minutes	10	11-11-2024	18-35	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	04-12-2024	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: 02/08/2024

Dr.ANIL KUMAR VERMA
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
First Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
SC212	**Physical Chemistry (Chemistry III)**	**4**	**2**	**0**	**5**

Instructor-in-charge: Dr.PRATIK KUMAR JAGTAP

Learning Outcomes:
This course is offered in the first semester for the Second year students of bachelor of sciences.

1. Pinpoint the historical aspects of development of quantum mechanics
2. Understand and explain the differences between classical and quantum mechanics
3. Understand the idea of wave function
4. Understand the uncertainty relations
5. Explain thermodynamically the operation of a concentration cell, and be able to predict the concentration in the cell based on the cell potential

Textbook (s) T1	The Elements of Physical Chemistry, Peter Atkins and Julio de Paula, Fourth edition, Oxford University Press, 2005.
Textbook (s) T2	Concise Inorganic Chemistry, J.D. Lee, Black Well Science, OUP, 5th Edition, 1996
Textbook (s) T3	Organic Chemistry, R.T. Morrison and R. Boyd, Prentice- Hall, Sixth Edition, 2002.
Textbook (s) T4	Physical Chemistry, G.K. Vemulapalli, PHI learning private limited, 2002.
Reference book (s) R1	Physical Chemistry, Ira N. Levine, Fifth Edition, Tata McGraw-Hill, 2002.
Reference book R2	Ernest L Eliel, Stereochemistry of Carbon Compounds, Tata McGraw-Hill Edition, 2002.
Reference book R3	Huheey, Keiter & Keiter, Inorganic Chemistry, Pearson Education, 2003.

Lecture-Wise-Plan:

Lecture Nos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./ Page Nos. of Text book)
1-3	To understand the transformation of energy from heat into work and vice versa	Thermodynamics - first law Work & heat, internal energy and enthalpy.	T1:2.1 – 2.8
4-6	To understand the role of enthalpy in chemistry	Thermo chemistry Enthalpy changes accompanying Physical Change and Chemical Change	T1:3.1 – 3.7
7-10	To understand the concept of entropy and Gibbs energy	Thermodynamics – Second Law Entropy and second law, absolute entropies and Third law, The Gibb's energy	T1: 4.1 – 4.11
11 - 14	To understand the redox reactions involved in electrochemical cells, cell potentials and applications of standard potentials	Electrochemistry - The migration of ions, electrochemical cells, The cell potential. Application of standard potentials	T1:9.2 – 9.13
15– 18	Principles of quantum mechanics to calculate observables on known wave functions.	Elementary Quantum Mechanics-l Black body radiation, Planck's radiation law, photoelectric effect	R1: 591 – 594
19 -20		Bohr's model of hydrogen atom and its defects.	T2: 4-10
21-24		De Broglie Hypothesis, Heisenberg's uncertainty principle, Sinusoidal wave equation,	R1: 595-599
25- 28	Solve time-dependent and time- independent Schrödinger equation for simple potentials.	Schrodinger's wave equation and its importance, Postulates of quantum mechanics.	T4: 366-373
29 - 30		Particle in a one dimension box.	R1: 606-610
31-33		Quantum numbers and their importance, radial wave function, angular wave function.	T2: 15-20

Lecture Nos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./ Page Nos. of Text book)
34-35	Knowledge about fundamental quantum mechanical process for forming of Molecular Orbitals from Atomic Orbitals	Molecular orbital theory (Basic Idea),	T2:98-117
36-38		Physical Picture of bonding and bonding wave function, Concept of л,л*,σ,σ* orbitals and their characteristics, Construction of M.O's by LACO-H2 ion	T2: 89-98
39-40		Hybrid orbitals-Sp-,Sp2, Sp3 Introduction to valence bond model of H2	T2:80-87

Chemistry III (Lab):

S. No.	Name of Experiment
1	To determine the enthalpy of neutralization of strong acid (hydrochloric acid) and strong base (sodium hydroxide).
2	T To determine the composition of a given binary mixture (ethanol-water) from the study of the viscosity-composition curve at lab temperature.
3	To determine the strength and normality of given acid solution (approx. *N*10 HCL) by titrating it against standard 0.5 Na OH solution conduct metrically.
4	To determine the strength of given weak acid (CH_3COOH) solution by titrating it against standard base (Na OH) solution conduct metrically.
5	To detect the presence of elements in the given organic compound.
6	To determine the strength of given HCL solution by titrating it against Na OH solution using pH meter
7	To standardize the given acid solution like (HCL) pH metrically
8	To determine the strength of given mono basic acid (like HCL) potentiometric ally
9	Determine experimentally the partition coefficient of I2 in CCI4 and water.
10	To determine the enthalpy of neutralization of a weak acid (say acetic acid) versus strong base (say Na OH) and determine the enthalpy of ionization of the weak acid.

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	50 Minutes	10	25-09-2024	1-15	CB
Test 2	50 Minutes	10	13-11-2024	16-30	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	11-12-2024	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: 02/08/2024

Dr.PRATIK KUMAR JAGTAP
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
First Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
SC213	**Ordinary Differential Equation**	**4**	**0**	**0**	**4**

Instructor-in-charge: Dr.SHANTI SWARUP DUBEY

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

1. Solution of first and first degree differential equation
2. Solution of Exact differential equation
3. Second order Linear Differential Equation
4. Basic concept power series method

Text Book T1	Ordinary and Patial Differentail Equation, M D Raisinghania, S Chand and Company, New Delhi
Reference Book (R1)	B.Rai, D.P Choudhary and H.I Freedman (2013) A course in ordinary differential Equations (2^{nd} Edition)
Reference Book (R2)	Daniel A. Murray(2003) Introductory course in differential Equations, Orient

Lecture-Wise-Plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page Nos of Text/Ref. Books)
1-4	First Order Differential Equations	Basic concepts and genesis of ordinary differential equations,	T l Ch-1 1.3-1.35
5-8	To find the order and degree of a differential equation	Differential equations of first order and first degree.	T1 Ch-2 2.1-2.76
9-14	Homogeneous Linear differential Equation	Equations in which variables are separable, Homogeneous equations, Linear differential equations and equations reducible to linear form	T1 Ch-2 2.6
15-19	Exact differential equations	Exact differential equations, Integrating factor, First order higher degree equations solvable for x, y and p.	T1 Ch-2 2.12

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page Nos of Text/Ref. Books)
20-21	Picard's method of successive approximations	Picard's method of successive approximations and the statement of Picard's theorem for the existence and uniqueness of the solutions of the first order differential equations.	T1 (Part-II) Ch-1 1.3-1.25
22-26	Second Order Linear Differential Equations	Statement of existence and uniqueness theorem for linear differential equations, General theory of linear differential equations of second order with variable coefficients;.	T1 Ch-10 10.1-10.58
27-30	Method of variation of parameters	Method of variation of parameters and method of undetermined coefficients, Reduction of order, Coupled linear differential equations with constant coefficients	T1 Ch-7 7.1-7.26
31-33	Higher Order Linear Differential Equations	Principle of superposition for a homogeneous linear differential equation, Linearly dependent and linearly independent solutions on an interval, Wronskian and its properties	T1 Ch-10 10.1-10.58
34-38	Series Solutions of Differential Equations	Power series method, Legendre's equation, Legendre polynomials, Rodrigue's formula, Orthogonality of Legendre polynomials, Frobenius method,	T1 CH7,7.1-7.6, Ch-9 9.1-9.50
39-43	Bessel's equation, & Recurrence relations.	Bessel's equation, Bessel functions and their properties, Recurrence relations.	T1 Ch-11 11.1-11.45

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	50 Minutes	10	23-09-2024	1-18	CB
Test 2	50 Minutes	10	11-11-2024	19-35	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	11-12-2024	1-43	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: 01/08/2024

Dr.SHANTI SWARUP DUBEY
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
First Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
SC214	**Database Management System**	**4**	**2**	**0**	**5**

Instructor-in-charge: Dr.PALAK KESHWANI

Learning Outcomes:
After Successful Completion of this course, students will be able to:

1. Understand fundamental database concepts and the role of DBMS in application.
2. Use SQL proficiently to create, query, and manipulate databases.
3. Design normalized database schemes and implement complete database systems.
4. Ensure data integrity and consistency through effective transaction management.

Textbook T1	Database System Concepts, Silberschatz A, Korth HF, and Sudarshans, TMH, 2002
Reference Book(s) R1	Database Mangaement Systems, Ramakrishna R. and Gehrke J, 3rd Edition, Mc-GrawHill, 2002
Reference Book(s) R2	Database Systems-The Complete Book, Hector G Molina, Jeffrey D.Ullmanand Jennifer Widoim, Pearson Education, 2002
NPTEL	https://nptel.ac.in/courses/106/105/106105175/
SWAYAM	https://onlinecourses.swayam2.ac.in/cec19_cs05/preview

Lecture-wise-plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page Nos. of Text/Ref. Books)
1-3	Introduction to Database Systems	Course overview, Overview of modern DBMS, Database Architecture	T1: 1.1-1.13
4-7	About Database	Data Independence, Data Dictionary, Types of Keys	T1: 2.1-2.13
8-10	Data modeling	Basic elements of ER model, Entities, Attributes and Entity sets, Relationship and Relationship sets Types of Relationship	T1: 7.1-7.10

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page Nos. of Text/Ref. Books)
11-14	Introduction to SQL	DDL & DML Commands	T1: 3.1-3.9
15-17	Understanding additional SQL structures	Insert, Delete, Update, View - Definition And Use, Temporary Tables	T1: 4.1-4.5
18-20	Integrity constraints	Integrity constraints: Not null, unique, check, primary key, foreign key, references	T1: 4.4-4.5
21-25	Types of Operators and Functions	In, Between, Like, Aggregate Functions, Nested Queries, Triggers	T1: 5.1-
26-30	Formal Query Languages	Relational algebra operators, Selection and projection, set operations , renaming, Joins, Division, Relational algebra queries	T1: 61.-6.4
31-35	Database design through Functional Dependencies & Normalization	Functional dependencies, Normal Forms: 1NF,2NF, 3NF, BCNF, Multi-valued dependencies:4NF,5NF	T1: 8.1-8.9
36-38	B Tree, B + Tree	Introduction and operations of B Tree, B+ Tree	T1: 12.1-12.8
39-40	Latest Technologies	Introduction to Hadoop, Big-Data, Data warehouse	T1: 14.1-14.10

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	50 Minutes	10	25-09-2024	1-14	CB
Test 2	50 Minutes	10	13-11-2024	15-30	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	11-12-2024	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: 02/08/2024

Dr.PALAK KESHWANI
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
First Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
SC215	**Basic Body Plan of Flowering Plan**	**4**	**2**	**0**	**5**

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

Textbook (s) T1	Structure Development And Reproduction in Flowering Plants, B.P Pandey, Botany for degree students, Bsc 2nd year
Textbook (s) T2	Structure Development And Reproduction in Flowering Plants, Unified Botany, Bsc 2nd year
Textbook (s) T3	Botany for degree students – Bryophyta: Vashishtha et al.
Textbook (s) T4	The Embryology of Angiosperms: Bhojwani and Bhatnagar.

Lecture-wise-plan:

Lecture Nos.	Learning objectives	Topics to be covered	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.	T2: 339-350, T2: 352-372, T2: 458-483
3-5		Diversity in plant form in annuals, biennials and perennials.	
6-9		The root system: the root apical meristem; differentiation of primary and secondary tissues and their roles; structural modification for storage, respiration, reproduction and for interaction with microbes.	

Lecture Nos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./ Page Nos.of Text Book)
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)	T2: 374-395
13-15		General Introduction of Secondary growth, cambium and its functions; formation of secondary xylem, a general account of wood structure in relation to conduction of water and minerals; characteristics of growth rings.	T2: 398-408
16-18		Wood and Wood Structure, Types and role of woody skeleton; secondary phloem - structure-function relationships, periderm.	T2: 408-416
19– 20	To understand the origin, development, arrangement, diversity in size and shape and internal structure of Leaf.	General Introduction of Leaf: origin, development, arrangement and diversity in size and shape;	T2: 425-443
21-23		Internal structure in relation to photosynthesis and water loss; adaptations to water stress; senescence and abscission in Leaf.	T2: 443-456
24-26	To understand the modified shoot, structure, development, functions of flowers.	General Introduction of Flower : a modified shoot ; structure, development and varieties of flower, functions,	T2: 486-504
27-29		General Introduction, structure of anther and pistil, the male and female gametophytes.	T2: 506-532
30-32		General Introduction, Types of pollination, attractions and rewards for pollinators; pollen-pistil interaction, self-incompatibility	T2:534-550
33-35			

Lecture Nos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./ Page Nos.of Text Book)
		Fertilization: events of double fertilization, significance, formation of seed-endosperm and embryo.	T2:551-566
36-38	To understand the development and maturation of fruits.	Fruit development and maturation. Significance of seed: suspended animation; formation of seed, Seed dormancy, dispersal strategies	T2:568-595
39-42		General Introduction of Vegetative reproduction: vegetative propagation, grafting, economic aspects.	T2:597-619

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	50 Minutes	10	23-09-2024	1-18	CB
Test 2	50 Minutes	10	11-11-2024	19-42	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	02-12-2024	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: 03/08/2024

Mr.SHUBHUM DEWANGAN
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
First Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
HSC211	**Elements of Spectroscopy**	**4**	**2**	**0**	**5**

Instructor-in-charge: Dr.ARUN KUMAR SINGH

Learning Outcomes:
Physics H1 form the first half of a two-semester comprehensive course on core level physics to be taught to all Bachelor of Science (Mathematics) students.
The course aims at:-

1. Developing an understanding of the basic principles of Spectroscopy.
2. Developing the application of concepts to problems of practical interest.
3. Improving the concepts and improving the problem solving skills of students.
4. To study the details of molecular spectra.
5. To study the characterization of materials.

Text Book (s) T1	Unified Physics for B.Sc. 1st by R.P. Goyal, Shivlal Agrawal & Company
Text Book T2	Atomic and Molecular Spectra : LASER, by Raj Kumar, Kedar Nath Ram Nath Publishers, Reprint (2018)
Reference Book (s) R1	Introduction to Magnetic Resonance Spectroscopy ESR, NMR, NQR by D. N.Sathyanarayana
Reference BookR2	A Textbook of Engineering Physics, by Avadhanulu M.N. & Kshirsagar P.G., 2010 Edition

Lecture-Wise-Plan:

Lecture Nos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./ Page Nos. of Text Book)
1-3	Atomic Models	Bohr's Model of an atom, Hydrogen spectra,	
4-5		Somerfield's Model,	
6-8		Vector atom model of an atom,	
9-12		Atom Spectra, Zeeman Effect,	
13-15		Paschen Back Effect, Stark Effect.	

Lecture Nos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./ Page Nos. of Text Book)
16-17	Spectroscopy Terms and Coupling	Spectroscopic Terms, L-S coupling, J-J Coupling,	
18-19		Selection Rule for LS, JJ Coupling, Equivalent and Non-equivalent electrons.	
20-21		Land g Factor, Term separation in Doublet, Alkali.	
22-23	Spectral analysis	Hyperfine Splitting, Broadening of Spectral Line, X-ray Spectra.	
24-27		Raman spectroscopy: Qualitative treatment of Rotational Raman effect; Effect of nuclear spin, Vibrational Raman spectra,	
28-33		Stokes and anti-Stokes lines; their intensity difference, rule of mutual exclusion.	
34-35	Molecular Spectra	Rotation spectroscopy: Selection rules, intensities of spectral lines,	
		Determination of bond lengths of diatomic and linear triatomic molecules.	
		Vibrational spectroscopy: Classical equation of vibration, computation of force constant, amplitude of diatomic molecular vibrations.	
36-39	Characterization of Materials	Electronic spectroscopy: Franck-Condon principle, electronic transitions,	
40-42		singlet and triplet states, fluorescence and phosphorescence,	
		Nuclear Magnetic Resonance (NMR) spectroscopy: Principles of NMR spectroscopy.	

Physics Lab

S. No.	Name of Experiment
l	Performance characteristics of a spectrophotometer.
2	Spectrophotometric analysis of a mixture.
3	Study the absorption of monochromatic light using colorimeter.
4	To verify the Beer-Lambert's law of absorption.
5	To find the frequency of a wave inputted from a function generator using Cathode Ray Oscilloscope (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	50 Minutes	10	24-09-2024	1-19	CB
Test 2	50 Minutes	10	12-11-2024	20-35	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	09-12-2024	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: 02/08/2024

Dr.ARUN KUMAR SINGH
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
First Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
HSC212	**Solid State Chemistry**	**4**	**2**	**0**	**5**

Instructor-in-charge: Dr.PRATIK KUMAR JAGTAP

Learning Outcomes:

1. The objective of a solid state chemistry is to describe specific crystal structures by applying basic crystallographic concepts.
2. To account on the generation of X-ray radiation and its effects of on matter.
3. To describe the experimental use of the diffraction phenomenon. Use powder diffraction data for characterising cubic substances.
4. In solid-state chemistry, we study the concept of a compound in a deeper level. It basically helps us understand the compound from a molecular level to the crystal structure level.
5. To understand the types of molecular defects and their significance

Textbook (s) T1	Chemistry for Degree Students (B.Sc. First) by Dr. K.N. Bapat, Dr. A. Pollai, S. Ghosh, P. Gupta & Dr. V. Ayachit
Textbook (s) T2	Unified Physics for Degree Students (B.Sc. Final) by Dr.R.P. Goyal
Textbook (s) T3	Chemistry for degree students, Dr. R. L. Madan, S. Chand Publication
Reference Book R1	Spectroscopy by H Kaur, PragatiPrakashan.
Reference Book R2	A textbook of Engineering Physics by MN Avadhanulu and PG Kshirsagar, S. Chand Publication, First Edition
Reference Book R3	Solid State Chemistry, Gurtu and Gurtu Publisher: Pragati Prakashan

Lecture-wise-Plan:

Lecture Nos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./Page Nos.of Text Book)
1-3	Unit I	Magnetic field Strength, Magnetic moments, Magnetization	T3:507 – 530
4-5		Magnetism: -Dia-magnetism, Para-magnetism, Ferro-magnetism, Anti-Ferro-magnetism, Ferri- magnetism,	T3:539 – 541

Lecture Nos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./Page Nos.of Text Book)
6-7	Unit I	Hard and Soft magnets Di-magnetism, Para- magnetism, Ferro-magnetism, Anti-Ferro-magnetism,	T3:545-553
8-9		Ferri-magnetism, Hard and Soft magnets	T3:541-545
10-11	Unit II	Single crystalline, polycrystalline and amorphous materials	T3: 570-625
12-13		Single crystals: unit cell, crystal systems, Bravais lattices	
14-16		directions and planes in a crystal, Miller indices – inter-planar distances	
17 -18	Unit III	Coordination number and packing factor for SC, BCC, FCC, ECC	
19-20		Crystal imperfections: point defects,	T1:3.1 – 3.7
20-21		Line defects	T1: 4.1 – 4.11
22-23		Crystalline solid, non-crystalline solid,	T1:9.2 – 9.13
24-25	Unit IV	Electrical Conduction, Band Theory, Conduction Mechanism,	T1: 10.3 – 10.11
26-28		Intrinsic & Extrinsic Semiconductor, Effect of Temperature, Di-electric property	T3: 570-625
29-30		Symmetry elements and symmetry operations	T3:4.14 – 4.19
31		Solid state reactions – Ceramic method, sol-gel method	T3: 4.20, 3.3 – 3.5, 13.10 – 13,14
32-33		Point group and space group	T3:8.6
34-36	Unit V	Liquid crystals: Nematic, Cholesteric, Smectic. Scanning electron	
37-40		microscopy (only introduction and application X- ray structure determination (NaCl and KCl only) – powder methods	

Chemistry Lab

S.No	Name of Experiment
1	The estimation of available chlorine in bleaching powder
2	Determination of Calcium and Magnesium in Limestone's and Dolomites
3	To estimate the percentage of iron in magnetite ore solution.
4	To estimate the percentage of iron in haematite ore solution.
5	To determine and separate the constituents like Copper, Zinc, Tin, Lead, and Iron in brass (VL)
6	To precipitate nickel from the solution by adding dimethyl glyoxime.(VL)
7	To study various crystals structures. (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	50 Minutes	10	24-09-2024	1-18	CB
Test 2	50 Minutes	10	12-11-2024	19-35	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	09-12-2024	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: 02/08/2024

Dr.PRATIK KUMAR JAGTAP
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
First Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
HSC213	**Set Theory and Metric Space**	**4**	**0**	**0**	**4**

Instructor-in-charge: Ms.YOGITA CHANDRAKAR

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

1. About SETs.
2. Metric Spaces.
3. Compactness and Connectedness of SETs.

Text Book T1	S. C. Malik and Savita Arora. Mathematical Analysis.
Reference Book(s)	S. Kumaresan (2011). Topology of Metric Spaces.
Reference Book(s)	Set Theory and Metric Spaces by Irving Kaplansky.

Lecture-Wise-Plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page Nos of Text/Ref. Books)
1-10	Set Theory	Definitions of Set, finite and Infinite set, Countable and Uncountable Set, Zorn's lemma , Cantor's theorem, POSET.	T /Ch-1/1-43
11-22	Metric Spaces	Definitions and examples of Metric spaces. Point Set Topology of Metric spaces	T /Ch-19/ 706-731
23-30	Complete Metric Spaces and Continuous Functions.	Cauchy and Convergent sequences, Completeness of Metric spaces, Dense sets, Continuous and Uniformly continuous functions	T/ Ch-19/732-754
31-35	Compactness	Compact Spaces, sequential compactness BWP, Heine-Borel theorem, Totallybounded sets, Equivalence of compactness and sequential compactness, continuous function on compact spaces.	T/ Ch-19/ 755-771

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page Nos of Text/Ref. Books)
36-40	Connectedness	Separated sets, connected and disconnected sets, continuous functions n connected sets,	T/ Ch-19/ 772-780

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	50 Minutes	10	24-09-2024	1-20	CB
Test 2	50 Minutes	10	12-11-2024	21-40	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	09-12-2024	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: 02/08/2024

Ms.Yogita Chandrakar
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
First Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
HSC214	**Data Science Using Python**	**3**	**1**	**0**	**4**

Instructor-in-charge: Mrs.Nisha Thakur

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 an understanding of the basic principles of Data Science and its 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.

Textbook (s) T1	Statistics (wikibooks.org)
Reference book (s) R1	Lecture Series from Youtube (Channel-Codebasics) (YouTube links are provided)

Lecture Nos.	Learning objectives	Topics to be covered	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: quantitative and qualitative, attributes variables	https://nptel.ac.in/courses/110/106/110106064/ (Module-01)
4-5		Scales of measurement nominal, ordinal, interval and ratio. Presentation: tabular and graphical.	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	https://www.investopedia.com/terms/l/log-normal-distribution.asp & https://www.youtube.com/watch?v=dX5pw_sQUmc

Lecture Nos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./ Page Nos. of Text Book)
9-12		Statistics for data science, machine learning, Median, Mean, Mode, Percentile Math	23-32 & https://www.youtube.com/watch?v=t4LOv9h-FJM
13-15		Statistics for data science, machine learning, Normal Distribution, Z Score, t Score	https://www.youtube.com/watch?v=okhrFgaUwio
16-17		Z test and t test for interpretation of Math, Statistics for data science, machine learning	
18-19	Understanding prediction for univariate and multivariate dataset	Introduction to Machine Learning, Linear Regression Single Variable	https://www.youtube.com/watch?v=8jazNUpO3lQ&list=PLeo1K3hjS3uvCeTYTeyfe0-rN5r8zn9rw&index=2
20-21		Linear Regression Multiple Variables, Gradient Descent and Cost Function	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
21-23		Training and Testing Data	https://www.youtube.com/watch?v=fwY9Qv96DJY&list=PLeo1K3hjS3uvCeTYTeyfe0-rN5r8zn9rw&index=7
24-27		Logistic Regression (Binary Classification), Decision Tree	https://www.youtube.com/watch?v=zM4VZR0px8E&list=PLeo1K3hjS3uvCeTYTeyfe0-rN5r8zn9rw&index=8 & https://www.youtube.com/watch?v=PHxYNGo8NcI&list=PLeo1K3hjS3uvCe

Lecture Nos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./ Page Nos. of Text Book)
			TYTeyfe0-rN5r8zn9rw&index=10
28-33		Support Vector Machine (SVM)	https://www.youtube.com/watch?v=FB5EdxAGxQg&list=PLeo1K3hjS3uvCeTYTeyfe0-rN5r8zn9rw&index=11
34-35	Learning about the minimization of factors for effective predictions	Eigen Systems, Factor Analysis, Notation	Printed Notes Contents
36-42		Principal Components Analysis (PCA) Exploratory Factor Analysis	Printed Notes Contents
40-42	Understanding the	Hypothesis Testing, P-value, using one & two sample Z-test and one & two sample T-test	Printed Notes Contents

Data Science LAB:

S. No.	Name of Experiment
1	To implement the outlier removal using Z-score and percentile of a sample dataset using Python.
2	To normalize the data using various scaling techniques using Python.
3	To implement the Linear regression technique for prediction using a sample historical univariate dataset using python.
4	To illustrate the use of dummy variable for a sample dataset for prediction with Linear regression using python.
5	To implement a classification problem by means of Decision Tree using Python.
6	To implement the Logistics regression technique for prediction using a sample historical univariate dataset using python.
7	To implement Hypothesis Testing using Z-test in Python
8	To implement Hypothesis Testing using t-test in Python
9	To implement the use of Principal Component Analysis (PCA) for prediction using Python.

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	50 Minutes	10	24-09-2024	1-12	CB
Test 2	50 Minutes	10	12-11-2024	13-36	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	09-12-2024	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: 03/08/2024

Mrs.Nisha Thakur
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
First Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
HSC215	**Genetics**	**4**	**2**	**0**	**5**

Instructor-in-charge: Dr.AMENA KHANANI

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

1. Define and describe different terminology and concepts in genetics.
2. Articulate the causes and effects of alterations in chromosome number and structure.

Text Book T1	Biotechnology and Genomics, P.K Gupta.
Text Book T2	Biotechnology, B.D Singh
Text Book T3	Cell Biology, Genetics, Evolution and Plant Breeding, P.K Gupta
Text Book T4	Cytology, Genetics, Evolution and Ecology, P.K Gupta.
Text Book T5	Unified Botany III, N.B Singh

Lecture-Wise-Plan:

Lecture Nos	Learning Objective	Topics to be covered	Reference
1	DNA: Structure	DNA: Structure	T5Ch.12 Pg. No.593-620
2-5	Types and Replication	Types and Replication	T5Ch.12 Pg. No.593-620
6	RNA: Structure	RNA: Structure	T5Ch.13 Pg. No.621-635
7-9	Type and Function	Type and Function	T5Ch.13 Pg. No.621-635
10	Mendel's work on transmission of traits	Mendel's work on transmission of traits	T5Ch.5 Pg. No.455-471
11	Genetic Variation	Genetic Variation	T4Ch.13 Pg. No.621-635
12	Molecular basis of Genetic Information	Molecular basis of Genetic Information	T4Ch.13 Pg. No.621-635

Lecture Nos	Learning Objective	Topics to be covered	Reference
13-14	Principles of Inheritance	Chromosome theory of inheritance	T3Ch.6 Pg. No.55-59
15	Incomplete dominance and co dominance	Incomplete dominance and co dominance	T3Ch.6 Pg. No.55-59
16	Multiple alleles	Multiple alleles	T3Ch.5 Pg. No.48-54
17	Lethal alleles	Lethal alleles	T3Ch.5 Pg. No.42-47
18	Epistasis	Epistasis	T3Ch.13 Pg. No.146-160
19-20	Pleiotropy, sex linked inheritance	Pleiotropy, sex linked inheritance	T3Ch.6 Pg. No.55-59
21	Extra-chromosomal inheritance	Extra-chromosomal inheritance	T3Ch.6 Pg. No.55-59
22-25	Linkage and crossing over	Recombination frequency as a measure of linkage intensity	T3Ch.7 Pg. No.60-77
26-28	Two factor and three factor crosses	Two factor and three factor crosses	T3Ch.7 Pg. No.60-77
29-31	Interference and coincidence	Interference and coincidence	T3Ch.7 Pg. No.60-77
32-34	Somatic cell genetics - an alternative approach to gene mapping	Somatic cell genetics - an alternative approach to gene mapping	T3Ch.7 Pg. No.60-77
35-37	Mutations Chromosomal Mutations	Deletion, Duplication, Inversion, Translocation, Aneuploidy and Polyploidy	T3Ch.14 Pg. No.161-304
38-39	Gene mutations	Gene mutations	T3Ch.14 Pg. No.161-304
40-41	Induced versus Spontaneous mutations	Induced versus Spontaneous mutations	T3Ch.14 Pg. No.161-304
42	Back versus	Suppressor mutations	T3Ch.14 Pg. No.161-304
43	Sex Determination	Chromosomal mechanisms, dosage compensation	T3Ch.9 Pg. No.87-105

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	50 Minutes	10	24-09-2024	1-11	CB
Test 2	50 Minutes	10	12-11-2024	12-21	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	09-12-2024	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: 02/08/2024

Dr.AMENA KHANANI
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
First Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
SC310	**Personality Development**	**3**	**0**	**0**	**3**

Instructor-in-charge: Mr.Md ZAFIR KHAN

Learning Outcomes:

1. After successful completion of the course student will be able to
2. It helps understand personality traits and formation and vital contribution in the world of business.
3. the course makes the students aware about the various dynamics of personality development.
4. The course aims to cause a basic awareness about the significance of soft skills in professional and inter-personal communications and facilitate an all-round development of personality.
5. Hard or technical skills help securing a basic position in one's life and career.

Text Books T1	Hurlock Elizabeth B Personality Development Tata Mcgraw Hill New Delhi
Text Books T2	Understanding Psychology: By Robert S Feldman. (Tata McGraw Hill Publishing)
Text Books T3	Personality Development and Career management: By R.M.Onkar (S Chand Publications)
Reference Books R1	Effective Business Communication – H.Murphy.
SWAYAM	https://onlinecourses.swayam2.ac.in/cec19_mg36/preview
NPTEL	https://onlinecourses.nptel.ac.in/noc22_hs77/preview

Lecture-Wise-Plan:

Lecture Nos	Learning Objective	Topics to be covered	Reference
1-4	Introduction to Personality	The concept personality- Dimensions of theories of Freud & Erickson-personality	T1
5-7	To learn the significance of PD	Significant of Personality development	T2
7-10	Understanding Success and Failure	The concept of success and failure	T2

Lecture Nos	Learning Objective	Topics to be covered	Reference
11-12	The basics of Self analysis	SWOT analyses	T1
13-15	Aspects of Personality	Exploring habits, attitudes, preferences and experience	T1
16-17	Understanding ways to improve Self	Personal Performance	T1
17-19	To know the areas of self-analysis	Area of Expertise, Ambition, Feeling, Emotion	T1
20-22	Understand basics of life	Life Story, Confusion and Uncertainty	T2
23-26	Understand and manage Stress	Stress	T2
27-30	Development of Personality	Aspects of Personality Development	T3
31-33	Positive outcome of PD	Leadership, Character building and Team work	T3
34-36	Other areas of PD	Time management, Ethics And Etiquette	T3
37-40	Practically elevate the learner's Self	Resume Building, Group Discussion, Interview	R1

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	50 Minutes	10	23-09-2024	1-12	CB
Test 2	50 Minutes	10	11-11-2024	13-22	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	02-12-2024	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: 03/08/2024

Mr.MD ZAFIR KHAN
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
First Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
SC311	**Mechanics of Rigid Bodies and Fluids**	**4**	**2**	**0**	**5**

Instructor-in-charge: Dr.ARUN KUMAR SINGH

Learning Outcomes:
Physics V form the first half of a two-semester comprehensive course on core level physics to be taught to all B.Sc. students.
The course aims at:-

1. Developing an understanding of the basic principles of Elasticity and rigid mechanics & fluid mechanics.
2. Developing the application of concepts to problems of practical interest.
3. Improving the concepts and improving the problem solving skills of students.

Textbook (s) T1	Unified Physics for B.Sc. 1st by R.P. Goyal, Shivlal Agrawal & Company
Reference book (s) R1	Physics for Degree Students B.Sc.First Year by C.L. Arora, S. Chand Publication

Lecture-Wise-Plan:

Lecture Nos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./ Page Nos.of Text Book)
1-3	Understanding Basics of Elasticity and its modulus(s)	Elasticity, Effect of temperature and impurities on elasticity of a substance; Small deformation; Stress and strain; Hooke's Law; Elastic constants for an isotropic solid	Page 308-311 (T1)
4-5		Young's modulus, Modulus of Rigidity, Poisson's ratio	Page 311-314 (T1)
6-8		Relationship between the various elastic moduli	Page 315-319 (T1)
9-10		Limiting values of Poisson's ratio, experimental determination of Poisson's ratio	Page 319-321 (T1)

Lecture Nos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./ Page Nos.of Text Book)
13-15	Learning about Bending and torsion of cylindrical shaped objects and practical examples	Torsion of a cylinder, strain energy of twisted cylinder, Determination of modulus of rigidity of a thin rod by static method	Page 321-325 (T1)
16-17		Torsion pendulum, Bending of beam and bending moment	Page 325-326, 328-330 (T1)
18-19		Cantilever, transverse oscillation of cantilever, a beam supported at its ends and loaded in the middle	Page 331-333 (T1)
20-21		Determination of Young's modulus of a bean by bending method, determination of Young's modulus, modulus of rigidity and Poisson's ratio of material of a wire by Searle's method.	Page 334-336 (T1)
21-23	Understanding Basic fluid mechanics and fluid flow equations	Rotational and Irrotational flow, Equation of continuity, Energy of a flowing fluid, Euler's equation of motion for a non-viscous fluid and its integration	Page -352-357 (T1)
24-27		Bernoulli's theorem, applications based on Bernouli;s theorem-Venturimeter, Torricelli's theorem, Shape of the wings of the aero plane. Viscous flow of fluids	Page 357-361 (T1)

Lecture Nos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./ Page Nos.of Text Book)
28-33	Learning about Viscosity and related laws	Effect of pressure and temperature on the coefficient of viscosity, Flow of liquid through a capillary tube, Poiseuille's formula, , experimental determination of coefficient of viscosity of a liquid –constant pressure difference method, variable pressure method. Two capillaries connected in series and parallel. Motion of spherical body in viscous fluid, derivation of Stock's law using dimensional method, expression for terminal velocity, falling of rain drops, falling of soldier with parachute.	Page 366-373 (T1)
34-35	Understanding surface tension, related terminologies	Intermolecular forces, cohesive and adhesive forces, with some example in daily life, Surface tension, explanation of surface tension using intermolecular forces. Surface energy	Page 366-373 (T1)
36-39		Effect of temperature and impurities on the surface tension, some other examples of surface tension-small drop of a liquid are spherical while bigger are flat, Angle of contact	Page 387-393 (T1)
40-42		Pressure difference between the two sides of a curved liquid surface, to derive an expression for excess of pressure on the curved surface, excess pressure inside spherical drop, excess pressure inside an air bubble. Determination of surface tension of a liquid using capillary rise method	Page 394-400 (T1)

Physics I (Lab)

S. No.	Name of Experiment
1	To determine the weight of unknown object using parallelogram law of vector edition.
2	To find the value of Young's modulus of a wire using Searle's Apparatus.
3	To find the value of Poisson's ratio of a rubber
4	To verify Newton's law of cooling.
5	To find the moment of inertia of a fly wheel.
6	To determine the frequency of alternating current using a sonometer and an electromagnet.

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	50 Minutes	10	23-09-2024	1-20	CB
Test 2	50 Minutes	10	11-11-2024	21-42	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	02-12-2024	1- 42	CB

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

Date: 02/08/2024

Dr.ARUN KUMAR SINGH
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
First Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
SC312	**Analytical Chemistry**	**4**	**2**	**0**	**5**

Instructor-in-charge: Dr.PIYUSH KUMAR THAKUR

Learning Outcomes:
This course is offered in the first semester for the Third year students of bachelor of sciences.

1. Explain the fundamentals of analytical chemistry and steps of a characteristic analysis.
2. Expresses the role of analytical chemistry in science.
3. Compare qualitative and quantitative analyses.
4. Expresses the quantitative analysis methods.
5. Expresses the qualitative analysis methods.

Textbook (s) T1	Textbook of quantitative Chemical Analysis, Vogel's, Sixth Edition, Pearson Education, 2003.
Textbook (s) T2	Research methodology methods and techniques, C.R. Kothari and GauravGarg, New Age international publishers, 2019.
Textbook (s) T3	University Chemistry, Bruce M. Mahan and Rollie J. Meyers, AWL publication, fourth edition, 1998.
Reference Book (R1)	Physical Chemistry, Ira N. Levine, Fifth Edition, Tata McGraw-Hill , 2002.
Reference Book (R2)	Huheey, Keiter & Keiter, Inorganic Chemistry, Pearson Education, 2003.

Lecture-Wise-Plan:

Lecutre No	Leaning Ojectives	Topics to be covered	Reference (Ch/Sec/Page)
1-3	To understand the data analysis for analytical data	Accuracy and precision, Error, types of error, systematic and random errors, minimization of errors.	T1:104-107

Lecutre No	Leaning Ojectives	Topics to be covered	Reference (Ch/Sec/Page)
4-8	To understand the data analysis for analytical data	Mean and standard deviations, reliability of results, confidence interval, comparison of results, student T test, F test, Comparison of two samples (Paired T test),	T2: 8.1-8.2 9.3
9-12		Correlation and regression, correlation coefficient and liner regression, Sampling, the basis of sampling, sampling procedure, sampling statistics.	T2:14.2 – 14.3
12-14	To understand the concept of Acid-bases and Buffer solutions	Acid-base theories, Definition of pH and pH scale (Sorenson and operational definitions).	T3: 208-217
15-18		PH at elevated temperatures, pH for aqueous solutions of very weak acid and base, pH for salts of weak acid and weak bases, polyprotic acids.	T3:218 – 253
19-20		Hard and soft acids, bases.	R2: 344-353
21-24	To understand the Volumetric analysis of chemicals	Introduction, Titrimetric analysis, classifications of reactions in titrimetric analysis, standard solutions. Preparation of standard solutions, primary and secondary standards,	T1: 292-295
25-28		Indicators, theory of indicators, Acid–base titrations in non-aqueous media.	T1: 296 – 316

Lecutre No	Leaning Ojectives	Topics to be covered	Reference (Ch/Sec/Page)
29-31	To understand the quantitative analysis of chemicals	Gravimetric Analysis, Impurities in precipitates, Gravimetric calculations,	T1:398-403
32-33		Precipitation equilibria (Solubility product, common ion effect), organic precipitation.	
34	To understand the different types of titration	Introduction, Types of EDTA titrations, Methods of End Point Detection	T1: 326-345
35-37		Indicators (b) Instrumental methods of End point detection (Spectrophotometric, Potentiometric, High frequency titrator),	T1: 345, 373
38-40		Types of Complexometric Titrations (a) Direct Titration (b) Back Titration (c) Replacement titration (d) Indirect Titration (e) Applications of Complexometric Titrations.	T1: 335-343

Chemistry V Lab

S. No	Name of Experiment
1	Determination of concentration of Mg^{2+} ions by EDTA using Eriochrome Black as indicator.
2	To determine the strength of ferrous ammonium sulphate (Mohr's salt) solution by using external indicator
3	Determination of the strength of given unknown oxalic acid solution by titrating it against Potassium permanganate.
4	To prepare a standard N/20 copper sulphate solution and then determine the strength of sodium thiosulphate solution iodometrically.

S. No	Name of Experiment
5	Determination of concentration of Ca^{2+} ions by EDTA using Eriochrome Black – T as indicator.
6	Preparation of acetate buffer solution (pH range 3- 6)
7	Estimation of Barium in given sample by Gravimetric Analysis
8	Estimation of Copper in given sample by Gravimetric Analysis

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	50 Minutes	10	25-09-2024	1-18	CB
Test 2	50 Minutes	10	13-11-2024	19-35	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	11-12-2024	1- 40	CB

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

Date: 03/08/2024

Dr.PIYUSH KUMAR THAKUR
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
First Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
SC313	**Linear Algebra**	**4**	**0**	**0**	**4**

Instructor-in-charge: Dr.SHANTI SWARUP DUBEY

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

1. The concept of linear independence of vectors over a field, the idea of a finite dimensional vector space.
2. Basis of a vector space and dimension of vector space.
3. Basic concept of linear transformations, the Rank-Nullity theorem.
4. The concept inner product space and orthogonality

Text Book T	Linear Algebra by K P Gupta, Pragati Prakashan Revised Edition 2016
Reference Book(s) R1	Stephen H. Friedberg, Arnold J. Insel & Lawrence E. Spence (2003). Linear Algebra (4thedition). Prentice-Hall of India Pvt. Ltd.
Reference Book(s) R2	. Vivek Sahai & Vikas Bist (2013). Linear Algebra (2nd Edition). Narosa Publishing House

Lecture-Wise-Plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page Nos of Text/Ref. Books)
1-6	To define vector space	Definition and examples vector spaces, Subspace, Linear span, Quotient space and direct sum of subspaces,	T l Ch-2 4-45
7-10	Dimension of vector spaces	Linearly independent and dependent sets, Bases and dimension. Rank and nullity of a linear transformation and rank-nullity theorem.	T1 Ch-3,Ch-4 46-72, 73-113
11-16	Properties of Linear Transformations	Isomorphism of vector spaces, Dual and second dual of a vector space, linear transformation,	T1 Ch-5 114-177

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page Nos of Text/Ref. Books)
17-21	Eigen values and Eigen vectors	Eigen vectors and eigen values of a linear transformation, Characteristic polynomial and Cayley–Hamilton theorem, Minimal polynomial.	T1 Ch 11 380-419
22-27	Concept of Inner Product Spaces	Inner product spaces and orthogonality, Cauchy–Schwarz inequality, Gram–Schmidt orthogonalisation, Diagonalisation of symmetric matrices.	T1 Ch-10 301-379
28-33	Ad joint of a Linear Transformation	Adjoint of a linear operator; Hermitian, unitary, normal linear transformations;.	T1 Ch-10 301-379
34-37	Canonical Forms..	Jordan canonical form, Triangular form,	T1 Ch-8 257-282
38-42	Invariant subspaces	Trace and transpose, Invariant subspaces	T1 Ch-9 283-300

Evaluation Scheme:

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Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	50 Minutes	10	24-09-2024	1-18	CB
Test 2	50 Minutes	10	12-11-2024	19-35	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	06-12-2024	1-42	CB

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Date: 02/08/2024

Dr.SHANTI SWARUP DUBEY
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
First Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
SC314	**Data Structure Algorithm**	**4**	**2**	**0**	**5**

Instructor-in-charge: Dr.PINKEY CHAUHAN

Learning Outcomes:
This course introduces the core principles and techniques for Data structures. Students will gain experience in how to keep a data in an ordered fashion in the computer. Students can improve their programming skills using Data Structures Concepts. After successful completion of the course student will be able to

1. Explore basic data structures such as stacks and queues.
2. Introduce a variety of data structures such as Linked list, Trees, search trees, Graphs
3. Introduce sorting and searching algorithms

Lecture-Wise-Plan:

Lectujre Nos.	Learning Objective	Topics to be covered	Reference(Ch./Sec./Page Nos. of Text Book)
1-3	To learn Introductio n of Data structure and its types	Introduction of Data structure, Data types: primitive, non-primitive data types, Linear and non-linear data structure.	T1 CH-1 1.1, 1.3, 1.4
4-6	To learn application of array and various searching techniques	Array concept (one dimension, two dimension), Linear and Binary Search Algorithms,	T1 CH-2 2.4
6-7	To learn introduction to linear data structure stack.	Stack concept	T1 CH-3 3.1
8-10	To learn various stack operations.	Operations PUSH, POP, TRAVERSE, Isfull, Isempty.	T1 CH-3 3.1, 3.2
11-13	To learn Applications of stack	Infix, Prefix, Postfix representation, Conversion using stack	T1 CH-3 3.3

Lectujre Nos.	Learning Objective	Topics to be covered	Reference(Ch./Sec./Page Nos. of Text Book)
14-15	To learn introduction to linear data structure Linked list and its types.	Linked List, Singly and Doubly Linear link lists, Singly and doubly circular linked list	T1 CH-4 4.1
15-16	To learn various linked List operations	Operations on linked lists insert, delete, Applications of linked lists.	T1 CH-4 4.8,4.9
17-18	To learn introduction to linear data structure Queue and its types.	Introduction, and Types of Queues, Priority Queue, Circular queue, Double Ended Queue,	T1 CH-3 3.1
19-21	To learn various Queue operations.	Operations (INSERT, DELETE, TRAVERSE)	T1 CH-3 3.1, 3.2
22-24	To learn various sorting techniques	Sorting Algorithms: Bubble Sort, Insertion Sort, Selection Sort	T1 CH-7 7.1, 7.2
25-26	To learn various sorting techniques using Divide and Conquer strategy.	Quick Sort, Merge Sort & Radix sort	T1 CH-7 7.3, 7.4, 7.5
27-29	To learn various sorting techniques	Linear search, Binary search, Searching and modification ,Introduction to Hashing	
30	To learn introduction to Nonlinear data structure Tree and its types.	Definition of trees and their types, Binary trees, Properties of Binary trees,.	T1 CH-5 5.1, 5.2
31-33	To learn various operations and traversal technique.	Insertion, deletion, Searching and traversal algorithm, Preorder, post order, in-order traversal) , BFS, DFS	T1 CH-5 5.3, 5.4, 5.5
34-35	To learn various applications of tree	Binary Search Trees, Implementations, AVL Trees, B tree,	T1 CH-5 5.6, 5.7
36	To learn introduction to Nonlinear data structure Graph and its types.	Definition of Graph and their types	T1 CH-6 6.1

Lectujre Nos.	Learning Objective	Topics to be covered	Reference(Ch./Sec./Page Nos. of Text Book)
37-38	To learn various applications of Graph	Adjacency and incident (matrix & linked list) representation of graphs, Weighted Graphs,	T1 CH-6 6.2
39-40	To learn various operations and traversal technique.	Shortest path Algorithm, Spanning tree, Minimum Spanning tree,	T1 CH-6 6.3, 6.4
41-42	To learn various operations and traversal technique.	Kruskal and prims algorithms.	T1 CH-6 6.3, 6.4

Evaluation Scheme:

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Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	50 Minutes	10	25-09-2024	1-15	CB
Test 2	50 Minutes	10	13-11-2024	15-35	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	11-12-2024	1- 42	CB

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Date: 03/08/2024

Dr.PINKEY CHAUHAN
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
First Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
SC315	**Plant Physiology**	**4**	**2**	**0**	**5**

Instructor-in-charge: Mr.SHUBHUM DEWANGAN

Learning Outcomes:
This course deals with various processes of plants like photosynthesis (particular emphasis on light and dark reactions), respiration, translocation and absorption and nitrogen metabolism.

1. To understand plant structures in the context of the physiological functions of plants.
2. Learn and understand mineral nutrition in plants.
3. To understand the growth and developmental processes in plants.
4. To understand about the growth and development of plants and their regulations.

Text Book (s) T1	Plant water relations, B.P. Pandey Botany for degree students – III Year
Text Book (s) T2	Mineral Nutrition's: Essential macro-and micro-elements and their role, Unified Botany – 3rd year
Text Book (s) T3	Photosynthesis and Respiration, S.K. Verma | Mohit Verma, A Textbook of Plant physiology.
Text Book (s) T4	Plants Physiology, Unified Botany – 3rd year

Lecture-Wise-Plan:

Lecture Nos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./ Page Nos.of Text Book)
1-2	To understand the plant water relations and their mechanisms.	General Introduction of Water and Properties and structures of Water. Importance of water to Plant Life.	T4:661-663
3-4		Diffusion, Permeability and Osmosis and their differences, Absorptions and movement of Water.	T4:663-686

Lecture Nos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./ Page Nos.of Text Book)
5-6		Theories of Water Translocation (Capillary, Root pressure, Cohesion theory)	T4:688-694
7-8		Transpiration and factors affecting transpiration. Stomatal Mechanism, Factors affecting stomatal movement.	T4:697-715
9-13	To understand the role of mineral elements in plants.	Introduction, Essential and Non-essential elements, types of essential elements, Role of Mineral elements in plants and their deficiency symptoms.	T4:718-730
14-16		Transport of organic substance: Mechanism of phloem transport; source-sink relationship; factors affecting translocation.	https://www.biologydiscussion.com/plant-physiology
17– 19	To Understand plant structures in the context of the physiological functions of plants.	General Introduction, Historical Background, Significance of Photosynthesis to Mankind, Requirements of photosynthesis	T4:743-745
20-22		Photosynthetic organisms and organelles, Photosynthetic pigments, Stages & Mechanism of photosynthesis,	T4:746-765
23-26		C3, C4 and CAM pathways of carbon fixation; Photorespiration.	T4:765-790
27-28	To understand the process of respiration in Plants and plant hormones.	General Introduction, Types of Respiration and Difference between Respiration and Photosynthesis.	T4:794-804
29-31		Mechanism of respiration, Glycolysis, Kreb's cycle, Factors affecting respiration.	T4:804-826
32-35		Plant growth regulators: Discovery, chemical nature (basic structure) and physiological roles of Auxin, Gibberellins, Cytokinin and Abscissic acid.	T4:829-863

Lecture Nos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./ Page Nos.of Text Book)
36-39	To understand the physiological functions of flowering plants.	Introduction, Classification of plants on the basis of photoperiod, Photomorphogenesis, Phytochrome Concept, Flowering Harmone – Florigen and their mechanisms of synthesis	T4:866-876
40-42		Vernalization, seed dormancy and germination, Plant movement.	T4:876-903

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	50 Minutes	10	24-09-2024	1-19	CB
Test 2	50 Minutes	10	12-11-2024	20-42	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	40	06-12-2024	1- 42	CB

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

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

Date: 03/08/2024

Mr.SHUBHUM DEWANGAN
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
First Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
SC316	**Anatomy and Physiology of Vertebrate**	**4**	**2**	**0**	**5**

Instructor-in-charge: Dr.AMENA KHANANI

Learning Outcome:
This course is offered in the Third Year First Semester Students of Bachelor of Sciences

1. Tell and explain different terms and processes in physiology.
2. Articulate physiological mechanism of different systems in human body

Text Books T1	Mordern Textbook of Zoology, , R.L Kotpal , Rastogi Publication
Text Books T2	Zoology , S.M Saxena, Ram Prasad & Sons
Text Books T3	Unified Zoology , Dr.Preeti Khare , Navbodh Prakashn
Text Books T4	Animal Physiology, Goyal and Shashtri.

Lecture-Wise-Plan:

Lecture Nos	Learning Objective	Topics to be covered	Reference
1	Integuments and its derivatives of vertebrates.	Basic Structure of Integument	T3Ch.1 Pg. No.01-14
2-5	Integuments and its derivatives of vertebrates.	Comparative Study of Integument in vertebrate	T3Ch.1 Pg. No.01-14
6	Integuments and its derivatives of vertebrates.	Structure of Scales, Hair and Feathers.	T3Ch.1 Pg. No.01-14
7-9	Structure of Gills and Lungs of vertebrates.	Structure of Gills and Lungs of vertebrates.	T3Ch.3 Pg. No.28-40
10	Structure of Air Sacs and Swim bladder of vertebrates.	Structure of Air Sacs and Swim bladder of vertebrates.	T3Ch.3 Pg. No.28-40
11	Structure of Air Sacs and Swim bladder of vertebrates.	Structure of Air Sacs and Swim bladder of vertebrates.	T3Ch.3 Pg. No.28-40
12	Endoskeleton	Endoskeleton	T3Ch.4 Pg. No.28-40

Lecture Nos	Learning Objective	Topics to be covered	Reference
13-14	Axial Skeleton	Skull	T3Ch.4 Pg. No.41-62
15	Axial Skeleton	Vertebrae	T3Ch.4 Pg. No.62-80
16	Axial Skeleton	Vertebrae	T3Ch.4 Pg. No.62-80
17	Axial Skeleton	Vertebrae	T3Ch.4 Pg. No.62-80
18	Appendicular skeleton	Appendicular skeleton Limb	T3Ch.4 Pg. No.73-80
19	Appendicular skeleton	Appendicular skeleton Limb	T3Ch.4 Pg. No.73-80
20-21	Appendicular skeleton	Girdle	T3Ch.4 Pg. No.68-80
22-25	Nervous System	General Plan of Brain	T3Ch.7 Pg. No.99-106
26-28	Nervous System	Spinal Cord	T3Ch.7 Pg. No.107-109
29-31	Ear and Eye	Structure and Function	T3Ch.8 Pg. No.111-121
32-34	Gonads	Testes in different classes	T3Ch.9 Pg. No.121-132
35-37	Endocrine glands	Endocrine glands and their functions	T1Ch.59 Pg. No.897-900
38-39	Excretion	Physiology of Excretion	T3Ch.13 Pg. No.163-172
40-41	Osmoregulation	Osmoregulation	T3Ch.14 Pg. No.173-179
42	Physiology of Muscle Contraction	Physiology of Muscle Contraction	T3Ch.15 Pg. No.180-185

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	50 Minutes	10	25-09-2024	1-11	CB
Test 2	50 Minutes	10	13-11-2024	12-21	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	11-12-2024	1- 42	CB

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Date: 03/08/2024

Dr.AMENA KHANANI
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
First Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
HSC312	**D Block Element**	**4**	**2**	**0**	**5**

Instructor-in-charge: Dr.PRATIK KUMAR JAGTAP

Learning Outcomes:

1. To acquire knowledge on Transition metals and their electronic configuration oxidation states, spin properties, Colour property, magnetic properties and Catalytic applications of D-Block elements.
2. To understand the Bonding in metals, Conductivity of metals, Semiconductors, and its applications.
3. To acquire the knowledge on structures of Compounds of D-Block elements, EAN and stability of metal carbonyls
4. To acquire knowledge on properties of Lanthanides and Atinides, Oxidation states to stability, Colour and magnetic properties,
5. Lanthanide and actinide contraction and its Consequences.

Text Book (s) T1	Chemistry for degree students, for II Year by Dr. R.L. Madan S.Chand Publication.
Text Book (s) T2	Chemistry for degree students, for III Year by Dr. R.L. Madan S.Chand Publication.
Text Book (s) T3	A Textbook Of Inorganic Chemistry Anil Kumar De New Age International, 2007
Reference Book (s) R1	Advanced Inorganic Chemistry by S.K. Agrawal and Keemti Lal, Pragati Publication
Reference Book (s) R2	Inorganic Chemistry 3rd Edition G.L. Mieessler and D.A. Tarr
Reference Book (s) R3	Concise Inorganic Chemistry by J.D. Lee

Lecture-Wise-Plan:

Lecture No	Learning Objectives	Topics to be Covered	Reference (Ch./Sec./Page Nos. Of Text
1-3	Unit I Metal Ligand Bonding in Transition Metal Complexes	Limitation of Valence Bond Theory, an elementary idea of crystal field theory	T3:507-530

Lecture No	Learning Objectives	Topics to be Covered	Reference (Ch./Sec./Page Nos. Of Text
4-5	Unit I Metal Ligand Bonding in Transition Metal Complexes	Crystal field splitting in octahedral, tetrahedral and square planar complexes	T3:539-541
6-7		Factors affecting the crystal field parameters, Thermodynamic and kinetic aspects of metal complexes	T3:545-553
8-10		A brief outline of thermodynamic stability of metal complexes	T3:5415-545
11-12	Unit-II Chemistry of elements of first transition series	Introducation, characteristic properties(electronic configuration, Complex formation, magnetic property, formation of colour catalytic activity, periodic properties) of D-Block Elements	T3:570-625
13-14		properties of the element of first transition series	T3: 570-625
15-18		Relatively stability of their oxidation state, coordination number Unit	
19-20	Unit-III Chemistry of the elements of Second and Third transition series	Introduction characteristic properties(Electronic configuration formation of periodic properties) of D-Block	
21		complex formation, magnetic property	T1:3.1-3.7
22		Colour Complex Formation catalytic activity	T1:4.1-4.11
23		Elements, Properties of the element of second and Third transition series	T1:9.2-9.13
24-26		Relatively stability of their oxidation state, coordination number	T1:10.3-10.11

Lecture No	Learning Objectives	Topics to be Covered	Reference (Ch./Sec./Page Nos. Of Text
27-28	Unit - IV: Magnetic Properties of Transition Metal complexes:	Types of magnetic behaviour, methods of determining magnetic susceptibility, spin only formula,	T3:570-625
29-30		L-S coupling, correlation of μs and μeff values, orbital contribution to magnetic moments, application of magnetic moment data for 3d metal complexes.	T3:4.14 – 4.19
31-33		Electronic spectra of Transition Metal Complexes. Types of electronic transitions, Selection rules for D-D transitions	T3:4.20,3.3-3.5 13.10-13,14
34-35		spectroscopic ground states, spectrochemical series. Orgel energy level diagram for d1 and d2 states, discussion of the electronic spectrum of [Ti (H2O)6]3+ complex ion	T3:8.6
36	Unit-V Co-Ordination Compounds	Werners coordination theory, effective atomic numbers	T-29-38
37-38		Nomenclature of coordination compounds	T-311-315
39-42		Valence bond theory of transition metal complexes	T-312

Chemistry I (Lab)

S.No	Name of Experiment
1	Preparation of . Tetramine Cupric Sulphate, [Cu(NH3)4]SO4□H2O
2	Preparation of Hexammine Nickel(Ii) Chloride, [Ni (NH3)6] Cl2
3	Preparation of Potassium Trioxalato Chromate(Iii), K3 [Cr (C2O4)3]□3H2O
4	Preparation of Sodium Trioxalato Ferrate(Iii), Na3 [Fe (C2O4)3]□3H2O
5	Preparation of Hexammino Cobaltic Chloride, [Co (NH3)6]Cl
6	Preparation of Iron(Iii) Acetylacetonate
7	Preparation of PRUSSIAN BLUE
8	Estimation of some metal ions by EDTA titration (Ni, Pb, Co, Fe)

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	50 Minutes	10	24-09-2024	1-20	CB
Test 2	50 Minutes	10	12-11-2024	21-40	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	09-12-2024	1-40	CB

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Date: 03/08/2024

Dr.PRATIK KUMAR JAGTAP
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
First Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
HSC313	**Integral Transformation and Fourier Analysis**	**4**	**0**	**0**	**4**

Instructor-in-charge: Ms.YOGITA CHANDRAKAR

Learning Outcomes:
After successful completion of the course, students will be able to know

1. Find Laplace Transformation.
2. Find Inverse Laplace Transformations.
3. Convert ODEs with BVP to Integral equations.
4. Fourier Series, Fourier Sine and Cosine Series.
5. Fourier Transformations, Fourier Sine and Cosine Transformations.

Text Book (T)	Fourier Series and Integral Transforms. Dr. S. Sreenadh, S.Ranganatham, Dr.M.V.S.S.N. Prasad, Dr. V. Ramesh Babu.
Reference Book(s) R1	Fourier series and Boundary Value Problems. James Ward Brown & Ruel V. Churchill(2011). McGraw-Hill Education.
Reference Book(s) R2	Laplace and Fourier Transforms. J. K. Goyal And K. P. Gupta.
Reference Book(s) R3	The Laplace Transform: Theory and Applications. Joel L. Schiff.

Lecture-Wise-Plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page Nos of Text/Ref. Books)
1-11	Laplace Transforms	Definition of L.T., Linearity property of LT, Change of scale property of LTShifting theorem, LT of Integral and Derivatives, LT of Periodic function.	T /Ch-2/ 131-199
12-22	Inverse Laplace Transforms	Definition of Inverse L.T., Linearity property of ILT, Change of scale property of ILT,Shifting theorem, ILT of Integral and Derivatives, Convolution theorem.	T /Ch-2/ 200-276
23-28	Fourier Series	Definition of Fourier series, Fourier Sine and Cosine Series	T/ Ch-1/ 3-127

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page Nos of Text/Ref. Books)
29-34	Fourier Transforms and Inverse Fourier Transforms	Definition of FT and IFT, Linearity property of FT, Change of scale property of FT , Shifting theorem, FT of	T/ Ch-3/ 279-357
35-40	Applications of Laplace and Fourier Transforms	Relation between LT and FT, solutions of ODEs And Integral equations.	T/ Ch-4/ 361-449

Evaluation Scheme:

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Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	50 Minutes	10	24-09-2024	1-20	CB
Test 2	50 Minutes	10	12-11-2024	21-40	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	40	09-12-2024	1- 40	CB

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Date: 03/08/2024

Ms.YOGITA CHANDRAKAR
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
First Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
HSC314	**Artificial Intelligence**	**4**	**2**	**0**	**5**

Instructor-in-charge: Dr.BHARATI PATEL

Learning Outcomes:

1. Introduce the basic Principles of AI towards problem solving, inference, perception, knowledge representation and learning.
2. Investigate applications of AI techniques in intelligent agents, expert systems, artificial neural Networks and other machine.
3. Experiment with a machine learning model for simulation and analysis.
4. Explore the current scope, potential, limitations, and implications of intelligent systems
5. To have a basic proficiency in a traditional A1 language including and ability to write simple to intermediate programs and an ability to understand code written in that language.

Lecture-Wise-Plan:

Lecture No	Learning Objective	Topics to be covered	Reference (Ch/Sec./Page Nos. of Text Book)
1-4	Overviews and Search Techniques	Introduction to AI, Problem Solving, State Space Search	15-32
5-7	Overviews and search Techniques	Blind Search: Depth first search, Breadth first search	48-60
8-10	Overview and search Techniques	Informed Search: Heuristic Function, Hill	71-77
11-13	Overview and search Techniques	Best first Search, A* and AO* Search	81-87
14-16	Overview and search Techniques	Constraint Satisfaction, Game tree	88-95
17-20	Overview and search Techniques	Game Playing: min-maz algorithm, alpha-beta pruning	135-148

Lecture No	Learning Objective	Topics to be covered	Reference (Ch/Sec./Page Nos. of Text Book)
21-24	How to do knowledge Representation	Introduction to KR, Knowledge agent, predicate logic, preposional logic	155-159
25-26	How to do knowledge Representation	Resolution method, forward chaining, backward chaining	160-190
29-30	How to Handling Uncertainty and Learning	Bayes' theorem, Limitation of native Bayesian system, Bayesian Belief Network (BBN)	380-386
31-34	How to Handling Uncertainty and Learning	Fuzzy logic, Fuzzy function, Fuzzy measure, Non monotonic reasoning	410-419
35-36	How to Handling Uncertainty and Learning	Learning: Concept of learning, Learning model, learning decision tree, Paradigms of machine learning	435-447
37-40	How to Handling uncertainty and Learning	Supervised and Unsupervised learning, Example of Learning, Learning by induction, Learning using Neural Networks	448-460

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Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	50 Minutes	10	25-09-2024	1-15	CB
Test 2	50 Minutes	10	12-11-2024	16-30	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	09-12-2024	1- 40	CB

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Date: 03/08/2024

Dr.BHARATI PATEL
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science
First Semester, 2024-2025
Course Handouts

Course Code	Course Title	L	P	T	U
HSC315	**Immunology**	**4**	**2**	**0**	**5**

Instructor-in-charge: Dr.AMENA KHANANI

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

1. Gain knowledge on different types of antigens, antibodies and how different types of antibodies are produced
2. Out line, compare and contrast the key mechanism of innate and adaptive immunity

Text Books T1	Morden Textbook of Microbiology and Immunology, Subhash Chandra Parija.
Text Books T2	Roitt's Essential immunology, Perter
Text Books T3	Cellular and Molecular Immunology, Abul K Abbas
Text Books T4	Immunology, Kuby

Lecture-Wise-Plan:

Lecture Nos	Learning Objective	Topics to be covered	Reference
1	Immunology	General concept	T4Ch.1 Pg. No.01-19
2-3	History and development	History and development	T4Ch.1 Pg. No.01-19
4-5	Immune system and immunity	Immune system and immunity	T4Ch.1 Pg. No.01-19
6-7	Organization of immune system	Organization of immune system	T1Ch.11 Pg. No.85-90
8	Antigen	Antigen	T1Ch.11 Pg. No.85-90
9-12	Antibody and its types	Antibody and its types	T1Ch.11 Pg. No.85-90
13	Cell involved in immune system	Cell involved in immune system	T1Ch.16 Pg. No.120 -134

Lecture Nos	Learning Objective	Topics to be covered	Reference
14-15	Basic structure and Function, Cytokines	Basic structure and Function, Cytokines	T1Ch.16 Pg. No.120 -134
16-17	Cell mediated immunity	Cell mediated immunity	T2Ch.1 Pg. No.03-52
18-19	Interferon's	Interferon's	T3Ch.19 Pg. No.1235-1273
20-22	Hypersensitivity.	Hypersensitivity.	T3Ch.19 Pg. No.1235-1273
23-24	Antigen	Antigen – Antibody interaction	T2Ch.12 Pg. No.90-94
25	Principle and its types	Principle and its types	T2Ch.12 Pg. No.90-94
26-27	Immunohematology	General concept, Blood group system	T3Ch.17 Pg. No.1101-1164
28-30	Rh factor, Medical Application of blood group	Rh factor, Medical Application of blood group	T3Ch.17 Pg. No.1101-1164
31-33	Origin and diversity in immune system.	Origin and diversity in immune system.	T3Ch.17 Pg. No.1101-1164
34	Effector mechanisms	Effector mechanisms	T3Ch.13 Pg. No.1101-1164
35-36	Immunity of infectious disease	Immunity of infectious disease	T3Ch.21 Pg. No.1101-1164
37	Monoclonal antibodies	Monoclonal antibodies	T3Ch.21 Pg. No.1101-1164
38	Autoimmune diseases	Hemolytic anemia, Rheumatoid arthritis	T3Ch.21 Pg. No.1101-1164
39		Insulin dependent diabetes, Myasthenia gravis.	T3Ch.21 Pg. No.1101-1164
40	Organ transplantation	Organ transplantation	T3Ch.21 Pg. No.1101-1164
41	Immune deficient diseases	Immune deficient diseases	T3Ch.21 Pg. No.1101-1164
42	Cancers, AIDS	Cancers, AIDS	T2Ch.12 Pg. No.353-499

Lecture Nos	Learning Objective	Topics to be covered	Reference
43	Vaccines	General introduction to vaccines, various types of vaccines	T2Ch.12 Pg. No.353-499

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Test 1	50 Minutes	10	24-09-2024	1-13	CB
Test 2	50 Minutes	10	12-11-2024	14-22	OB
Quiz/Assignment/Lab	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	70	9-12-2024	1- 43	CB

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Date: 03/08/2024

Dr.AMENA KHANANI
Instructor-in-charge