This document contains scheme of study and course breakups (only chemistry courses) of following semesters of BS program;

- 2nd semester (new scheme of study)
- 2nd semester for repeaters (old scheme of study)
- 4th semester
- 6th semester
- 8th semester (only organic section)

University of Poonch Rawalakot

Department of Chemistry

New Scheme of Studies of BS Program (2nd semester)

Semester 2	GEN-3201	Expository Writing	3 (3-0)	General
	GEN-3202	Arabic/Kashmir Studies/Intro to History	2 (2-0)	General
	GEN-3203	Application of Information & Communication Technologies	3 (2-1)	General
	BOT-3204	Diversity of Plants	3 (2-1)	Interdisciplinary
	ZOO-3205	Animal Diversity-I	3 (2-1)	Interdisciplinary
	CHM-3206	Inorganic Chemistry	4 (3-1)	Major

INORGANIC CHEMISTRY BS 2nd (CHM-3206)
(Course breakup)

Course Title	Inorganic Chemistry
Course Code	CHM-3206
Credit Hours	4(3-1)
Learning objectives	To understand the basics of Inorganic chemistry, periodic table and different theories related to bonding. To also understand the concept of acid, base and their relative strength. Students will also be able to know about basic laboratory ethics and necessary precautionary measures required to carry out chemical reactions in laboratory
Contents	**Theory** Modern periodic table, similarities and differences among first row elements, their diagonal and vertical relationship with other elements, group trends and periodic properties in s, p, d and f block elements. Inorganic chemistry, Types of bonding, VSEPR, VBT, MOT, Acid base concept, Chemistry of p-block and d-block elements and introduction to modern materials. **Practical** **1)** Awareness about the toxic nature of chemicals and their handling, cleaning of glassware, safe laboratory **2)** Analysis of four ions (two anions and two cations) from mixture of salts **3)** Determine the %age purity of NaCl (rock salt) by Mohr's method. **4)** Determination of number of water molecules (x) in CuSO4.XH2O iodometrically **5)** Determination of amount/dm3 of FeSO4.7H2O with K2Cr2O7 by both internal and external indicators. **6)** Determination of %age of iron in Ferric alum (NH4)2SO4 Fe2(SO4)3.24H2O using K2Cr2O7 by both internal and external indicators. **7)** Standardization of EDTA solution by Magnesium Sulfate/Zinc Sulfate solution by complexometry.

INORGANIC CHEMISTRY BS 2nd (CHM-3206)
(Course breakup)

	8) Find out the amount of Ca2+ in the given sample of marble (lime stone) by complexometry.
Suggested reading	**1.** Principles of Structure and Reactivity by J. E., Keiter, E. A. and Keiter **2**. Comparative Inorganic Chemistry by Moody B. **3**.Basic Inorganic Chemistry by Cotton, F. A., Wilkinson, G. and Gaus, P. L., 4. Practical inorganic chemistry by Marr G. and Rockett B. W.

Teacher Sig. Sadaf Jamshad Chairman Sig. ----------

INORGANIC CHEMISTRY BS 2nd (CHM-3206)
(Course breakup)

Programme	BS		
Semester	2nd		
Course Title	Inorganic Chemistry		
Course Code	CHM-3206	Credit Hours	4(3-1)
No of week	19		
Total no. of lectures			
Course Instructor	Sadaf Jamshad		

Detail of Lectures /Activity

Weeks		Lecture topic	Activity
Ist	Lecture	Modern periodic table and its properties. similarities and differences among first row elements, their diagonal and vertical relationship with other elements,	Lectures and practical
	Lecture	Group trends and periodic properties in s, p, d and f block elements.	
	Lecture	Atomic radii, ionic radii, ionization potentials, electron affinities, electronegativities and redox potential.	
	Practical	Introduction to lab equipment	
2nd	Lecture	Nature and types of chemical bonding.	Lectures and practical
	Lecture	Theories related to shapes of molecules, VSPER	
	Lecture	VBT and hybridization	
	Practical	Awareness about the toxic nature of chemicals and their handling, cleaning of glassware, safe laboratory operations.	
3rd	Lecture	Directed valence bond theory (hybridization) and their applications to homo and hetero di-atomic inorganic molecules and metallic bond.	Lectures and practical

INORGANIC CHEMISTRY BS 2nd (CHM-3206)
(Course breakup)

	Lecture	Different Concepts of acids and bases and their properties	
	Lecture	pH, pKa, pKb and significance of buffer solutions.	
	practical	Determine the %age purity of NaCl (rock salt) by Mohr's method.	
4th	Lecture	Law of mass action and its applications, precipitation and solubility product and common ion effect.	Lectures and practical
	Lecture	co-precipitation and fractional precipitation	
	Lecture	Theories of indicators.	
	Practical	Determination of number of water molecules (x) in CuSO4.XH2O iodometrically.	
5th	Lecture	General properties of group iii elements, bonding in boranes and its applications.	Lectures and practical
	Lecture	Gradation of the characteristic properties in group iv elements.	
	Lecture	comparison of carbon and silicon, allotropic forms of carbon Structure and industrial applications of carbides, silicates and silicones.	
	Practical	Detection of acidic radical in salt.	
6th	Lecture	Gradation of the characteristic properties in group v elements.	Lectures and practical
	Lecture	Oxides of nitrogen (NO and NO2) and their role in air pollution, oxyacids (HNO2 and HNO3) of nitrogen.	
	Lecture	Preparation of nitric acid and ortho phosphoric acid.	

INORGANIC CHEMISTRY BS 2nd (CHM-3206)
(Course breakup)

	Practical	Detection of Basic salt radical in salt.	
7th	Lecture	Gradation of the characteristic properties in group vi elements.	Lectures and practical
	Lecture	Thionic acids (H2SO3 and H2SO4) and uses of hypo in photography.	
	Lecture	Preparation of sulfuric acid	
	practical	Analysis of ions in salts.	
8th	Lecture	MIDS	Lectures and MIDS
	Lecture	Gradation of the characteristic properties in group vii elements and peculiar behavior of fluorine.	
	Lecture	Interhalogens and pseudohalogens.	
	Practical	Determination of amount/dm3 of FeSO4.7H2O.	
9th	Lecture	Discovery of noble gases, structure and properties of xenon fluorides,	Lectures AND Practical
	Lecture	Preparation, properties and uses of xenon fluorides.	
	Lecture	Industrial uses of noble gases and their compounds.	
	Practical	Indicators and its types.	
10th	Lecture	Electronic configuration and general characteristics of d-block elements.	Lectures and Practical
	Lecture	Werner's concept about d block elements.	
	Lecture	nomenclature of coordination compounds.	
	Practical	Determination of %age of iron in Ferric alum (NH4)2SO4 Fe2(SO4)3.24H2O using K2Cr2O7.	

INORGANIC CHEMISTRY BS 2nd (CHM-3206)
(Course breakup)

11th	Lecture	Nomenclature of Complexes	Lectures and Practical
	Lecture	Binding energy and oxidation number of d-block elements.	
	Lecture	Color of transition metals.	
	Practical	Structure of EDTA and its preparation.	
12th	Lecture	.Electronic configuration of d block elements.	Lectures and practicals
	Lecture	Physical properties of d block elements.	
	Lecture	Chemical properties of d-block elements.	
	Practical	Standardization of EDTA solution by Magnesium Sulfate/Zinc Sulfate solution.	
13th	Lecture	Typical and non-typical transition elements.	Lectures and practical
	Lecture	Industrial applications of transition elements.	
	Lecture	Abnormal oxidation state of some elements.	
	Practical	Lab reports	
14th	Lecture	Anomalous behavior of some elements in d series.	Lectures and practicals
	Lecture	Properties of abnormal elements in d series.	
	Lecture	Para magnetism and diamagnetism.	
	practical	Find out the amount of Ca2+ in the given sample of marble (lime stone).	
15th	Lecture	Interstitial compound.	Lectures and practicals
	Lecture	Alloys and their properties.	
	Lecture	Applications of alloy.	

INORGANIC CHEMISTRY BS 2nd (CHM-3206)
(Course breakup)

	practical	Lab report	
16th	Lecture	Steel and its types.	Lectures and practicals
	Lecture	Corrosion and its types.	
	Lecture	Electrochemical theory.	
	Practical	Lab Report	
17th	Lecture	Class presentations	Lectures and practicals
	Lecture	Class presentations	
	Lecture	Class presentations	
	Practical	Lab quiz	
18th	Lecture	Class presentations	Assignments and ppts
	Lecture	Class presentations	
	Lecture	Class presentations	
19th	Terminal exams		Terminal exams

Teacher Sig. Sadaf Jamshad Chairman Sig. ----------

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UNIVERSITY OF POONCH RAWALAKOT
AZAD JAMMU AND KASHMIR

Course Breakup for BS (4-Years) program (2nd, 4th, 6th and 8th Semester)
(Old Scheme of study)

Semester-II (For repeaters)

Course Code	Course Title	Credit hours
CHM-3201	Organic Chemistry	3(2-1)
ISL-3202	Islamic Studies / Ethics	2(2-0)
BOT-3203	Botany-II	3(2-1)
ZOO-3204	Principles of Animal Life-II	3(2-1)
STA-3205	Statistics	3(2-1)
ENG-3206	English-II	3(3-0)
	Total	**18**

Organic CHEMISTRY BS 2nd (CHM- 3201)

Course Title	Organic chemistry
Course Code	CHM -3201
Credit Hours	3(2-1)
Learning objectives	The overall goal has been to provide students with a solid,compact introduction to the field of organic chemistry.
Contents	**Theory** Dipole moment; inductive and field effects; resonance; aromaticity; tautomerism; hyperconjugation; hydrogen bonding; acids and bases; factors affecting the strengths of acids and bases. Hydrocarbons :Discussion on the preparation, properties and reactions of alkanes, alkenes, alkynes and aromatics. Oxygenated Hydrocarbons Discussion on the preparation, properties and reactions of alcohols (phenols), ethers, aldehydes, ketones, carboxylic acids and derivatives. Introductory Organic Spectroscopy Introduction to IR, UV, 1H-NMR and Mass spectrometric methods, and their usage for structure elucidation of some simple organic compounds. **Practical** • Quantitative analysis of compounds with different functional groups, • Synthesis of organic compounds using a tool for understanding techniques like reflux, distillation, filtration, recrystallization and yield calculation, organic synthesis may include • preparation of benzanilide from benzoyl chloride • preparation of succinic anhydride from succinice acid • preparation of phthalimide from phthalic anhydride • preparation of oximes and hydrazine from carbonyl

Organic CHEMISTRY BS 2nd (CHM- 3201)

	• preparation of ester from a carboxylic acid and alcohol
Suggested reading	1) Furniss, B. S, Hannaford, A. J Smith, P. W. G, Tatchell, A. R Vogel' S Textbook of practical organic chemistry, 5th ed., Longman, UK, (1989). 2) Pavia, D. L., Kriz, G. S., Lanpman, G. M. and Engel, R. G., A Microscale Approach to organic laboratory techniques, 5th ed., Brooks/Cole Cengage Learning, (2013). 3) Mayo, D. W., Pike, R. M, and Forbes, D. C., Microscale Organic to Laboratory with Multistep and Multisacle Synthesis, 5th ed., John-wile & Sones, Inc., (2011). 4) Gilbert, G. C. and Martin, S. F., Experimental organic chemistry: Aminiscale and Microscale approach 5th ed., Brooks/ Cole Cengage learning, (2010). 5) Brown, W. H., Fotte, C. S., Lverson, B. L. and Anslyn, E. V., organic chemistry, 6th ed., Brooks Cole Cengage learning, (2012).

Teacher Sig. Fazia Sher Chairman Sig. ----------

Organic CHEMISTRY BS 2nd (CHM- 3201)

Programme	BS		
Semester	2nd		
Course Title	Organic Chemistry		
Course Code	CHM-3201	Credit Hours	3(2-1)
No of week	19		
Total no. of lectures			
Course Instructor	Fazia Sher		

Detail of Lectures /Activity

Weeks		Lecture topic	Activity
Ist	Lecture	Brief introduction. of Introduction to organic chemistry	Lectures and practical
	Lecture	Concept of inductive effect,+ve I,-ve I	
	Practical	Introduction to lab equipment	
2nd	Lecture	Concept of Dipol moment	Lectures and practical
	Lecture	Concept of Resonance ,resonance hybrid, Л δ Л resonance	
	Practical	Introduction of Quantitative analysis of different functional group	
3rd	Lecture	Concept of hyperconjugation,Hyperconjugation in carbocation	Lectures and practical
	Lecture	Hyperconjugation in alkene,in free radical	
	Practical	Analysis of –COOH group	
4th	Lecture	Tautomerism	Lectures and practical
	Lecture	Hydrogen Bonding	
	Practical	Analysis of ketone group	
5th	Lecture	Aromaticity intro aromatic and non aromatic compounds,Huckle ruke	Lectures and practical
	Lecture	Acid base concept	
	Practical	Analysis of Aldehyde group	
6th	Lecture	Concept of weak acids and weak bases,conjugate acid conjugate base	Lectures and practical

Organic CHEMISTRY BS 2nd (CHM- 3201)

	Lecture	Organic acids and bases	
	Practical	Analysis of Ether group	
7th	Lecture	Scale of acidity and basicity	
	Lecture	Ka and pka values and strength of acid and base,induction	
	Practical	Synthesis of soap(saponification)	
8th	Lecture	Effect of resonance, Electrostatic effect on strength of acid and base	Lectures and MIDS
	Lecture	Effect of H-bonding on strength of acids and bases (MIDTERM)	
	Practical	Synthesis of phenol	
9th	Lecture	Synthesis of Alkane by wurtz reaction	Lectures AND Practical
	Lecture	Clemmnenson reduction	
	Practical	Synthesis of benzoic acid	
10th	Lecture	Synthesis of alkene by dehydration,elimination reaction	Lectures and Practical
	Lecture	Witting reaction	
	Practical	preparation of succinic anhydride from succinice acid	
11th	Lecture	Synthesis of alkyne	Lectures and Practical
	Lecture	Diels-alder reaction	
	Practical	preparation of phthalimide from phthalic anhydride	
12th	Lecture	Preparation of alcohol from aldehyde and ketones	Lectures and practicals
	Lecture	Preparation of alcohol from Grignard reagent	
	Practical	preparation of benzanilide from benzoyl chloride	
13th	Lecture	Introduction of phenol Preparation of phenol by cumene process	Lectures and practical
	Lecture	Dow process for synthesis of phenol, Rasching process	
	Practical	preparation of oximes and hydrazine from carbonyl	

Organic CHEMISTRY BS 2nd (CHM- 3201)

14th	Lecture	Introduction of ether Preparation of ether by williamson synthesis	Lectures and practicals
	Lecture	Preparation of aldehyde	
	Practical	preparation of ester from a carboxylic acid and alcohol	
15th	Lecture	Wolff-kishner reduction	Lectures and practicals
	Lecture	Jones oxidation	
	Practical	Determination of actual yield and comparision with theoretical yield.	
16th	Lecture	Synthesis of carboxylic acid	Lectures and practicals
	Lecture	Koch reaction,haloform reaction	
	Practical	Analysis of amine group	
17th	Lecture	Introduction of spectroscopy,HNMR	Lectures and practicals
	Lecture	Infrared spectroscopy,Mass spectroscopy	
	Practical	Lab quiz +Lab reports	
18th	Lecture	Class presentations	Assignments and ppts
	Lecture	Class presentations	
19th	Terminal exams		Terminal exams

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Semester-IV

Course Code	Course Title	Credit hours
CHM-4401	Inorganic Chemistry	3(2-1)
CHM-4402	Biochemistry	3(2-1)
BOT-4403	Botany-IV	3(2-1)
ZOO-4404	Animal Diversity-II	3(2-1)
CHM-4405	Applied Chemistry	2(2-0)
ARB-4406	Arabic	3(3-0)
	Total	**18**

INORGANIC CHEMISTRY BS 4th (CHM 4401)

Course Title	Inorganic Chemistry
Course Code	CHM 4401
Credit Hours	3(2-1)
Learning objectives	To understand the basics of Inorganic chemistry, periodic table and different theories related to bonding
Contents	**Theory** Inorganic chemistry, Types of bonding, VSEPR, VBT, MOT, Acid base concept, Chemistry of p-block and d-block elements and introduction to modern materials. **Practical** **1)** Awareness about the toxic nature of chemicals and their handling, cleaning of glassware, safe laboratory **2)** Analysis of four ions (two anions and two cations) from mixture of salts **3)** Acid-Base Titrations **4)** Redox Titrations **5)** Complexometric Tirations **6)** Preparation of Ferrous sulphate **7)** Preparation of Ferric alum **8)** Preparation of Barium sulphate
Suggested reading	**1.** Principles of Structure and Reactivity by J. E., Keiter, E. A. and Keiter **2**. Comparative Inorganic Chemistry by Moody B. **3**.Basic Inorganic Chemistry by Cotton, F. A., Wilkinson, G. and Gaus, P. L.,

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INORGANIC CHEMISTRY BS 4th (CHM 4401)

Programme	BS		
Semester	4th		
Course Title	Inorganic Chemistry		
Course Code	CHM-4401	Credit Hours	3(2-1)
No of week	19		
Total no. of lectures			
Course Instructor	Sadaf Jamshad		

Detail of Lectures /Activity

Weeks		Lecture topic	Activity
Ist	Lecture	Attainment of a stable configuration and types of bonds.	Lectures and practical
	Lecture	Oxidation number and formal charge	
	Practical	Introduction to lab equipment	
2nd	Lecture	VBT and Hybridization	Lectures and practical
	Lecture	Theories related to shapes of molecules, VSPER	
	Practical	Acid-base Titration	
3rd	Lecture	Calculation of oxidation number and Formal charge	Lectures and practical
	Lecture	Different Concepts of acids and bases and their properties	
	practical	Redox Titration	
4th	Lecture	pH, pKa, pKb and significance of buffer solutions	Lectures and practical
	Lecture	Theory of Indicators, solubility, solubility product, common ion effect and their applications	
	Practical	Complexometric Titrations	

INORGANIC CHEMISTRY BS 4th (CHM 4401)

5th	Lecture	.. General properties of group iii elements, bonding in boranes and its applications	Lectures and practical
	Lecture	Gradation of the characteristic properties in group iv elements and Structural aspects of ortho and metasilicates and their industrial applications.	
	Practical	Detection of acidic radical in salt.	
6th	Lecture	Gradation of the characteristic properties in group v elements.	Lectures and practical
	Lecture	Oxides of nitrogen (NO and NO2) and their role in air pollution, oxyacids (HNO2 and HNO3) of nitrogen.	
	Practical	Detection of Basic salt radical in salt.	
7th	Lecture	Gradation of the characteristic properties in group vi elements.	Lectures and practical
	Lecture	Thionic acids (H2SO3 and H2SO4) and uses of hypo in photography.	
	practical	Analysis of ions in salts.	
8th	Lecture	MIDS	Lectures and MIDS
	Lecture	Gradation of the characteristic properties in group vii elements and peculiar behavior of fluorine and Interhalogens, pseudohalogens.	
	Practical	Lab Report	
9th	Lecture	Preparation of oxyacids of halogens (HClO3 and HClO4) and their uses.	Lectures AND Practical
	Lecture	Preparation, properties and uses of xenon fluorides	
	Practical	Preparation of Ferrous sulphate	
10th	Lecture	Electronic configuration and general characteristics of d-block elements.	Lectures and Practical
	Lecture	Werner's concept and nomenclature of coordination compounds.	

INORGANIC CHEMISTRY BS 4th (CHM 4401)

	Practical	Preparation of Ferric alum	
11th	Lecture	Nomenclature of Complxes	Lectures and Practical
	Lecture	Binding energy and oxidation number of d-block elements and d-d transition.	
	Practical	Preparation of Barium sulphate	
12th	Lecture	Liquid crystals and its properties.	Lectures and practicals
	Lecture	Engineering ceramics and its properties.	
	Practical	Synthesis of compounds	
13th	Lecture	Fiber glass	Lectures and practical
	Lecture	Properties of Fiber glass	
	Practical	Lab reports	
14th	Lecture	Anomalous behavior of some elements.	Lectures and practicals
	Lecture	Properties of abnormal elements.	
	practical	Structure of different indicators	
15th	Lecture	Physical and chemical property of thin film.	Lectures and practicals
	Lecture	Biological applications of liquid crystal.	
	practical	Lab report	
16th	Lecture	Thermal conductivity of Modern materials	Lectures and practicals
	Lecture	Chemical properties of modern materials	
	Practical	Lab Report	
17th	Lecture	Class presentations	Lectures and practicals
	Lecture	Class presentations	
	Practical	Lab quiz	
18th	Lecture	Class presentations	Assignments and ppts
	Lecture	Class presentations	
19th	Terminal exams		Terminal exams

Teacher Sig. Sadaf Jamshad Chairman Sig. ----------
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University of Poonch Rawalakot
Faculty of Basic and Applied Sciences
Course Breakup: Biochemistry (CHM-4402)

Course Title	Biochemistry
Course Code	CHM 4402
Credit Hours	3(2-1)
Learning objectives	□ To acquaint students with the chemistry and biology of macromolecules. □ Students able to know about reason of different biomolecules and their role in body
Contents	**Theory** **Carbohydrates:** Nomenclature, steroisomerism, epimerism,. Reactions of monosaccharide, reactions of sugars due to hydroxyl group. Disaccharides, sucrose, lactose, maltose, cellulose, etc. Polysaccharides: starch, glycogen, cellulose, inuline, dextrin, chitin, Agar Mucopoly saccharides like hyaluronic acid, heparin, chondroitin sulphate. **Lipids:** fatty acids, classification of fatty acids.bile acids and bile salts, triglycerides, hydrolysis of triglycerides, sponification, chararcterization of fats, waxes, behavior of lipids in water. Micelle, chylomicron, VLDL, LDL, HDL. Plasma Lipoproteins. **Protiens:** Amino acids found in proteins, amino acid used in protein synthesis. Non-protein amino acids, isoelectric point. Classification of proteins, protein sequencing, different levels of protein structure. **Nucleic acids:** chemical composition, Bases present in nucleic acids: purines and pyrimidines, nucleotids and nucleosides, structure of DNA, base composition of DNA, types of RNA, nucleases. **Practicals** 1. Detection of carbohydrates, monosaccharides and polysaccharides. 2. Detection of lipids on the basis of physical and chemical properties. 3. Qualitative tests for proteins of amins acids.

	4. Preparation buffers at different pHs. 5. Precipitation.
Suggested reading	**Books Recommended (Reference Material for Theory)** 1. D. Voet, J. G. Voet, C. W. Pratt, "Biochemistry", John Wiley & Sons, New York, 1999. 2. A. L. Lehninger, D. L. Nelson, M. M. Cox, "Principles of Biochemistry", 3rd Ed., Worth Publishers, New York, 2000. 3. G. Zubay, "Biochemistry", W. C. B. Publishers, Toronto, 1998. 4. L. Stryer, "Biochemistry" 5th Ed., W. H. Freeman & Co., 2002. 5. R. K. Murray, D. K. Granner, P. A. Mayes, "Harper's Biochemistry", Rodwell, 2000. 6. Guyton and Hall, "Text Book of Biochemistry", Barcourt Brace Asia, 1998. 7. D. E. Schumm, "Essential of Biochemistry", Medical Edition series New York, 1999. 8. M. Ahmed, "Essentials of Medical Biochemistry", Merit publishers Faisalabad, 1982. 9. P. C. Champe, A. R. Harvey, "Biochemistry", Lippincott-Raven Publishers, 1994. 10. G. L. Zubay, "Principles of Biochemisty", Mc Millan Publishing Co., 1995. 11. L. Stryer, "Biochemistry", W. H. Freeman & Co., N. Y., 1995 **Books Recommended (Reference Material for Practicals)** 1. D. T. Plummer, "An Introduction to Practical Biochemistry", Tata Mc Graw-Hill Publishing company Ltd. New Delhi, 1988. 2. G. Rajagopal, S. Ramakrishnan, "Practical Biochemistry for Medical Students", Orient Longman Ltd., Hyderabad, 1983.

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Course Breakup: Biochemistry (CHM-4402)

	3. S. P. Singh, "Manual of Biochemistry", CBS Publishers, New Delhi, 1988.

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Details of Lectures/Activity

Weeks	Lecture Number	Course content	Activity
1st	Lecture	Nomenclature, steroisomerism, epimerism,	Lectures and Practical
	Lecture	nomenclature, steroisomerism, epimerism,	

University of Poonch Rawalakot
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Course Breakup: Biochemistry (CHM-4402)

	Practical	Detection of carbohydrates, monosaccharides and polysaccharides.	
2nd	Lecture	Reactions of monosaccharide	Lectures and Practical
	Lecture	Reactions of sugars due to hydroxyl group.	
	Practical	Detection of carbohydrates, monosaccharides and polysaccharides.	
3rd	Lecture	Disaccharides, sucrose, lactose, maltose, cellulose, etc.	Lectures and Practical
	Lecture	Disaccharides, sucrose, lactose, maltose, cellulose, etc.	
	Practical	Detection of lipids on the basis of physical and chemical properties.	
4th	Lecture	Polysaccharides: starch, glycogen, cellulose, inuline, dextrin, chitin,	Lectures and Practical
	Lecture	Polysaccharides: starch, glycogen, cellulose, inuline, dextrin, chitin,	
	Practical	Detection of lipids on the basis of physical and chemical properties.	
5th	Lecture	Agar Mucopoly saccharides like hyaluronic acid, heparin, chondroitin sulphate.	Lectures and Practical
	Lecture	Agar Mucopoly saccharides like hyaluronic acid, heparin, chondroitin sulphate.	
	Practical	Qualitative tests for proteins of amins acids.	
6th	Lecture	Agar Mucopoly saccharides like hyaluronic acid, heparin, chondroitin sulphate.	Lectures and Practical
	Lecture	fatty acids	
	Practical	Qualitative tests for proteins of amins acids.	
7th	Lecture	fatty acids,	Lectures and Practical QUIZ
	Lecture	QUIZ	
	Practical	Qualitative tests for proteins of amins acids.	
8th	Lecture	Classification of fatty acids.	Lectures/MIDS
	Lecture	Classification of fatty acids.(Midterm)	
	Practical	Collection of Lab report	

University of Poonch Rawalakot
Faculty of Basic and Applied Sciences
Course Breakup: Biochemistry (CHM-4402)

Weeks		Course content	Activity
9th	Lecture	Bile acids and bile salts,	Lectures and Practical
	Lecture	triglycerides,	
	Practical	Preparation of acidic buffers at different pHs.	
10th	Lecture	hydrolysis of triglycerides	Lectures and Practical
	Lecture	saponification, characterization of fats,	
	Practical	Preparation of acidic buffers at different pHs.	
11th	Lecture	Waxes, behavior of lipids in water. Micelle,	Lectures and Practical
	Lecture	Chylomicron, VLDL, LDL, HDL. Plasma Lipoproteins	
	Practical	Collection of LAB reports	
12th	Lecture	Amino acids found in proteins	Lectures and Practical
	Lecture	Amino acid used in protein synthesis	
	Practical	Preparation of basic buffers at different pHs.	
13th	Lecture	Non-protein amino acids, isoelectric point	Lectures and Practical
	Lecture	QUIZ	
	Practical	Preparation of basic buffers at different pHs.	
14th	Lecture	protein sequencing	Lectures and Practical
	Lecture	protein sequencing	
	Practical	Precipitation.	
15th	Lecture	Classification of proteins,	Lectures and Practical
	Lecture	different levels of protein structure	
	Practical	Precipitation.	
16th	Lecture	chemical composition,	Lectures and Practical
	Lecture	Bases present in nucleic acids: purines and pyrimidines	
	Practical	Precipitation.	
17th	Lecture	nucleotids and nucleosides,	Lectures and Practical
	Lecture	Structure of DNA	
	Practical	Collection of Lab reports	
18th	Lecture	Base composition of DNA.	Presentations and Assignmentd
	Lecture	types of RNA, nucleases	
	Practical	LAB QUIZ	
19th	Terminal EXAMS		Terminals

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Applied CHEMISTRY BS 4th (CHM 4405)

Course Title	Applied Chemistry
Course Code	CHM 4405
Credit Hours	2(2-0)
Learning objectives	To understand the basics of basic principles and parameters for industrial plant unit operations and unit processes.
Contents	**Theory** Applied chemistry, Flow sheet diagrams and unit operations and unit processes of different acids and base, cement industry, petroleum, textile, polymer and fuel industries and their applications.
Suggested reading	**1.** Applied chemistryy by Oleg Roussak, H. D. and Gesser **2**. Applied and Inorganic Chemistry by Haq Nawaz

Teacher Sig. Sadaf Jamshad Chairman Sig. ----------

Applied CHEMISTRY BS 4th (CHM 4405)

Programme	BS		
Semester	4th		
Course Title	Applied Chemistry		
Course Code	CHM-4405	Credit Hours	2(2-0)
No of week	19		
Total no. of lectures			
Course Instructor	Sadaf Jamshad		

Detail of Lectures /Activity

Weeks		Lecture topic	Activity
Ist	Lecture	Basic principles for industrial plant unit operations and unit processes.	Lectures
	Lecture	Basic parameters for industrial plant unit operations and unit processes.	
2nd	Lecture	Raw materials. Unit processes and unit operation of sulphuric acid.	Lectures
	Lecture	Flow sheet of sulphuric acid.	
3rd	Lecture	Raw materials. Unit processes and unit operation of Nitric acid.	Lectures
	Lecture	Flow sheet of nitric acid.	
4th	Lecture	Raw materials. Unit processes and unit operation of Hydrochloric acid.	Lectures
	Lecture	Flow sheet of hydrochloric acid.	
5th	Lecture	Raw materials. Unit processes and unit operation of oxalic acid.	Lectures
	Lecture	Flow sheet of Oxalic acid.	
6th	Lecture	Raw materials. Unit processes and unit operation of Formic acid.	Lectures
	Lecture	Flow sheet of Formic acid.	

Applied CHEMISTRY BS 4th (CHM 4405)

7th	Lecture	Raw materials. Unit processes and unit operation of Caustic soda.	Lectures
	Lecture	Flow sheet of Caustic soda.	
8th	Lecture	MIDS	Lectures and MIDS
	Lecture	. Raw materials. Unit processes and unit operation of Washing soda	
9th	Lecture	Flow sheet of Washing soda..	Lectures
	Lecture	Cement industry.	
10th	Lecture	Raw materials. Unit processes and unit operation of cement industry,	Lectures
	Lecture	Applications of cement industry.	
11th	Lecture	Petroleum industry.	Lectures
	Lecture	Raw materials. Unit processes and unit operation of Petroleum industry.	
12th	Lecture	Applications of Petroleum industry.	Lectures
	Lecture	Textile industry.	
13th	Lecture	Raw materials. Unit processes and unit operation of Textile industry.	Lectures
	Lecture	Applications of Textile industry.	
14th	Lecture	Polymer industry.	Lectures
	Lecture	Raw materials. Unit processes and unit operation of Polymer industry.	
15th	Lecture	Applications of Polymer industry.	Lectures
	Lecture	Fuel industry.	

Applied CHEMISTRY BS 4th (CHM 4405)

16th	Lecture	Raw materials. Unit processes and unit operation of Fuel industry.	Lectures
	Lecture	Applications of Fuel industry.	
17th	Lecture	Class presentations	Lectures
	Lecture	Class presentations	
18th	Lecture	Class presentations	Assignments and ppts
	Lecture	Class presentations	
19th	Terminal exams		Terminal exams

Teacher Sig. Sadaf Jamshad Chairman Sig. ----------

Semester-VI

Course Code	Course Title	Credit hours
CHM-5601	Physical Chemistry-II	4(3-1)
CHM-5602	Organic Chemistry-II	4(3-1)
CHM-5603	Inorganic Chemistry-II	4(3-1)
CHM-5604	Bio Chemistry-II	4(3-1)
	Total	**16**

University of Poonch Rawalakot
Faculty of Basic and Applied Sciences
Course Breakup: Physical Chemistry II (CHM-5601)

Course Title	Physical Chemistry II
Course Code	CHM 5601
Credit Hours	4(3-1)
Learning objectives	The course introduces the basic concepts of Quantum Mechanics, Electrochemistry and Nuclear chemistry and their applications.
Contents	**Theory** 1. **Quantum mechanics** Black Body radiations, photoelectric effect, Compton effect, postulates of quantum mechanics, concept of wave functions,operators, eigen and non-eigen functions, derivation of Schrodinger wave equation for one dimension and three dimensions,concept of degeneracy, orthogonal and normalized set of functions, tunneling effect, Pauli exclusion principle. **2. Electrochemistry** Conductance, resistance, types of electrolytic dissociation, weak and strong electrolytes, activity, activity coefficients and their determination by emf method, Debye-Huckel limiting law, Huckel and Onsager equation on conductance, concept of electrode potential, standard electrode potential, development of cells, calculation of cell constant, change in free energy and entropy of electrochemical cells, electrochemical basis for corrosion. **3-Nuclear Chemistry** Atomic nucleus, nuclides, nuclear stability, modes of decay, nuclear energetics, , fusion and fission, non-spontaneous nuclear processes, nuclear reactors, beta decay systematic, nuclear spins **Practicals** **Potentiometry** 1. Determine the pH of a given solution by buffer solution method. 2. To find out the strength of HCl solution by titrating it against NaOH solution using pH meter. 3. Determine the dissociation constant of weak acid using potentiometer.

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Faculty of Basic and Applied Sciences
Course Breakup: Physical Chemistry II (CHM-5601)

	Conductometry 1. Conductance measurements . 2. Find out the strength of HCl solution by titrating it against NaOH solution conductometrically.
Suggested reading	**Books Recommended (Reference Material for Theory)** 1. Alberty, R.A and Silbey, R.J., "Physical Chemistry" John Wiley, New York, 1995. 2. Atkins, P.W, "Physical Chemistry" 5 th Ed., W.H. Freeman & Company, New York, 1994. 3. Barrow, G. M., "Physical chemistry" McGraw Hill, Singapore, 1988. 4. Levine, I.N., "Quantum Chemistry" 4th Ed., Prentice Hall, New Jersey, and Prentice Hall India 1991. 5. Hanna, M.W., "Quantum Mechanics in Chemistry" 3 rd Ed., The Benjamin/Cummings Co., California, 1981. 13 6. Lowe, J.P., "Quantum Chemistry" 2nd Ed. Academic Press. Boston.2 New York, 1993. 7. Bockris, J.M. and Reddy, A. K. N., "Modern Electrochemistry" Plenum Press, New York, 1970. 8. Bard. A. and Faulkner, L.R., "Electrochemical Methods Fundamentals and Applications" **Books Recommended (Reference Material for Practicals)** 1. Daniel, F. and et al, "Experimental physical chemistry" New York McGraw Hill, New York 2. Findlay, A.and. Kitchner, J.A., "Practical physical Chemistry" Longman, Green and Co.,1976. 3. Shoemaker, D.P. and Garland, C., "Experiments in physical chemistry" McGraw Hill, New York. Courses for Semester-VI

Teacher Sig. Mehrosh Islam Chairman Sig. ----------

University of Poonch Rawalakot
Faculty of Basic and Applied Sciences
Course Breakup: Physical Chemistry II (CHM-5601)

Details of Lectures/Activity

Weeks	Lecture Number	Course content	Activity
1st	Lecture	Introduction to Quantum mechanics	Lectures and Practical
	Lecture	Differences between classical and quantum mechanics	
	Lecture	Importance and need of quantum mechanics	
	Practical	Introduction to glassware and lab safety measures	
2nd	Lecture	Early experiments in Q. Mechanics Black body radiations	Lectures and Practical
	Lecture	Photoelectric effect	
	Lecture	Compton effect	
	Practical	Solutions making	
3rd	Lecture	Introduction to Wave function	Lectures and Practical
	Lecture	Few restrictions on wave function	
	Lecture	Orthogonal and orthonormal wave function	
	Practical	Use of PH meter	
4th	Lecture	Few numericals on wave function	Lectures and Practical
	Lecture	Postulates of Quantum mechanics	
	Lecture	Introduction to Operators,	
	Practical	Making acidic buffers	
5th	Lecture	knowledge of different operators eg laplacian, hermition and different operators of P.E, momemtum etc	Lectures and Practical
	Lecture	Characteristics of operators and few numericals	
	Lecture	Eigen and non eigen functions	
	Practical	Making basic buffers	
6th	Lecture	Examples of eigen and non eigen functions	Lectures and Practical
	Lecture	Schrodinger wave function	
	Lecture	Derivation of Schrodinger wave function for 1 D and 3D states	
	Practical	Presentations by students regarding Normal and Molar solutions	
7th	Lecture	Concept of degeneracy	Lectures and Practical QUIZ
	Lecture	Paulis exclusion principle Tunneling effect	
	Lecture	QUIZ	
	Practical	Determine the strength of HCl by titrating against NaOH using Ph meter	
8th	Lecture	Introduction to electrochemistry	Lectures/MIDS
	Lecture	Applications of Electrochemistry in daily life	
	Lecture	Ohm,slaw Conductance ,resistance and their numericals	
	Practical	Collection of Lab report	

University of Poonch Rawalakot
Faculty of Basic and Applied Sciences
Course Breakup: Physical Chemistry II (CHM-5601)

Weeks		Course content	Activity
9th	Lecture	Types of electrolytic dissociation	Lectures and Practical
	Lecture	Strong and weak electrolytes	
	Lecture	Activity and activity cofficient	
	Practical	Determine PH of given solutions by buffer solution method	
10th	Lecture	Determination of activity coefficient by EMF method	Lectures and Practical
	Lecture	Numerical problems	
	Lecture	Huckel and Onsager equation on conductance	
	Practical	Determine the dissociation constant of weak acid using Potentiometer/ Ph meter	
11th	Lecture	Huckel and onsager equation on conductance	Lectures and Practical
	Lecture	Debye Huckel Limiting Law	
	Lecture	Electrochemical Cells and their types	
	Practical	Collection of LAB reports	
12th	Lecture	Development of cells	Lectures and Practical
	Lecture	Calculation of cell constant	
	Lecture	Concept of electrode potential and standard electrode potential	
	Practical	Determination of cell constant in lab	
13th	Lecture	Change in free energy and entropy of an electrochemical cell	Lectures and Practical
	Lecture	Nernst equation and its numericals	
	Lecture	QUIZ	
	Practical	Conductance measurements of few strong electroltyess	
14th	Lecture	Electrochemical basis for corrision	Lectures and Practical
	Lecture	Numerical problems on cell constant, cell potential	
	Lecture	Introduction to Nuclear Chemistry	
	Practical	Conductance measurements of few weak electroltyes	
15th	Lecture	Atomic Nucleus ,Nucleides	Lectures and Practical
	Lecture	Modes of decay of Nucleus	
	Lecture	Nuclear energetics,	
	Practical	Determine the strength of HCl by titrating against NaOH using Conductometer	
16th	Lecture	Nuclear Fission	Lectures and Practical
	Lecture	Nuclear Fusion	
	Lecture	Non Spontaneous Nuclear processes	
	Practical	Presentations in lab regarding saturated unsaturated solutions	
17th	Lecture	Nuclear Reactor	Lectures and Practical
	Lecture	Beta decay systematic	
	Lecture	Nuclear Spins	
	Practical	Collection of Lab reports	
18th	Lecture	Presentations by students	Presentations and Assignmentd
	Lecture	Presentations by students	
	Lecture	Presentations by students	
	Practical	LAB QUIZ	

University of Poonch Rawalakot
Faculty of Basic and Applied Sciences
Course Breakup: Physical Chemistry II (CHM-5601)

19th	Terminal EXAMS	Terminals

Teacher Sig. Mehrosh Islam Chairman Sig. ----------

Organic CHEMISTRY BS 6th (CHM- 5602)

Course Title	Organic chemistry-II
Course Code	CHM -5602
Credit Hours	4(3-1)
Learning objectives	The aim of the course is to make students familiar with the concepts and applications in two important topics in advanced organic chemistry,namely concerted organic reactions and spectroscopy.
Contents	**Theory** Chemistry of carbonyl compounds with special reference to condensation reactions, Active methylene compounds, Active methylene compounds.Alkylation, Arylation of active methylene compounds. Acid and base catalysed aldol condensation.Conditions, mechanism and synthetic applications of the following reactions:Claisen- Schmidt reaction, Claisen reaction, knoevenagel reaction, Perkin reaction, Reformatsky reaction, Mannich reaction, Stobbe's condensation, and Wittig reaction.Basic spectroscopy: introduction; detailed account of ultraviolet and infrared spectroscopy. **Practical** **1)** Separation of three component mixtures by chromatographic (CC, TLC) methods.(10 mixtures) **2)** Simple preparations: at least four by the choice of teacher concerned.
Suggested reading	1. Handrickson, J. B., Cram, D.J. and Hammond, G.S., Organic Chemsitry, 3rd Ed, MacGraw-Hill, Tokyo, 1970. 2. Morrison, R.T., and Boyde, R.N., Organic Chemistry, 6th Ed. Prentice Hall, Englewood Cliffs, New Jersey, 1992. 3. March, J., Advanced Organic Chemistry, 4th Ed., John Wiley & Sons, New York, 1992. 4. Finar, I.L., Organic Chemistry, 6th Ed., Vol. 1 & 2, Longman, London, 1973.

Organic CHEMISTRY BS 6th (CHM- 5602)

	5. Brown, D.W., Floyed, A. J. and Sainsbury, M., Organic Spectroscopy, J. Wiley and sons,Chichester, 1998. 6. Williams, D.H. & Fleming, I., Spectroscopic Methods in Organic Chemistry, 4th Ed.,McGraw-Hill Book Co., London, 1987.

Teacher Sig. Amina Khurshid Chairman Sig. ----------

Programme	BS		
Semester	6th		
Course Title	Organic Chemistry-II		
Course Code	CHM-5602	Credit Hours	4(3-1)
No of week	19		
Total no. of lectures			
Course Instructor	Amina Khurshid		

Detail of Lectures /Activity

Weeks		Lecture topic	Activity
Ist	Lecture	Brief introduction. of carbonyl compounds, Condensation reactions of carbonyl compounds.	Lectures and practical
	Lecture	General reaction of aldehyde and ketones	
	Lecture	Condensation reaction of	

Organic CHEMISTRY BS 6th (CHM- 5602)

		carbonyl compounds	
	Practical	Introduction to lab equipment	
2nd	Lecture	Cannizaro's reaction	Lectures and practical
	Lecture	Introduction of active methylene compounds.	
	Lecture	Synthetic application of active methylene compounds	
	Practical	Introduction of chromatograpy	
3rd	Lecture	Reactivity of active methylene compounds.	Lectures and practical
	Lecture	Synthesis of adipic acid by using acetoacetic ester	
	Lecture	iodoform test (Active methylene group)	
	Practical	Detection of pigments by using thin layer chromatography	
4th	Lecture	Synthesis of crotonic acid by using acetoacetic ester	Lectures and practical
	Lecture	synthesis of butanoic acid by using acetoacetic ester	
	Lectrue	Synthesis of glutaric acid by using acetoacetic ester	
	Practical	Preparations of various solvent systems.	
5th	Lecture	Alkylation of active methylene compounds	Lectures and practical
	Lecture	Alkylation of active methylene compounds	
	Lecture	Synthesis of succinic acid by using acetoacetic ester	
	Practical	Determinations of pigments by TLC.	
6th	Lecture	Synthesis of active methylene compound (ethyl acetoacetate)	Lectures and practical
	Lecture	Keto-enol tautomerism in active methylene compounds	
	Lecture	Synthesis of succinic acid using	

Organic CHEMISTRY BS 6th (CHM- 5602)

		diethyl malonate	
	Practical	Determinations of pigments by TLC.	
7th	Lecture	Acidity of methylene group (salt formation)	
	Lecture	Claisen_shimidtd condensation reaction	Lectures and practical
	Lecture	Claisen reactions Claisen_shimidtd condensation reaction	
	practical	Introduction of CC.	
8th	Lecture	Claisen_shimidtd condensation reaction	Lectures and MIDS
	Lecture	Synthetic application of of Claisen_shimidtd condensation	
	Lecture	Arylation of active methylene compound	
	Practical	Separation of compounds by using Column chromatography.	
9th	Lecture	Knoevenagel reaction	Lectures AND Practical
	Lecture	Synthesis of alkylacetic acid by using ethylacetoacetate	
	Lecture	Ketonic hydrolysis of ethylacetoacetate	
	Practical	Separation of compounds by using Column chromatography.	
10th	Lecture	Acid hydrolysis of active methylene compound	Lectures and Practical
	Lecture	Stobbe's condensation	
	Lecture	Mannich reaction	
	Practical	Introduction of synthesis of compounds	
11th	Lecture	Wittig reaction	Lectures and Practical
	Lecture	Basic spectroscopy: introduction,	
	Lecture	principle of UV(beer Lambert	

Organic CHEMISTRY BS 6th (CHM- 5602)

		law),,	
	Practical	Synthesis of methyl orange	
12th	Lecture	Instrumentation of UV visible spectroscopy	Lectures and practicals
	Lecture	Study of Chromophores and axochrome groups	
	Lecture	Bathochromic and hypsochromic effect	
	Practical	Introduction of nitration	
13th	Lecture	Concept of hyperchromic and hypochromic effect	Lectures and practical
	Lecture	Effect of conjugation	
	Lecture	Description of Homoannular and Hetroannular	
	Practical	Preparation of nitration	
14th	Lecture	Study of terms such as Dienes,Exocyclic and exocyclic	Lectures and practicals
	Lecture	Woodward fisher rule and examples	
	Lecture	Woodward fisher rule and examples	
	practical	Calculations of RF values of different samples	
15th	Lecture	Spectra elucidation and Lamda max	Lectures and practicals
	Lecture	Infrared spectroscopy: introduction principle	
	Lecture	introduction of IR Spectroscopy	
	practical	Determination of actual yield and comparision with theoretical yield.	
16th	Lecture	Instrumentation of IR Spectroscopy	Lectures and practicals
	Lecture	Instrumentation of IR Spectroscopy	
	Lecture	Introduction of vibrations	
	Practical	Seperation of lead cadmium mixture by paper	

Organic CHEMISTRY BS 6th (CHM- 5602)

		chromatography	
17th	Lecture	How we can find out degree of freedom for linear and non-linear compounds	Lectures and practicals
	Lecture	Examples of linear compounds	
	Lecture	Examples of non linear compounds	
	Practical	Lab quiz +Lab reports	
18th	Lecture	Class presentations	Assignments and ppts
	Lecture	Class presentations	
	Lecture	Class presentations	
19th	Terminal exams		Terminal exams

Teacher Sig. Amina Khurshid Chairman Sig. ----------

UNIVERSITY OF POONCH RAWALAKOT AJK

Faculty of Basic & Applied Sciences

Session2023

Subject: coordination chemistry	**Course Code: CHM-5603**
Course Structure: Lectures: 3 Lab:1	**Credit Hours: 4**
Prerequisites: Inorganic Chemistry	**Course Instructor: Farakh**

Course Outline:

Electronic configuration and oxidation states of transition metals, Werner's theory for coordination complexes and its comparison with Blomstrand-Jorgensen Chain Theory, ligands, nomenclature of coordination complexes. Bonding Theories (VBT, MOT and CFT) for explanation of coordination bonding. Common geometries of coordination complexes.
Chelates and chelate effect. Distortion in Structures. The spectro-chemical series, colour of metal complexes.
Magnetic properties (diamagnetism, paramagnetism), Iso- merism, Stereo chemistry.

2. Pi-Acceptor Ligands

Introduction Mono-, bi- and poly nuclear transition metal carbonyls, bonding nature, general characteristics and reactions. The 18-electron rule as applied to metal carbonyls, Rationalization of molecular structures, Equation of Structures based on spectroscopic evidence.

Reference Material:

- Cotton, F.A. and Wilkinson G., *"Advanced Inorganic Chemistry",* 5th Ed, John Wiley & Sons, New York, 1988.
- James Huheey, E., "*Inorganic Chemistry, Principles of Structure and Reactivity",* 3rd. Ed.,
Cambridge, Harper International, London, 1983.
- Basolo, F. and Johnson, R., *"Coordination Chemistry",* W.A. Benjamin, Inc., 1964.
- Zafar Iqbal M., *"Pi-Acceptor Ligands",* UGC Islamabad, 1982.
- Kent Murmann R., *"Inorganic complex compounds",* Reinhold publishing corporation, NewYork, 1964.
- Kamlesh Bansal, *"Coordination Chemistry",* Campus Books International, New Dehli, 2003.

Course Objectives:

This course introduces the concept of Coordination chemistry, Transtation metals. Further, it Focuses on the bonding, Structure and geometry of coordination complexes. It also serves to Familiarize the student with the different bonding theories of coordination bond.

Schedule for Quizzes and Final Exam:

- Quizzes will be normally announced at least one day in advance, and may be given in lecture or in tutorial. Quizzes will usually be closed-book (some might be open-book) and will typically require about 10 minutes to complete. A student who misses a quiz for any reason will be assigned a score of zero for that quiz. There will be at least two quizzes throughout the semester.
- Exams will be conducted on schedule announced by department.
- Midterm and terminal exam will be from the syllabus covered in the whole semester.
- The examinations will focus on understanding and applying the concepts taught in class and practiced in lab/tutorial exercises and assignments.

Grading Policy:

As per institution policy

Teaching Methodology:

Class room lectures on whiteboard both, surprise quizzes can be at the start or end of lecture.

Attendance and Assignment Policy:

All students are expected to attend all lectures. Latecomers, coming in class after 10 minutes all be marked absent, must be on time.

Late assignment submission will result in negative marking. Copying will not be tolerated and will be dealt with very seriously.

Note:

Teacher reserves the right to change the lecture schedule, contents and assessment criteria based upon the class situation.

Course Breakup

Week	Topic	Activity
1st	1. Introduction to Coordination Chemistry 2. Introduction to transtation metals 3. Examples of coordination complexes 4. Estimation of Mg^{+2} With EDTA	Lectures Practical
2nd	5. Electronic configuration of transtation metal 6. Introduction of Transtation series 7. Oxidation states of transtation metals 8. Estimation of Ca+2 With EDTA	Lectures Practical
3rd	9. Werner's theory for coordination complexes 10. Werner's complexes 11. Primary and secondary valences 12. Estimation of Ni+2 with EDTA	Lectures Practical
4th	13. Introduction to ancient theory of coordination complexes 14. Jorgensen Chain Theory 15. comparison Blomstrand-Jorgensen Chain Theory with 16. Estimation of Ni+2 with EDTA (Back Titration).	Lectures Practical
5th	17. Introduction of ligand 18. Classification of ligand 19. Examples of various ligands 20. Estimation of Mg+2 and Zn+2 with EDTA (direct Titration	
6th	21. What is Nomenclature 22. Rules of Nomenclature	**Lectures**

	23. Naming of different coordination complexes 24. Estimation of Ca+2 and Zn+2 in a Mixture (Masking).	
7th	25. Introduction to Bonding Theories 26. VBT Assumptions 27. Geometry and hybridization 28. Estimation of Cd+2	**Assignment** **Lectures** Practical
8th	29. Introduction to CFT 30. Orbitals splitting energy 31. Estimation of SO4-2 and PO4-3 wit (Indirect Titration)	Lectures Practical
	Mid Term Exam	
9th	32. Introduction to MOT 33. Examples of MOT 34. Energy diagrams 35. Redox titration	Lectures Practical
10th	36. Structure of coordination compound **37.** Energy diagrams of polyatomic molecules **38.** Calculation of bond energy **39.** Redox titration	**Quiz**
11th	40. Chelates and Chelates effect 41. Dissertation in structure 42. Spectrochemical Series 43. Redox titration	Lectures Practical
12th	44. Colour of metal complexes 45. Magnetic properties 46. Isomerism 47. Estimation of $SO4^{-2}$ with EDTA	Lectures Practical
13th	48. Stereochemistry 49. Introduction to pi acceptor ligands 50. Introduction to Mono,bi and polynuclear metal carbonyls 51. Redox titration	Lectures Practical
14th	52. Bonding nature of metal carbonyls 53. General properties and reaction c carbonyls 54. 18 electron rule applying on metal carbonyls 55. Redox titration	Lectures Practical
15th	56. Relationlaziion of molecular structure	Lectures Practical

	57. Relationlaziion of molecular structure (Contin….) 58. Estimation of $PO4^{-3}$ with EDTA	
16th	59. Equation of structure 60. Equation of structure(contin….) 61. Based on spectroscopic evidenc Estimation of Iron	**Practical**
17th	Presentation Presentation Presentation Use of potassium iodate for determination of copper	**Practical**
18th	Presentation Presentation Presentation Use of potassium iodate for determination of H_2O_2	**Practical**
19th	TERMINAL EXAM	

Signature of Teacher:_____ Chairman:

Dean:_____

Biochemistry-II(CHM-5604) BS 6th

Course Title	Biochemistry-II
Course Code	CHM-5604
Credit Hours	4(3-1)
Learning objectives	The course introduces the basic concepts of biocatalysis and enzymes in detail.
Contents	**Theory** **Biocatalysis and acid-base regulation:** Body fluids as electrolytes solutions, pH, Henderson-Hesselbalch equation and buffers, Acid and bases, amino acids as acids and bases, buffering capacity of amino acids, regulation of acid base balance, acidosis, alkalosis, homeostasis, detoxification, circulatory system, and its role to maintain body homeostasis. **Enzymes:** Chemical nature, nomenclature, and classification of enzymes. Cofactors, substrate specificity, enzyme-substrate interaction. Kinetics of single substrate reactions, effect of different factors on enzymes activity, enzyme inhibition, regulatory enzymes, allosteric enzymes, multi enzymes system, zymogens and isozymes, immobilized enzymes, and their uses. **Practical** 1. Determination of cholesterol in fluids. 2. Determination of hemoglobin in the fluids. 3. Estimation of ascorbic acid in the given sample. 4. Determination of chloride in fluids. 5. Determination calcium in fluids. 6. Determination of total acidity in the given sample
Suggested reading	1. Lehniger, A.L, "Principles of Biochemistry", Worth Publisher, New York, (2001). 2. Voet, D. and Voit J. G., "Biochemistry", John Wiley & Sons, New York, (2000). 3. K. K. Pillai, J. S. Qadry, "Biochemistry and Clinical Pathology" CBS Publishers & Distributors, 1996.

Teacher Sig. Sidra Ayub Chairman Sig. ----------

Dean Sig ----------

Biochemistry-II(CHM-5604) BS 6th

Course breakup for BS 6th

Programe		BS	
Semester		6th	
Course Title		Biochemistry-II	
Course Code	CHM-5604	Credit Hours	4(3-1)
No of week		19	
Total no. of lectures		64	
Course Instructor		Sidra Ayub	

Details of lecture/Activities

Weeks	No of Lecture	Topic of Lecture	Activity
1st	1	Bio catalysis	Lectures and practical
	2	Body fluids	
	3	Body fluids as electrolytes solutions	
	4	**Introduction to lab equipment**	
2nd	5	pH	Lectures and practical
	6	Henderson-Hessel Balch equation	
	7	Buffers, buffering capacity	
	8	**Solution Preparation**	
3rd	9	Applications of buffers	Lectures and practical
	10	Acid and bases	
	11	amino acids as acids and bases	
	12	**1. Determination of cholesterol in fluids.**	
4th	13	buffering capacity of amino acids	Lectures and practical
	14	regulation of acid base balance	
	15	Maintenance of blood pH	
	16	**1. Determination of cholesterol in fluids.**	
5th	17	acidosis, alkalosis.	Lectures and practical
	18	Disorders of acidosis, alkalosis	
	19	Compensatory mechanism of acidosis, alkalosis	
	20	**2. Determination of hemoglobin in the fluids.**	

Biochemistry-II(CHM-5604) BS 6th

6th	21	homeostasis	
	22	Clinical significance of homeostasis	**Quiz I**
	23	detoxification	
	24	**2. Determination of hemoglobin in the fluids.**	
7th	25	circulatory system	Lectures and practical
	26	Anatomy of circulatory system	
	27	Clinical significance of circulatory system	
	28	**3. Estimation of ascorbic acid in the given sample.**	
8th	29	Role of circulatory system to maintain body homeostasis	**Mid term exam**
	30	Role of circulatory system to maintain body homeostasis.	
	31	**Mid term exams**	
	32	**3. Estimation of ascorbic acid in the given sample.**	
9th	33	Chemical nature of enzymes	Lectures and practical
	34	nomenclature of enzymes	
	35	classification of enzymes.	
	36	**Lab Reports**	
10th	37	Cofactors	Lectures and practical
	38	substrate specificity	
	39	enzyme-substrate interaction	
	40	**4. Determination calcium in fluids**	
11th	41	Mechanism of Enzyme Action	Quiz II
	42	Enzyme kinetics	
	43	Enzyme kinetics	
	44	**5. Determination of chloride in fluids**	
12th	45	Kinetics of single substrate reactions	Lectures and practical
	46	Kinetics of single substrate reactions	
	47	Kinetics of multi substrate reactions	

	48	**5. Determination of chloride in fluids**	
13th	49	effect of different factors on enzymes activity	Lectures and practical
	50	enzyme inhibition	
	51	Types of enzyme inhibition	
	52	**6. Determination of total acidity in the given sample**	
14th	53	regulatory enzymes,	Lectures and practical
	54	allosteric enzymes	
	55	multi enzymes system,	
	56	**6. Determination of total acidity in the given sample**	
15th	57	zymogens	Lectures and practical
	58	isozymes	
	59	Industrial applications of enzymes	
	60	**Lab Reports**	
16th	61	immobilized enzymes	Lectures and practical
	62	Types of immobilized enzymes	
	63	Uses of immobilized enzymes	
	64	Revision of practical	
17th	Lecture	Class presentations	Assignments and ppts
	Lecture	Class presentations	
	Lecture	Class presentations	
	Practical	**Lab quiz**	
18th	Lecture	Class presentations	Assignments and ppts
	Lecture	Class presentations	
	Lecture	Class presentations	
	Lecture	Class presentations	
19th		**Terminal exams**	Terminal exams

Signature of teacher_____ Chairman_____

Semester-VIII

Specialization (Inorganic/Organic/ Physical/Biochemistry)	Credit hours
Paper-I	3(3-0)
Paper-II	3(3-0)
Paper-III	3(3-0)
Elective Course –I (Other than the field of specialization)	3(3-0)
Research project/ advanced Practicals	4(0-4)
Total	**16**

Semester-VIII

Physical Chemistry		
Course code	**Course Title**	**Credit hours**
CHM-6801	Quantum Mechanics	3(3-0)
CHM-6802	Colloids and Surfactants	3(3-0)
CHM-6803	Electrochemistry	3(3-0)
CHM-6804	Nuclear and Radiation Chemistry	3(3-0)
CHM-6805	Chemical Thermodynamics	3(3-0)
CHM-6806	Catalysis	3(0-3)
CHM-6807	Computational Chemistry	3(0-3)
CHm-6808	Solid State Chemistry	3(3-0)
CHM-6861	Advanced Practicals in Chemistry	4(0-4)
CHM-6862	OR Thesis	4(as per nature)
Inorganic Chemistry		
CHM-6816	Inorganic Chemistry in Biological systems	3(3-0)
CHM-6817	Chemical Crystallography	3(3-0)
CHM-6818	Inorganic Polymers	3(3-0)
CHM-6819	Basics of Nuclear Chemistry	3(3-0)
CHM-6820	Industrial Chemistry	3(3-0)
CHM-6821	Organometallic Chemistry	3(3-0)
CHM- 6822	Advanced Inorganic Chemistry-III	3(3-0)

CHM-6861	Advanced Practicals in Chemistry	4(0-4)
CHM-6862	OR Thesis	4(as per nature)
Organic Chemistry		
CHM-6831	Reaction Mechanism-II	3(3-0)
CHM-6832	Spectroscopy-II	3(3-0)
CHM-6833	Natural Products	3(3-0)
CHM-6834	Introduction to Organic Polymers	3(3-0)
CHM-6835	Pericyclic Reactions and Photochemistry	3(3-0)
CHM-6836	Organic Synthesis-II	3(3-0)
CHM-6837	Special Topics in Organic Chemistry	3(3-0)
CHM-6861	Advanced Practicals in Chemistry	4(0-4)
CHM-6862	OR Thesis	4(as per nature)
Biochemistry		
CHM-6846	Cell biology and cell Biosignaling	3(3-0)
CHM-6847	Microbiology and immunology	3(3-0)
CHM-6848	Nutrition	3(3-0)
CHM-6860	Biochemistry Practicals lab IV	3(3-0)
CHM-6861	Advanced Practicals in Chemistry	4(0-4)
CHM-6862	OR Thesis	4(as per nature)

Course Breakup

Program	BS
Semester	8th
Course Title	Intro. to Organic Polymers
Course Code	CHM-6834
Credit Hours	3(3-0)
No. of Weeks	18
Name of course Instructor	

Details Of Lectures

Week	Course contents
1st week	Introduction The Origins of Polymer Science and the Polymer Industry. Basic Definitions and Nomenclature. Skeletal Structure Homopolymers Copolymers Monomers, dimers, and oligomers.
2nd Week	**Introduction to Types of polymerization reactions** Addition polymerization reactions Cationic polymerization and radical polymerization n Anionic polymerization coordination polymerization
3rd Week	iv. **Condensation polymerization. reactions** v. Quiz vi. **Assignment /presentation**
4th Week	General Reactions and Reactivity of Functional Groups. Carothers Equation, Control of the Molar Mas Stoichiometric Control of M n Kinetics Molar Mass Distribution in Linear Systems and Average Molar Masses
5th Week	Step growth and Chain Growth. Termination Steady-State Kinetics High-Conversion Bulk Polymerizations
6th week	**Midterm exam**
7th week	Polymerization by carbonyl substitution reactions, Polyamides structure
8th week	Synthesis of carbonyl polymers. Polyesters & Polycarbonates general information Synthesis of Polyesters & Polycarbonates general information

week	i. Quiz ii. Assignment /presentation
10th week	Polymerization by electrophilic aromatic substitution. Chain growth.
11th week	Polymerization by nucleophilic attack on isocyanates. Polymerization of alkenes. Anionic polymerization is multiple conjugate addition
12th week	Cationic polymerization requires stabilized carbocations. Ziegler–Natta polymerization. Ziegler–Natta polymerization applications
13th week	Mass Spectra of Polymers. Methods of Soft Ionization for Polymers Electrospray Ionization. Matrix-Assisted Laser Desorption/Ionization
14th week	Chemical Composition and Molecular Microstructure. Itroduction Principles of Spectroscopy. Uses of Electromagnetic Radiation in Polymer Science The Beer Lambert Law for Absorption of Electromagnetic Radiation. Ultraviolet and Visible Light Absorption Spectroscopy Applications of UV-vis Spectroscopy in Polymer Science
15th week	Applications of IR Spectroscopy in Polymer Science Practical Aspects of Spectroscopy. Analysis of Molecular Structure and Composition by NMR Spectroscopy Analysis of End Groups and Branch Points by NMR Spectroscopy
16th week	Determination of Molecular Microstructure by NMR Spectroscopy Determination of Tacticity Determination of Repeat Unit Sequence Distributions in Copolymers Other Uses of NMR Spectroscopy in Polymer Science mPractical Aspects of NMR Spectroscopy
17th week	Terminals

Recommended Books

1. Young, R., & Lovell, P.A., *Introduction to Polymers*, Chapman & Hall Publishers, UK.
2. Cowie, J.M.G., *Polymers Chemistry and Physics of Modern Materials*, Billing & Sons Ltd. UK.

University of Poonch, Rawalakot

Department of Chemistry

Course Breakup for affiliated colleges

Course Title: Pericyclic Reactions and Photochemistry

Course Code:CHM-6835

Program: BS (8^{th})

Section: Organic

Weeks	Course Contents
Course content for midterm	
1^{st}	Introduction to pericycylic reraction types
2^{nd}	Cycloaddition reaction with examples
3^{rd}	Strereochemistry of reactants and products with examples
4^{th}	Electrcyclic reaations
5^{th}	Stereochemistry of cycladdition ractions
6^{th}	Practice with discusion
Course content for Terminal	
7^{th}	Detail study of sigmatropic reactions
8^{th}	Symmetry orbital and correlation diagram
9^{th}	Woodward Hoffmann Theory and Fuki's theory
10^{th}	Introduction to photochemistry and Ist and 2^{nd} law
11^{th}	Quantum yield yield
12^{th}	Norish type one and norish typr II Reactions
13^{th}	Jablonski diagram
14^{th}	Phosphoresnce and flouresence discussion
15^{th}	Presentations
16^{th}	Presentations

University of Poonch Rawalakot

Department of Chemistry

Course Breakup for affiliated colleges

Course Title: Spectroscopy-II

Course Code: CHM-6832

Program: BS (8^{th})

Section: Organic

Weeks	Course Contents
Course content for midterm	
1^{st}	Chemical Shift of aromatic substituted compounds i.e (1,2,3) substituted Benzene Rings.
2^{nd}	Diamagnetic shielding/Anisotropic effect of alkenes, alkynes and aromatic compounds.
3^{rd}	I.R of Alkanes, Alkenes and Alkynes
4^{th}	Carbonyl Compounds
5^{th}	Aldehydes Ketones carboxylic acid and esters and Mclefferty rearrangement.
6^{th}	U.V of conjugated and non-conjugated Alkenes Alkynes
Course content for Terminal	
7^{th}	Mass Fragmentation of Alkanes/Alkenes
8^{th}	Alcohols ethers and amines effects
9^{th}	Structure with U.V and I.R combined
10^{th}	Identifying and Comparing similar Structures by H-NMR (Cont...)
11^{th}	Identifying and Comparing similar Structures by H-NMR
12^{th}	C^{13} introduction and chemical shifts
13^{th}	C^{13} of various functional groups
14^{th}	Structural elucidation by combined spectroscopic techniques. Alkanes from Mass 15-60
15^{th}	Structural elucidation by combined spectroscopic techniques. Alcohols and ethers
16^{th}	Structural elucidation by combined spectroscopic techniques. Aromatic compounds

UNIVERSITY OF POONCH RAWALAKOT

Department of Chemistry

Course breakup

Course Title: Biochemistry-II - Cell Biology & Biosignaling

Course Code: CHM-5604

Credit Hours: 4 (3-1)

BS- VI

Course log

Weeks	Course content	
1st	**Cell Biology** Introduction to cell theory	Mid term portion
2nd	Introduction to cell structure	
3rd	Chemical composition, structure and function of cell organelles	
4th	Chemical composition, structure and function of cell organelles	
5th	Structure and function of nucleus, quize	
6th	Chromosomes, genes	
7th	Cell cycle, mitosis	Terminal portion
8th	Meiosis and cytokinesis	
9th	Transportation through plasma memebrane	
10th	Glucose transport channels	
11th	**Biosignaling** Cell signal transduction	
12th	Insulin signaling pathway	
13th	Disruption of insulin signaling during insulin resistance amd diabetes	
14th	Disruption of insulin signaling during insulin resistance amd diabetes	
15th	Leptin signaling to regulate food intake/ appetite	
16th	Disruption of leptin signaling in obesity and leptin resistance	

.Department of Chemistry
Course Breakup

Course Title	Advanced practical's in Chemistry
Course Code	CHM-6861
Credit Hours	4(0-4)
Contents	• Preparation of Maritus Yellow • Synthesis of 5,5-diphenylhydantion • Preparation of benzoic acid • Preparation of carboxylic acid hydrazide • Preparation of n-butyl chloride • Preparation of 2-iodobenzoic acid • Prepartion of 2,4-dinitrophenylhydrazone • Protection of functional group OH group
Suggested reading	1. Furniss, B.S., Hannaford, A.J., Smith, P.N.G., & Taldull,, A.R., Vogels Textbook of Practical Organic Chemistry, 5 th Ed., Longman Scientific & Technical, London, 1989. 2. Adams, R., Johnson, J.R., & Wilcox Jr., Laboratory Experiments in Organic Chemistry,

Programme	BS		
Semester	8th		
Course Title	Advanced practicals in Chemistry		
Course Code	CHM-6861	Credit Hours	4(0-4)
No of week	19		
Course Instructor	Shabana Siddique		

Course Breakup

Weeks	Course Contents
1st	Introdution to lab. and instrutions about preparation of Maritus yellow
2nd	Performance for Maritus Yellow
3rd	Instruction of synthesis of 5,5-diphenyle hydention
4th	Performanace
5th	Preparation of benzoic acid
6th	Preperation of carboxylic acid hydrazide
7th	Preperation of n -butyl chloride
8th	Preperation of 2- iodobenzoic acid
9th	Quiz and assignment
10th	Preperation of 2,4-dinitrophenylhydrazone
11th	Preperation of 2,4-dinitrophenylhydrazone
12th	Instruction about protection of functional group
13th	Performance for the protection of OH group
14th	Performance for the protection of OH group
15th	Presentations
16th-19	Revision