



List of Revised Courses

Department : **Chemistry**

Program Name : **PhD**

Academic Year : **2019-20**

List of Revised Courses

Sr. No.	Course Code	Name of the Course
01.	SPC-R1	Research Methodology & Computer Applications
02.	CH-R2	Thrust Area in Chemical Sciences
03.	CH-R3	Seminar



Minutes of Meetings (MoM) of Board of Studies (BoS)

Academic Year : 2019-20

School : School of Physical Sciences

Department : Chemistry

Date and Time : April 25, 2019 - 04:00 PM

Venue : Faculty room of New Chemistry Building

The scheduled meeting of member of Board of Studies (BoS) of Department of Chemistry, School of Studies of Physical Science, Guru Ghasidas Vishwavidyalaya, Bilaspur was held to design and discuss the content of each paper of U.G. (CBCS), P.G. (ECS) and Ph. D Course work (ECS).

The following members were present in the meeting:

1. Prof. Prof. Alok Mittal, (External Expert Member BoS, Dept. of Chemistry, MNIT, BHOPAL)
2. Prof. G. K. Patra (Member BoS, Dept. of Chemistry)
3. Dr. Bhaskar Sharma (HOD, Assistant Prof., Dept. of Chemistry.-cum Chairman, BOS)
4. Dr S. K. Singh (Member BoS, Associate Professor, Dept. of Chemistry)
5. Dr. Subhash Banerjee (Member, Assistant Professor, Dept. of Chemistry)

Following points were discussed during the meeting

1. The course content of Ph. D. Course work teaching was modified in light of incorporation of Computer Applications and other slight modification of course content.
2. The syllabi of Skill Enhancement Course (SEC) of B.Sc. III and B.Sc. IV sem. were also modified.

The committee discussed and approved the scheme and syllabi. The following courses were revised in the of B. Tech. Final year (VII and VIII Semesters) :

- ❖ Skill Enhancement Course-1 (SEC-1)
- ❖ Skill Enhancement Course-2 (SEC-2)
- ❖ Research Methodology & Computer Applications (SPC-R1)
- ❖ Thrust Area in Chemical Sciences (CH-R2)
- ❖ Seminar (CH-R3)

Signature & Seal of HoD
अध्यक्ष/Head
रसायन शास्त्र विभाग
Deptt. of Chemistry
गुरु घासीदास विश्वविद्यालय,
Guru Ghasidas Vishwavidyalaya,
बिलासपुर 495009 (छ.ग.)
Bilaspur 495009 (C.G.)



Scheme and Syllabus

Proposed Course Structure for Ph.D. Course Work (Chemistry, GGV, Bilaspur)

A. School-Specific Common Courses:

S. No	Title of the paper	Paper Type	Credits
SPC-R1	Research Methodology & Computer Applications	Common course Compulsory	4

B. Discipline-Specific courses: Total 10 credits: All these courses are compulsory to each student.

S. No	Title of the paper	Paper Type	Credits
CH-R1	Modern Techniques in Chemical Sciences	Compulsory for Chemistry	4
CH-R2	Emerging Area in Chemical Sciences	Compulsory for Chemistry	4

C. Research theme-specific courses:

6 credits

S. No	Title of the paper	Paper Type	Credits
CH-R3	Seminar on research topic with written report by student Mode of study includes: Assigning the topic to students based on their basic background and presentation in the form of seminar which will be followed by discussion and submission of the write-up. This will be evaluated by group of teachers.	Successful	No Credit



Paper II

Credit 6

CH-R1 Modern Techniques in Chemical Sciences

1. Basic theory, instrumentation and analytical applications: Spectroscopic techniques [NMR, ESR, MS (EI, FAB, MALDI-TOF), IR, UV-Vis, Fluorescence and Phosphorescence, Atomic Absorption, Biosensors.
2. **Techniques for Materials Characterization**
Basic theory and analytical applications of the following physical methods: X-ray diffraction methods (single crystal and powder method), Thermoanalytical methods (TGA, DSC, DTA), Microscopic methods (SEM, TEM, AFM), Surface Properties (XPS, BET), Cyclic Voltammetry, SQUID.
3. **Separation Techniques:**
Introduction, classification of chromatographic methods, terms and relationships in chromatography, sample characterization High performance liquid chromatography (HPLC), Gas chromatography (GC) and ion exchange chromatography, GPC.

Principle, Instrumentation and Application of :
Reverse Osmosis (RO), Nanofiltration (NF), Ultra Filtration (UF) and Micro Filtration (MF), gel electrophoresis, chiral separations.
4. **Computational Chemistry:** Theoretical Chemistry a quantum approach, MO theory, Ab initio calculation, Geometry optimization, basis set, electronic structure calculations.,

Books Recommended

1. F.W Fifield & D.Keal, Principles and Practice of Analytical chemistry Blackwell Publishing Company, (2004)
2. Pradyot Patnaik, (2004), Dean's Analytical chemistry, Hand Book Second edition McGraw- Hill Hand Books
3. J. D Seader /Ernest J. Henley, Separation Processes Principles; John Wiley & Sons Inc. N.Y. (1998)
4. Skoog, Holler, Nieman, H.B Principles of Instrumental Analysis Fifth edition College publishers.
5. G.H. and H. Freiser, Solvent Extraction in Analytical Chemistry, 1st edition (1958), John Wiley, New York.
6. B. L. Karger, L.R. Snyder and C. Howarth, An Introduction to Separation Science, 2nd Edition (1973) John Wiley, New York.
7. E.W. Berg, Chemical Methods of Separation, 1st edition (1963), McGraw Hill New York.
8. D.G. Peters, J.M.Hayes and C.M. Hieftj, Chemical Separation and Measurements, 2nd edition 1974, Saunders Holt, London.
9. R.M. Silverstein and F.X. Webster, Spectroscopic Identification of Organic Compounds, 6th Edition (2003) John Wiley, New York.F
10. J.R.Dyer, Application of Absorption Spectroscopy of Organic



Proposed Course Structure for Ph.D. Course Work (Chemistry, GGV, Bilaspur)

- Compounds, Prentice Hall, New Delhi (1978).
11. J.M. Hollas, *Modern Spectroscopy*, 4th edition (2004), John Wiley and Sons, Chichester.
 12. C.N. Banwell and E.M. Mc Cash, *Fundamentals of Molecular Spectroscopy*, 4th edition (1994), Tata McGraw Hill, New Delhi.
 13. R. S. Drago, *Physical Methods in Chemistry*, International Edition (1992), Affiliated East-West Press, New Delhi.
 14. D.A. Skoog, F.J. Holler and T.A. Nieman, *Principles of Instrumental Analysis*, 5th Edition (1998), Harcourt Brace & Company, Florida.
 15. H.A. Strobel, *Chemical Instrumentation – A Systematic Approach*, 2nd Edition (1973), Addison Wesley, Mass.
 16. R.L. Pecsok, L. D. Shields, T. Cairns and L.C. Mc William, *Modern Methods of Chemical Analysis*, 2nd Edition (1976), John Wiley, New York.

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CH-R2: Thrust Area in Chemical Sciences

- 1. Emerging Green Chemistry:** Green chemistry, introduction, 12 principles, Solvent-free synthesis; Environmentally benign solvents: Water and Ionic liquids as green solvents and catalysts in organic synthesis. Microwave in chemical synthesis: Basic principles, advantages and examples. Sonochemistry and green aspects;
- 2. Nano-Chemistry:** Introduction, **Nucleation and growth, heterogeneous nucleation, Size effect**, Synthesis and assembly, techniques, General methods of preparation and synthesis. Types of nano materials, their Properties and applications. Carbon nanotube, micro- and mesoporous materials.
- 3. Formation of Carbon-Carbon bonds via organometallic reagents:** (i) Palladium-Catalyzed Coupling Reactions, (ii) Organoboron Reagents, (iii) Organozinc Reagents, (iv) Organocopper Reagents.
- 4. Multicomponent reactions (MCRs):** Definition, Advantages and examples particularly, Ugi reaction, Biginelli reactions, Strecker amino acid synthesis, Passerini synthesis, Mannich reaction,
- 5. The chemistry of molecular recognition:** Host and Guest Chemistry. Supramolecular interactions and their characterization, Supramolecular catalysis and transport processes, Cyclodextrin- a naturally occurring cyclic host, calixarene- a versatile host; Chemosensor, Electrochemical sensors, Origin and source of chirality, chiral ligands, chiral drugs, asymmetric epoxidation
- 6. Polymers:** Mechanism and kinetics of radical, condensation and living radical polymerizations. Spectroscopic characterization and testing of polymers. Measurement of molecular weights: viscosity, light scattering, osmotic and size exclusion chromatographic method. Properties and applications of commercial polymers: polyamides, polyesters, phenolic resins, epoxy resins and silicones. Fire retarding polymers, conducting polymers, and biocompatible polymers.

Books Recommended

1. Mike Lancaster, Green Chemistry: An Introductory Text, Royal Society of Chemistry, 2002.
2. Nina Hall(Editor-in-chief), The new Chemistry, Cambridge university Press, 2000.
3. CNR Rao, Muller and Cheetham, The Chemistry of Nano Materials, Vol.I & II, Wiley-VCH (2005)
4. Geoffrey A. Ozin, and Andre Arsenette, Nano Chemistry, RSC Publishing, 2005
5. S.C. Tjong, Nano Crystalline Materials Elsevier, 2006
6. George S. Zweifel, Michael H. Nantz, Modern Organic Synthesis - An Introduction, 1st Edition, 2007; ISBN: 978-0-716-77266-8; Ed. W. H. Freeman
7. Dale L. Boger, Modern Organic Synthesis, TSRI press.



Proposed Course Structure for Ph.D. Course Work (Chemistry, GGV, Bilaspur)

- University press INC, New York, 2001
11. M.B. Smith & Jerry March, March's Advanced Organic Chemistry, 5th Edition (2001), John Wiley & Sons, New York.
 12. M. N. Hughes, Inorganic Chemistry of Biological Processes, 2nd Ed. (1981), John-Wiley & Sons, New York.
 13. W. Kaim and B. Schwederski, Bioinorganic Chemistry: Inorganic Elements in the Chemistry of Life, An introduction and Guide, Wiley, New York (1995).
 14. S. J. Lippard and J. M. Berg, Principles of Bioinorganic Chemistry, University Science Books, (1994).
 15. I. Bertini, H. B. Grey, S. J. Lippard and J. S. Valentine, Bioinorganic Chemistry, Viva Books Pvt. Ltd., New Delhi (1998).
 16. Ariga Katsuhiko, Kunitake Toyoki, Supramolecular chemistry- fundamentals and applications: advanced text book, Publisher: Iwanami Shoten Publishers, Tokyo, 2006.
 24. Jean Marie Lehn, Supramolecular chemistry: concepts and perspective, Wiley-VCH (June 1995).
 25. Crego-Calama, Mercedes Reinhoudt, Davis N. Ed. Supramolecular chirality, Topics in current Chemistry, vol 265, 2006, Springer Verlag.
 26. F. A. Cotton and G. Wilkinson, Advanced Inorganic Chemistry, 6th Edn., (1999), John-Wiley & Sons, New York.
 27. Catalysis: Principles and Application, editor(s) : B. Viswanathan, S. Sivasanker, A.V. Ramaswamy ISBN: 978-81-7319-375-0: (2007).
 28. Jacobsen, E.N., Pfaltz, A.; Yamamoto, H. (ed), Comprehensive Asymmetric Catalysis I-III; Springer Verlag: Berlin, 1999.
 29. Textbook of Polymer Sciences, F. W. Billmeyer Jr, Wiley.Polymer Sciences, V. R. Gwariker, N. V. Vishwanathan and J. Sreedhar, Wiley-Eastern.
 30. Functional Monomers and Polymers, K. Takemoto, Y. Inaki and R. M. Otanbrite.
 31. Contemporary Polymer Chemistry, H. R. Alcock and F. W. Lambe, Prentice Hall.
 32. Physics and Chemistry of Polymers, J. M. G. Cowie, Blackie Academic and Professional.

CH-R3 : Seminar on research topic with written report by student

No Credit

Mode of study includes: Assigning the topic to students based on their basic background and presentation in the form of seminar which will be followed by discussion and submission of the write-up. This will be evaluated by group of teachers.

Handwritten signatures and dates of the faculty members involved in the seminar evaluation:

- B-Shan 25-04-17
- Shan 25/4/19
- Prapu 25/4/19
- Shelani
- KSUP
- Prak
- ASSE