Name of Institute: Institute of Sciences, Humanities & Liberal Studies(ISHLS)
Name of Faculty: Dr. Paras Patel

Course code: MCH0325
Course name: Pharmaceutical Analysis
Pre-requisites: B.Sc. (Chemistry)
Credit points:

L	T	P	C
4	0	0	4

Offered Semester: III

Course Coordinator (weeks XX - XX)
Full Name: Dr. Paras Patel
Department with siting location: Department of Chemistry
Class-9 (EDC Cell), 4th Floor, Bhanwar Building
Telephone: EXT : 3404
Email: paraspatel.gd@indusuni@ac.in
Consultation times: 4:15 pm to 5:00 pm (Monday to Friday)

Course Lecturer (weeks xx - XX)
Full name: Dr. Paras Patel
Department with siting location: Department of Chemistry
Class-9 (EDC Cell), 4th Floor, Bhanwar Building
Telephone: EXT : 3404
Email: paraspatel.gd@indusuni.ac.in
Consultation times: 4:15 pm to 5:00 pm (Monday to Friday)

Students will be contacted throughout the Session via Mail with important information relating to this Course.

Course Outcomes (CO)

By participating in and understanding all facets of this Course a student will:

1. Define different kind of wet analysis used in pharmaceutical industry. [BT-1]
2: Demonstrate water analysis. [BT-3]
3: Calculate assay and purity of drug by different analytical techniques. [BT-5]
4: Categorize different pharmaceutical formulation. [BT-4]
5: Explain the monograph of different pharmacopoeia. [BT-2]
6: Express various principals of clinical chemistry. [BT-2]

Course Outline
(Key in topics to be dealt)

- Common Analysis in Pharmaceutical Lab
- Pharmaceutical Analysis-I
- Pharmaceutical Analysis-II
- Analytical Aspects of Drug Discovery
- Clinical Chemistry

Method of delivery
(Face to face lectures, , Active Learning Techniques)
Face to Face Lecture

Study time
(How many hours per week including class attendance)
04 hours per week

CO-PO Mapping (PO: Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										
CO4										
CO5										
CO6										

Blooms Taxonomy and Knowledge retention (For reference)
(Blooms taxonomy has been given for reference)

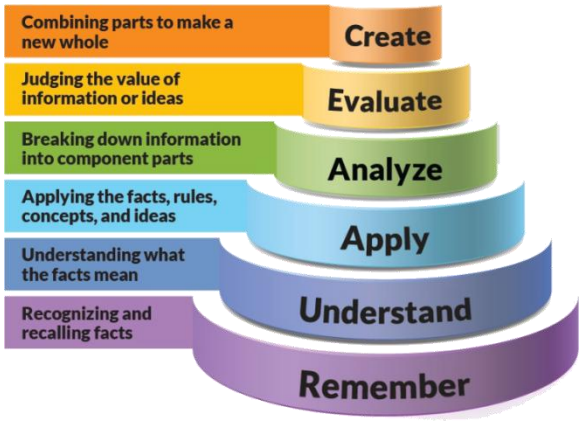

Figure 1: Blooms Taxonomy

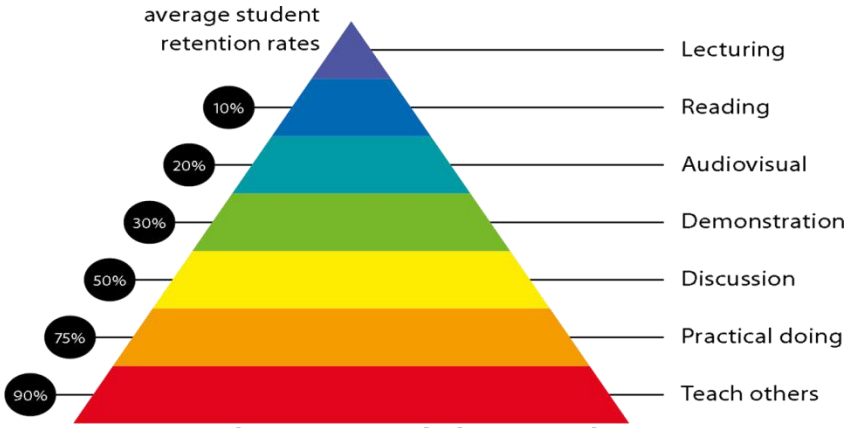

Figure 2: Knowledge retention

Graduate Qualities and Capabilities covered

(Qualities graduates harness crediting this Course)

General Graduate Qualities	Specific Department of _____Graduate Capabilities
Informed Have a sound knowledge of an area of study or profession and understand its current issues, locally and internationally. Know how to apply this knowledge. Understand how an area of study has developed and how it relates to other areas.	**1 Professional knowledge, grounding & awareness:-** Student's will gain knowledge about chemistry subject in the both areas i.e. theory as well as practical's. Professionally students will know how chemistry is important in our daily life as well as to build up any industry. Students will be having knowledge/ awareness about chemicals' such as how to use them and how hazardous they are for the environment.
Independent learners Engage with new ideas and ways of thinking and critically analyze issues. Seek to extend knowledge through ongoing research, enquiry and reflection. Find and evaluate information, using a variety of sources and technologies. Acknowledge the work and ideas of	**2 Information literacy, gathering & processing:-** Student's will be able identify the problems happening in the society as well as in the industry such as Photochemistry, uses of Aromatic heterocyclic compounds and their reactions, Organic waste coming from the industries etc. with this basic information they will be

others.	having ability to gather the possible solutions.
Problem solvers Take on challenges and opportunities. Apply creative, logical and critical thinking skills to respond effectively. Make and implement decisions. Be flexible, thorough, innovative and aim for high standards.	**4 Problem solving skills:** Organic Chemistry education provides students with the tools to solve many problems based on Chemistry. This means that students should be able to apply the scientific method: define a problem clearly, develop testable hypotheses, design and execute experiments, analyse data using appropriate statistical methods, and draw appropriate conclusions. Students should be able to integrate knowledge across chemical sub disciplines and apply this knowledge to solve problems. In the laboratory, in addition to the characteristics described above, students should understand the fundamental uncertainties in experimental measurements.
Effective communicators Articulate ideas and convey them effectively using a range of media. Work collaboratively and engage with people in different settings. Recognize how culture can shape communication.	**5 Written communication:-** Students should be able to retrieve specific information from the chemical literature, critically evaluate technical articles, and manage many types of chemical information. Students should able to develop proficiency with electronic searching of appropriate technical databases, including structure-based searching
	6 Oral communication:- Students should orally able to use communication technology such as computerized presentations as well as software for word processing, chemical-structure drawing, writing review article on any related topic, poster preparation and research paper presentation to any conferences.
	7 Teamwork:- Students should be able to Solve scientific problems often involves working in disciplinary and

	multidisciplinary teams. This is especially true in industry and increasingly in academic settings. Students should learn to work productively with a diverse group of peers in classroom and laboratory activities. Students should be able to lead portions of an activity or be effective followers, as dictated by the situation. Peer- and self-assessment is often an effective way to evaluate student contributions to group activities.
Responsible Understand how decisions can affect others and make ethically informed choices. Appreciate and respect diversity. Act with integrity as part of local, national, global and professional communities.	**10 Sustainability, societal & environmental impact:** With this course students will know/ aware/ learn about the sustainable use of the organic reagents while performing the laboratory experiments. Students will be able to understand various photochemical reactions happening in the environment and their participation in global warming. So they will be having capabilities/ knowledge how to tackled/ deal with different types of organic pollutants coming from the organic laboratory and industry.

Lecture/tutorial times

(Give lecture times in the format below)_M.Sc. Chemistry _SEM-2

Example:

Attendance Requirements

The University norms states that it is the responsibility of students to attend all lectures, tutorials, seminars and practical work as stipulated in the Course

outline. Minimum attendance requirement as per university norms is compulsory for being eligible for mid and end semester examinations.

Reference Books:

1. Quality assurance in Analytical Chemistry, Elizabeth Prichard and Vicki Barwick, LGC, Teddington, UK, 2007.
2. Quality Assurance in Analytical Chemistry W. Funk, V. Dammann, G. Donnevert VCH Weinheim (1995).
3. Principles of Instrumental Analysis, D.A. Skoog, F.J. Holler, and J.A. Nieman 5th Edition (1998).
4. Good Laboratory practice, Eds. W.Y. Garner, M.S. Barge and J.P. Ussary, ACS Professional Refernce Book (1992).
5. Quantitative Organic Analysis Via functional groups, 3rd Ed. S. Sigia. John Wiley, N.Y. (1972).
6. Pharmaceutical Drug Analysis (Methodology-Theory-Instrumentation Pharmaceutical assays-Cognate Assays), AshutoshKar, New Age Int. Pvt. Ltd. New Delhi (2010).
7. Indian Pharmacopeia 2010, Vol. I, II, III and Addendum 2012, 6th Ed. The Indian Pharmacopoeia Commission, Ghaziabad, 2010.
8. British Pharmacopeia.
9. Pharmaceutical Analysis, T. Higuchi and E. Brochmann- Hanssen, Interscience (1961).
10. The quantitative analysis of drugs, D.C. Garratt, Chapman and Hall (1964).
11. Pharmaceutical Analysis, A.H. Beckett and J.B. Stenlake, Chapman and Hall.
12. Methods of Drug Analysis, B.F. Granbowshi, Lea and Feniger.
13. Analysis of Drugs and Chemicals, N. Evers, W. Smith and C. Grifin.
14. Hawk's Physiological Chemistry, Mc Graw Hill.
15. Bioanalytical Chemistry by S. Mikkelsen and E. Corton, John Wiley and Sons, 2004.
16. Clinical Chemistry: Principles, Procedures, Correlations, 4th edition by Michael L.
17. Bishop, Janet L. Duben-Engelkrik, Edward P. Fody, Lippincott Williams and Wilkins,2000.

ASSESSMENT GUIDELINES

Your final course mark will be calculated from the following:

Example:

- **CIE (60 Marks)**

1. Mid Sem Exam = 40 Marks
2. Assignment = 10 Marks (2 assignment)
3. Presentation = 05 Marks
3. Attendance = 05 Marks(bonus for student having >80% attendance)

CIE Total = 60 Marks

- ESE (40 Marks)

1. ESE exam = 40 Marks

SUPPLEMENTARY ASSESSMENT

Students who receive an overall mark less than 40% in mid semester or end semester will be considered for supplementary assessment in the respective components (i.e mid semester or end semester) of semester concerned. Students must make themselves available during the supplementary examination period to take up the respective components (mid semester or end semester) and need to obtain the required minimum 40% marks to clear the concerned components.

Practical Work Report/Laboratory Report:

A report on the practical work is due the subsequent week after completion of the class by each group.

Late Work

Late assignments will not be accepted without supporting documentation. Late submission of the reports will result in a deduction of -% of the maximum mark per calendar day

Format

All assignments must be presented in a neat, legible format with all information sources correctly referenced. **Assignment material handed in throughout the session that is not neat and legible will not be marked and will be returned to the student.**

Retention of Written Work

Written assessment work will be retained by the Course coordinator/lecturer for two weeks after marking to be collected by the students.

University and Faculty Policies

Students should make themselves aware of the University and/or Faculty Policies regarding plagiarism, special consideration, supplementary examinations and other educational issues and student matters.

Plagiarism - Plagiarism is not acceptable and may result in the imposition of severe penalties. Plagiarism is the use of another person's work, or idea, as if it is his or her own - if you have any doubts at all on what constitutes plagiarism, please consult your Course coordinator or lecturer. Plagiarism will be penalized severely.

Do not copy the work of other students.
Do not share your work with other students (except where required for a group activity or assessment)

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Course schedule (subject to change)

(Mention quiz, assignment submission, breaks etc as well in the table under the Teaching Learning Activity Column)

	Week #	Topic & contents	CO Addressed	Teaching Learning Activity (TLA)
	Weeks 1	Common Analysis in Pharmaceutical Lab: Parameters for processing water analysis.	1 & 2	
	Weeks 2	Loss on drying and Karl fisher analysis Heavy metal ion analysis,Sulphated ash analysis, Dissolution analysis.	1 & 2	
	Week 3	Assay and purity by various spectroscopic techniques. Assay and purity by various chromatographic techniques	1 & 2	
	Week 4	Pharmaceutical Analysis-I: General idea regarding pharmaceutical industry, definition and classification of drugs, introduction to pharmaceutical formulations, classification of dosage forms.	3 & 4	
	Week 5	Sources of impurities in pharmaceutical chemicals and raw materials. Standardization of finished products and their characteristics, official methods of control, use of pharmacopoeia.	3 & 4	
	Week 6	Analysis of compounds based on functional groups (eg. Aspirin, paracetamol, ascorbic acid, vitamin-A), classical and instrumental.	3 & 4	
	Week 7	Methods of drug analysis, proximate assays, assays of enzyme containing	3 & 4	

		substances, biological and microbiological assays and tests.		
	Week 8	Pharmaceutical Analysis-II : Limit tests, solubility tests, disintegration tests, stability Studies.	3,4 & 5	
	Week 9	Impurity profile of drugs, bioequivalence and bioavailability studies. Analytical Aspects of Drug Discovery: Discovery of new chemical entity.	3,4 & 5	
	Week 10	Identity and purity assessment, bioavailability/dissolution requirement, high-throughput screening, degradation classification	3,4 & 5	
	Week 11	Clinical Chemistry: Composition of blood, collection and preservation of samples, common determinations-	6	
	Week 12	serum electrolytes, blood glucose, blood urea nitrogen, uric acid, albumins and globulins, acid and alkaline phosphatases, barbiturates.	6	
	Week 13	Principles of various Immunoassays (radio immunoassay, fluorescence immunoassay, enzyme immunoassay).	6	
	Week 14			
	Week 15			