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

Course code: MCH0307
Course name: Preparative Chemistry-I
Pre-requisites: Bachelor of Science in Chemistry
Credit points:

L	T	P	C
4	0	0	4

Offered Semester: IV

Course Coordinator (weeks XX - XX)
Full Name: Dr. Madhuresh Makavana
Department with siting location: Chemistry Department, ISHLS,
Staff Room, 4th Floor, Bhanvar Building
Telephone: EXT : 3425
Email: madhureshmakavana.gd@indusuni.ac.in
Consultation times: 4:15 pm to 5:00 pm (Monday to Friday)

Course Lecturer (weeks xx - XX)
Full Name: Dr. Madhuresh Makavana
Department with siting location: Chemistry Department, ISHLS,
Staff Room, 4th Floor, Bhanvar Building

Telephone: EXT : 3425
Email: madhureshmakavana.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)

After the successful completion of the course, students will be able to;
1) Solve the advance chemical bonding problems [BT3].
2) Apply the theories of bonding to solve the advance problems [BT3].
3) Calculate the equilibrium constant of the reaction [BT3].
4) Analyse the thermodynamics of reaction [BT4].
5) Apply the phase rule to calculate the eutectic point [BT3].
6) Describe the quantitative derivation of the lever rule [BT1].

Course Outline

(Key in topics to be dealt)

- **Chemical Bonding-I**
- **Chemical Bonding-II**
- **Chemical Equilibria**
- **Phase Rule**

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

Study time

(How many hours per week including class attendance)

CO-PO Mapping (PO: Program Outcomes)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO 1	-	-	-	-	-	-	-	-	-	-	-	-
CO 2	-	-	-	-	-	-	-	-	-	-	-	-
CO 3	-	-	-	-	-	-	-	-	-	-	-	-
CO 4	-	-	-	-	-	-	-	-	-	-	-	-
CO 5	-	-	-	-	-	-	-	-	-	-	-	-

Blooms Taxonomy and Knowledge retention (For reference)

(Blooms taxonomy has been given for reference)

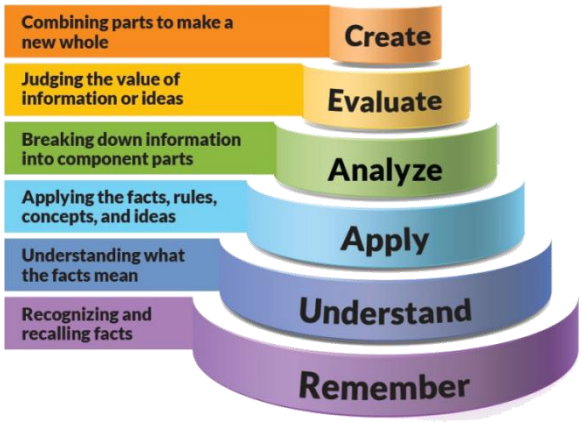


Figure 1: Blooms Taxonomy

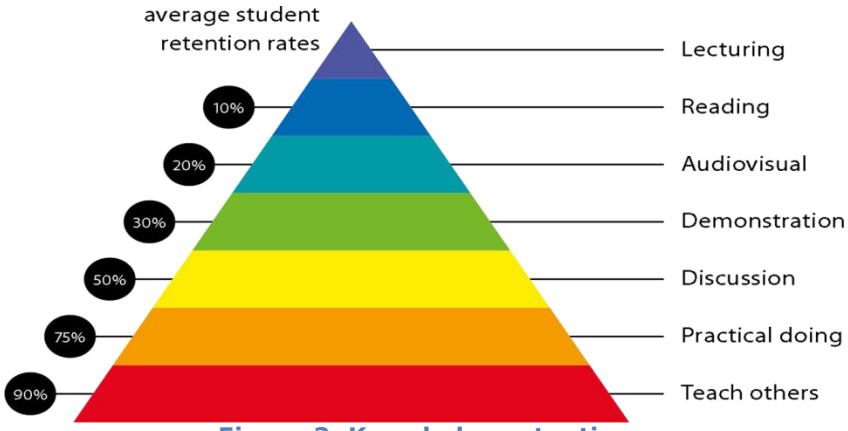


Figure 2: Knowledge retention

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 others.	**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 water quality, loss due to corrosion, pollutant coming from cement plant etc. with this basic information they will be 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:** Chemistry education provides students with the tools to solve problems. This means that students should be able to apply the scientific method: define a problem clearly, develop testable hypotheses, design and execute experiments, analyze 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 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, and 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 green products, proper management of renewable energy resources, and to find out new energy replacement sources. Students will be socially aware about the sources of pollutant that damages the water, soil, air etc. So they will be having capabilities/ knowledge how to tackled/ deal with different types of pollutions.

Practical work:

(Mention what practical work this Course involves)

N.A.

Lecture/tutorial times

(Give lecture times in the format below)_

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.

Details of referencing system to be used in written work

1. UGC-CSIR NET (JRF & LS) Chemical Science by A. Tomar, N. Sharma, P.Gupta
2. Joint CSIR-UGC NET Chemical Science (Paper-II & III) by N. Sharma
3. Trueman's UGC-CSIR JRF / NET Chemical Sciences by M. Gagan
4. CSIR-UGC NET/JRF/SET Chemical Sciences by H. Kulshretha, A. Taneja
5. UGC-CSIR NET (JRF & LS) Chemical Science by T. Aditya
6. Atkins' Physical Chemistry by P. Atkins, J. D. Paula
7. Inorganic Chemistry by P. Atkins, T. Overton, J. Rourke, M. Weller, F. Armstrong

Text books

1. Principles of Physical Chemistry by B. R. Puri, L. R. Sharma, M. S. Pathania
2. Inorganic Chemistry: Principles of Structure and Reactivity by J. E. Huheey

Additional Materials

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)

.

Course schedule(subject to change)

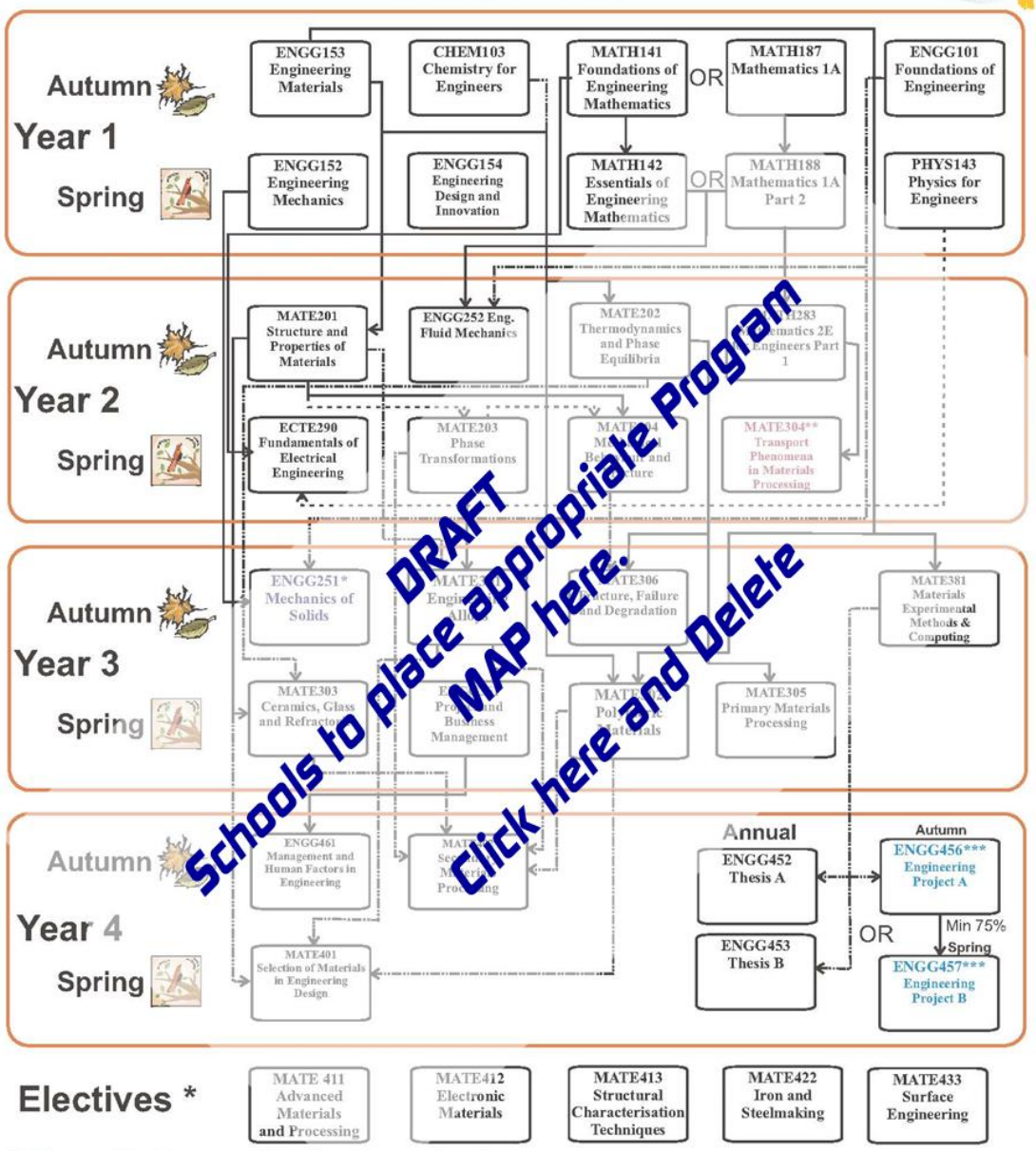
(Mention quiz, assignment submission, breaks etc as well in the table under the Teaching Learning Activity Column)

	Week #	Topic & contents	CO Addressed	Teaching Learning Activity (TLA)
	Week 1	**Unit-I** **Chemical Bonding-I:** Octet rule, Bond parameters-Bond length, Bond angle	1	
	Week 2	Bond enthalpy, Bond order, Resonance structure, Dipole moment	1	
	Week 3	Ionic bond-Born-Haber cycle, Polarization and Fajan rule, Solubility of ionic compounds	2	
	Week 4	Covalent bond-Sidgwick Powell theory, % of ionic character in covalent bond	2	
	Week 5	**Unit-II** **Chemical Bonding-II:** Coordination bond, VSEPR theory	2	
	Week 6	Valence Bond theory(VBT), Hybridization	2	
	Week 7	Molecular orbital theory(MOT), Metallic bond, Hydrogen bonding	2	
	Week 8	Vander Waals bonding, Lattice energy of Ionic solids, Problems	2	
	Week 9	**Unit-III** **Chemical Equilibria:** Introduction, Laws of mass action, Equilibrium constant (K_p and K_c) and relation between them	3	
	Week 10	Significance of magnitude of equilibrium constant, Units of equilibrium constant, Reaction	3	

		Quotient, Relation of vapour density and Degree of dissociation (α)		
	Week 11	Le-Chatelier's principal, Effect of concentration, volume, pressure, catalyst, inert gas addition, temperature	3	
	Week 12	Thermodynamics of equilibrium, Homogeneous equilibria, Dependance of equilibrium constant, Problems	4	
	Week 13	**Unit-IV** **Phase Rule:** Introduction, Degree of freedom (*F*), Phase transition, Phase diagram, Phase diagram of CO_2	5	
	Week 14	Phase diagram of Sulphur, Two component system, Reduced phase rule, Eutectic systems	5	
	Week 15	Calculation of Eutectic point and Eutectic composition, Vapour pressure-composition diagram of a binary liquid solution	6	
	Week 16	Tie line, The liver rule, Quantitative derivation of the lever rule, Problems	6	

PROGRAM MAP for Bachelor of Engineering (Materials Engineering)

DEGREE - 2012



* Note: Students will take three electives
Some electives are only offered every 2nd year

ENGG251* Note: Full time students entering Year 3 in 2012 will need to take one elective in Autumn as they have already completed ENGG251

MATE304** Note: Full time students entering Year 3 in 2012 will need to take MATE304 in Spring of their 4th year or take it in 2012 and defer another subject to Spring 2012

ENGG456***Note: If ENGG456 Engineering Project A (6cp) is done instead of a thesis, a student needs to complete 4 electives and is not eligible for honours