University of Management & Technology
School of Science & Technology
Department of Basic Sciences

NS-114 CHEMISTRY FOR ENGINEERS

Lecture Schedule	**Sec A** (Tue/Thur: 08:00-09:30) **Sec B** (Mon/Wed: 11:00-12:30) **Sec C** (Mon/Wed: 08:00-09:30)	**Semester**	Fall 2013
Pre-requisite	F.Sc. /A-level Chemistry	**Credit Hours**	3
Instructor(s)	Dr Sammia Shahid Dr Ayesha Mohy-ud-Din	**Contact**	sammia.shahid@umt.edu.pk ayesha.mohyuddin@umt.edu.pk
Office	2nd Floor, South Block, S3-38, Room No. 5	**Office Hours**	See office window

Course Description	In today's society chemistry is greatly involved in the world of engineering. Whether it is aerospace, electrical, mechanical, environmental, energy or other engineering fields, the makeup of substances is always a key factor which must be known. The more chemistry an engineer understands, the more beneficial it is. The curriculum is designed to prepare the undergraduate for work in the highly diverse engineering profession. All engineering fields have unique bonds with the chemistry. So this course provides an introduction to basic undergraduate chemistry and covers the concepts such as the periodic table, mole, stoichiometry, properties of matter & solutions, acid and bases, chemical equilibrium, chemical kinetics, transition elements, thermodynamics, electrochemistry, battery technology, fuel cell types and organic chemistry. In addition to that applied concepts are given on corrosion, polymers, metals, semiconductors, environmental pollutants and pollution control. The course is taught using a problem-solving approach.
Expected Outcomes	In future, global problems and issues will require an in-depth understanding of chemistry to have a global solution. Upon completion of this course, students will be able to understand the structure and property relationships of different engineering materials; they will be ready to meet the challenges and opportunities of creating products especially nanomaterials and processes, controlling corrosion & oxidation, manipulating complex systems, and managing technical operations in industries.
Textbook(s)	Chemistry ,5th edition (LPE) John McMurry & Robert C.Fay By: Pearson Education, Delhi, India, 2008 Engineering Chemistry Gadag & Nityananda Shetty By: IK International Publications, Delhi, India
Grading Policy	• Quizzes & Assignments: 20% • Midterm: 30% • Final Exam: 50%

Course Schedule

Week	Lecture #	TOPICS	CH	SECTIONS
1	1	Matter & Measurement, Periodic Table	1	1,3
	2	Periodic properties, Measurement (precision & Accuracy)	1	4 – 5
2	1	Unit conversion calculations	1	13
	2	Quantum theories, quantum numbers & wave functions	2	1 – 6
3	1	Naming Chemical compounds	2	7 – 10
	2	chemical equations, Avogadro's number, Mole	3	1– 4
4	1	Stoichiometry Calculations, Yield of chemical reactions	3	5 – 9
	2	%age composition, Empirical formula, combustion analysis	3	10 – 13
5	1	Reactions in Aqueous Solutions	4	1 – 6
	2	Ionic Solids and Lattice Energy	6	1– 8
6	1	Thermo-chemistry, Energy conservation	8	1 – 5
	2	Thermodynamics standard state, Calorimetry, Hess's Law, Heat of formation	8	6 – 10
7	1	Reaction Rates, Integrated & differential rate laws, Half life	12	1 – 5
	2	1^{st} order, 2^{nd} order and Zero order reactions, Catalysis	12	6-7, 13-14
8	1	Applications of Chemistry in Engineering (Nanomaterials, ceramics, polymers, surface engineering)	--	--
	2			
9	1	Electrochemistry, Galvanic cells, cell potentials	17	1 – 4
	2	Oxidation/Reduction, Primary, secondary & reserve Batteries	17	5 – 9
10	1	Fuel Cells, Electrolysis	17	10
	2	Types of Corrosion, consequences & Prevention methods	17	11 – 14
11	1	Chemical Equilibrium, Acid Base Concepts	14	1 – 6
	2	The pH Scale, Acid base indicators	14	7 – 10
12	1	Equilibria in Solutions of Weak Acids and Bases	14	11 – 13
	2	Applications of Aqueous Equilibria	15	1 – 2
13	1	Buffer Solutions, Common ion effect	15	3 – 4
	2	Ionization Constant, Measuring Solubility Equilibria	15	11 – 13
14	1	Fuels, Classification, Criteria of selection of Fuel	--	--
	2	Nuclear Chemistry, nuclear power & weapons	22	1 – 3,10
15	1	Organic Chemistry	23	1 – 4
	2	Naming Organic Compounds	23	5 – 6