

SYLLABUS: CHEMISTRY

Date / Revision	23 May 2015 / 02 May 2017 / PP
Faculty	Engineering and Lifesciences
Study Program	AVE, AUE, COS, MEE, INE, ELE, MTE, FTE, CHE, BME

SUBJECT: Chemistry

1 Basic Information

1.01	Subject Name	Chemistry
1.02	Semester	1
1.03	Level	1
1.04	SKS	2
1.05	Mandatory / Curriculum	Mandatory / F-02
1.06	Subject Code	CHEM
1.07	Subject Code	LS-F-CHEM-1102
1.08	Year	2017 (7)
1.09	Quality Control	Final Test, see evaluation
1.10	Limitations	Min 12 and Max 32 students in one class
1.11	Combined with	AVE, AUE, COS, MEE, INE, ELE, MTE, FTE, CHE, BME
1.12	Perquisite	None
1.13	Responsible	Mr. Tutun Nugraha, PhD / Ms. Evhy, MSc
1.14	Revision	15-08-2017/MaS

2 Description of Subject

This course will provide students with an understanding of the underlying principles of chemistry which are primarily the composition, structure, properties and reactivity of matter. Students will be encouraged to employ logic and original thinking in order to use both qualitative and quantitative methods to solve a variety of problems.

3 Objectives

- Understand the principles of kinetics and thermodynamics as applied to the rates and equilibrium positions of chemical reactions
- Make predictions about the atomic structure and chemical properties of the elements based in their position in the periodic table.
- Use standard names and symbols to represent elements, isotopes, ions, compounds, and chemical reactions.
- Identify patterns in bonding, molecular geometry, and chemical reactions.
- Explain the physical properties of solids, liquids, gases, and solutions .
- Understand the principles of kinetics and thermodynamics as applied to the rates and equilibrium positions of chemical reactions.
- Apply quantitative reasoning skills to determine quantities of matter and energy involved in physical and chemical changes

4 Competency

After having the course, students are expected to:

- Understand and be able to explain the general principles, laws, and theories of chemistry
- Use critical thinking and logic in the solution of problems
- Apply learned chemistry skills to new situations
- Demonstrate an understanding of chemistry
- Apply chemical principles in the laboratory setting.

5 Learning Approach / Methodology

- Lectures/ Class contact (time-tabled) supplemented with interactive questions and answers;
- Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing;
- Student Study Effort: homework/assignment; preparation for test/quizzes/ examination.

6 Evaluation

5.1	Absence maximum	25%
5.2	Participation in Discussion	05 Points
5.3	Homework / Classwork	05 Points
5.4	Presentation /Simulation	10 Poin
5.5	Daily Quiz	20 Points
5.6	Final Examination	60 Points
	Total	100 Points

7 Text Book and Reference

1	Main Text Book: Chemistry: The Central Science, 12th Ed, Authors: Brown, Lemay and Bursten, Publisher:
2	Supplement Textbooks: <ul style="list-style-type: none"> Chemistry, Sixth Edition, International Student dan Lecture Version James E. Brady, James E. Brady, Neil D. Jespersen, Neil D. Jespersen, Alison Hyslop, Alison Hyslop. Wiley

8 Content / Topics of Lecture

Week	Content/ Topics of Lecturing	Text Book	Remark
1	Introduction; Matter and Measurement: Introduction, Properties and Changes of Matter, Separation of Mixture, Unit of Measurement, Uncertainty of Measurement		
2	Atoms, Molecules, and Ions: Fundamental Chemical Laws, Atomic theory, Atomic Models, Radioactivity, Atomic Symbol, Chemical Bonds, Periodic Table, Naming various types of compounds, Formulas, Acids		
3	Stoichiometry: Calculations with Chemical Formulas and Equations Law of Conservation of Mass, Chemical equations, reactions types, formula weight, Moles, Finding Empirical Formulas, Limiting Reactans.		Quiz
4	Aqueous Reactions and Solution Stoichiometry: Solutions, Dissociation, Electrolytes and Nonelectrolytes, Metathesis (Exchange) Reactions, Solution chemistry, Molecular and Ionic equations, Displacements reactions, Molarity, Solution, Titrations		
5	Electrochemistry: Application of Redox, Oxidation reduction reactions involve a transfer of electrons., OIL- RIG, Oxidation Involves Loss, Reduction Involves Gain, LEO-GER, Lose Electrons Oxidation, Gain Electrons Reduction		Quiz
6	Thermochemistry: Classification of energy, Law of conservation energy, Unit of energy, Energy Flow and Conservation of Energy, Endothermic and Exothermic Reactions		
7	Electronic Structure of Atoms: Electromagnetic radiation (light), the nature of energy, Quantum mechanics, Orbital		
8	MIDTERM SEMESTER BREAK		

9	Basic Concepts of Chemical Bonding, Molecular Geometry and Bonding Theories: Molecular Geometry and Directional Bonding, Molecular orbital theory, Molecular Geometry		Quiz
10	Gases: General Properties of Gases, Pressure, Gases and Stoichiometry, Gas diffusion and effusion.		
11	Liquids and Intermolecular Forces: Molecular interactions, Properties of Liquids and Solids, IMF Force Properties, Evaporation and Condensation, Melting Freezing and Sublimation, Types of IMF, Types of Crystalline Solids		
12	Chemical Kinetics and equilibrium: The Collision Model, Reactions Energy diagram, Arrhenius Equation		Quiz
13	Acid-Base Equilibria: The Nature of Acids and Bases, Acid Strength, The pH Scale, Calculating the pH of Strong Acid Solutions, Calculating the pH of weak Acid Solutions, Bases, Polyprotic Acids, Acid-Base Properties of Salts		
14	Chemical Thermodynamics and Nuclear Chemistry: <ul style="list-style-type: none"> • Entropy, Free Energy and Equilibrium • Radioactivity, Nuclear power plant, • Diagnostic and therapeutic radiation 		Journal discussion and Presentation
15	Review the Semester Topics <ul style="list-style-type: none"> • Wrap-Up 		
16	Final Examination		