

SYLLABUS:

Date / Revision 23 May 2015 / 02 May 2017 / PP
Faculty Life Sciences (LS)
Study Program Chemical Engineering(CHE), Food Technology (FTE)

SUBJECT: Physical and Analytical Chemistry Laboratory

1 Basic Information

1.01	Subject Name	Physical and Analytical Chemistry Laboratory
1.02	Semester	4
1.03	Level	1
1.04	SKS	1
1.05	Mandatory / Curriculum	D-02
1.06	Subject Code	PACL
1.07	Subject Code	PACL
1.08	Year	2017 (7)
1.09	Quality Control	Final Test, OFSE, see evaluation
1.10	Limitations	Min 12 and Max 32 students in one class
1.11	Combined with	None
1.12	Pre-requisite	Chemistry & Lab, Physical Chemistry, Analytical Chemistry, Applied Statistics.
1.13	Responsible	Dr. Tutun Nugraha
1.14	Revision	15-05-2017/pp

2 Description of Subject

This course will provide students with an opportunity to apply various basic principles that were given in class rooms, particularly during the classes of Physical Chemistry and Analytical Chemistry. Furthermore, students will also learn various techniques that are used in the field of analytical chemistry, and at the same time applying various principles from the field of physical chemistry. Students will carry out various measurement followed by the relevant calculation to elicit the process being studied. 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

This course introduces students into the practical sides of science of chemical analysis as well as the related instrumentations that are utilized in the analysis. In the process, various principles based on the concept given in physical chemistry classes will also be given to the students. Furthermore, students will also be introduced into the mathematical/statistical analysis to finally come up with relevant information for final reporting required in such analysis. This course will supplement analytical and physical chemistry classes given previously.

4

Competency

Through this subject students will understand various concepts relevant to physical and analytical chemistry laboratory, which include:

- The general principle of Analytical Chemistry and Physical Chemistry including the principles of basic chemistry that are involved.
- Physical principles that govern the properties and behavior of chemical system
- Physical and analytical chemistry experimental skills
- Writing scientific report on the experiment that were carried out in the lab

5

Learning Approach / Methodology

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

6

Evaluation

5.1	Absence maximum	25%
5.2	Report	25 Points
5.3	Lab journal/safety	5 Points
5.4	Presentation /Simulation	-
5.5	Daily Quiz	10 Points
5.6	Final Examination	60 Points
	Total	100 Points

7 Text Book and Reference

1	Main Text Book: <ul style="list-style-type: none"> Physical Chemistry, Ira N Levine, 6th Edition, ISBN 978-007-127636-8, Mc Graw-Hill, 2009. Fundamental of Analytical Chemistry, Skoog and Wests, 9th Edition, Cengage Learning
2	Supplement Textbooks: <ul style="list-style-type: none"> Physical and Analytical Chemistry Laboratory Manual, T Nugraha, K. Maulida, Faculty of Life Sciences, IULI, 2017 (Available from Photocopying from instructor)

8 Content / Topics of Lecture

Week	Content/ Topics of Lecturing	Text Book Chapter	Remark
1	General Experiment Rules in Laboratory <ul style="list-style-type: none"> Introduction Safety procedure, material safety data sheet, personal protective equipment Experiment schedule Introduction to Research project by Students 		1 x 3 x 50 minutes
2,3	Thermogravimetric analysis and kinetic of drying of flour <ul style="list-style-type: none"> Moisture content of material through the process thermogravimetric. Kinetic equations to eventually calculate the rate of evaporation, and the phenomena and kinetics of the evaporation process Appropriate techniques that are involved in a gravimetric analysis 	Levine, Chapter Skoog, Wests, Chapter	2 x 3 x 50 minutes
4,5	Equation of states for ideal gas and real gas – virial and Van der Waals <ul style="list-style-type: none"> The ideal gas equation of states, Van der Waals, and Virial equations to predict the correlation between P, V, n and T Calculation using spreadsheet (Microsoft Excel) including creating reports in the form of tables and graphs 	Levine, Chapter Skoog, Wests, Chapter	2 x 3 x 50 minutes
6,7	Analytical of active substance content of analgesic drugs with thin layer chromatography (TLC) <ul style="list-style-type: none"> Introduction to the principles of separation and analytical process utilizing thin layer chromatography (TLC) techniques Identify the active ingredients in analgesic drugs. 	Levine, Chapter Skoog, Wests, Chapter	2 x 3 x 50 minutes
8	MIDTERM SEMESTER BREAK		
9,10	Adsorption Isotherm <ul style="list-style-type: none"> Introduction the principles of adsorption isotherm The dye adsorption by the adsorbent The adsorption isotherm equation 	Levine, Chapter Skoog, Wests, Chapter	2 x 3 x 50 minutes

11,12	<p>Solution colligative properties: the increasing of boiling point</p> <ul style="list-style-type: none"> • Introduction colligative properties: the increasing of boiling point, study the boiling point of solution and pure solvent • The effect of Van't Hoff factor • The differences in the colligative properties of electrolyte and non-electrolyte solution • The molecular weight of a substance with a boiling point elevation method 	Levine, Chapter Skoog, Wests, Chapter	2 x 3 x 50 Minutes
13,14	<p>The Kinetics of antacid tablet dissolution</p> <ul style="list-style-type: none"> • Introduction of the process that are involved in the dissolution of medicine, in this case an antacid tablet dissolution was used to study its kinetics 	Levine, Chapter Skoog, Wests, Chapter	2 x 3 x 50 minutes
15	Final Examination		