1.- GENERAL INFORMATION

Learning unit	Department	Format
Physical Chemistry Lab III	Chemistry	Lab

Prerequisites (P)	Corequisites (CO)	Ascribed Academy	Module:
Physical Chemistry II	Physical Chemistry III	Physical Chemistry	M2 Chemical synthesis, purification and transformation

Type	Lecture Hours	Practice Hours	Total hours	Credits
Basic Particular Mandatory	None	51	51	3

2.- GENERIC COMPETENCIES

-Problem solving
-Synthesis and analysis.
- Teamwork.
-Computer skills
-Managing information
-Oral and written production
-Discerning and decision-making

Specific competencies:
- Autonomous development of the acquired knowledge.
-Autonomy and teamwork
-Ability to solve problems of physical chemistry.

3.- SPECIFIC CHARACTERISTICS OF THE COMPETENCIES

Knowledge	Students… • Analyze the concepts of chemical kinetics to determine the speed and the order of reaction. • Define the law of speed of a chemical reaction based on the concentration of reagents or products. • Determine the action of a catalyst over the reaction rate. • Establish the relationship between the activation energy and the speed of a reaction. • Discuss the solubility of substances among them based on their structure and determine the equilibrium of their phases. • Discuss the properties of colloids.
Skills	• Determine the law of speed of a chemical reaction based on experimental data.

	• Interpret the values of speed constant and order of reaction. • Identify the action of different catalysts such as metal ions, salts and raise in temperature over the speed of a chemical reaction. • Handle specialized software to create graphs and statistical analysis. • Calculate thermodynamic parameters (activation energy, vapor enthalpy, vapor pressure) based on experimental data. • Create phase diagrams for two or three components. • Distinguish the differences between colloid, suspension, emulsion and solution. • Identify the different types of colloids based on their physical properties.
Aptitudes	• Offer solutions to specific and practical problems that involve the acquire knowledge. • Relate different knowledge of different fields and apply it in professional and ordinary situations. • Develop study habits and manage their own learning.
Values	• Develop and exercise values such as responsibility, honesty, tolerance, respect, solidarity, willingness and positive attitude towards group work.

4.- TRANSVERSAL COMPETENCIES

☐	Foreign Language (English)
☑	Critical, analytical and synthetic thinking.
☑	Oral and written expression
☑	Professional ethics
☑	Administration of human and material resources
☑	Leadership and sustainability
☐	Creativity, innovation and entrepreneurship
☐	Other

5.- COURSE CONTENT OF THE LEARNING UNIT

UNIT I. Kinetics and catalysis

Practice 1: Law of speed of a chemical reaction.

Practice 2: Determine the order of reaction and the speed constant.

Practice 3: Kinetics and activation energy.

Practice 4: Effect of the concentration and the temperature in the speed of a reaction.

UNIT II. Surface phenomena

Practice 5: Water absorption through capillarity in materials.

Practice 6: Vapor pressure and water enthalpy.

Practice 7: Phase diagram of two components.

Practice 8: Phase diagram of three components.

Practice 9: Adsorption isotherm.

UNIT III. Colloidal systems

Practice 10 Colloids

Practice 11: Surfactants.

6.- ASSESSMENT	
☑	Numeric Grade
☐	
☐	

7.- GRADING CRITERIA OF THE LEARNING UNIT	
INDICATOR OF EVALUATION	**PERCENTAGE**
Departmental exams	0
Partial exam	0
Homework	0
Research activities	0
Practice reports	50
Class participation	0
Other: Work and performance at the lab	50

8.- REQUIRED MATERIAL (for students)	
☑	Calculator
☐	Periodic table
☑	Lab coat
☐	Text book
☐	Workbook
☑	Other
☐	

9.-SPECIFIC CONTENT BY LEARNING UNITS

Content unit	Generic competency of the content unit	Topics	Class hours	Professor activities	Student activities	Bibliography
UNIT I. Kinetics and catalysis	Students … -Calculate the speed constants, orders of reaction and activation energies based on experimental results. -Interpret of results to establish conclusions	**Practice 1:** Law of speed of a chemical reaction. **Practice 2:** Determine the order of reaction and the speed constant. **Practice 3:** Kinetics and activation energy. **Practice 4:** Effect of the concentration and the temperature in the speed of a reaction.	3 hours per practice	Professor - Briefly describes the objective of the practice. Explains the procedure of the practice generally. - Monitors the results to guide students.	Students… -Review and understand the procedure for each practice before entering the lab. - Follow the procedure of each practice in order. - Record the results, measurements and observations. - Create a report with graphs, charts, results and conclusions.	▪ Gilbert W. Castellan (1987), *Fisicoquímica* 2nd edition. Addison – Wesley Iberoamérica ▪ P.W. Atkins (2006), *Química Física*. 8th edition). Ed. Addison – Wesley Iberoamérica

UNIT II. Surface phenomena	Students -determine the thermodynamic parameters based on experimental graphs.	**Practice 5:** Water absorption through capillarity in materials. **Practice 6:** Vapor pressure and water enthalpy. **Practice 7:** Phase diagram of two components. **Practice 8:** Phase diagram of three components. **Practice 9:** Adsorption isotherm.	3 hours per practice	Professor… -Briefly describes the objective of the practice. -Explains the procedure of the practice generally. - Monitors the results to guide students.	Students -Review and understand the procedure for each practice before entering the lab. - Follow the procedure of each practice in order. - Record the results, measurements and observations. - Create a report with graphs, charts, results and conclusions.	▪ Gilbert W. Castellan (1987), *Fisicoquímica* 2nd edition. Addison – Wesley Iberoamérica ▪ P.W. Atkins (2006), *Química Física*. 8th edition). Ed. Addison – Wesley Iberoamérica

UNIT III. Colloidal systems	Students.. Identify and classify colloids based on their physical properties.	**Practice 10** Colloids **Practice 11:** Surfactants.	3 hours per practice	Professor… -Briefly describes the objective of the practice. -Explains the procedure of the practice generally. - Monitors the results to guide students.	Students… -Review and understand the procedure for each practice before entering the lab. - Follow the procedure of each practice in order. - Record the results, measurements and observations. - Create a report with graphs, charts, results and conclusions.	▪ Gilbert W. Castellan (1987), *Fisicoquímica* 2nd edition. Addison – Wesley Iberoamérica ▪ P.W. Atkins (2006), *Química Física*. 8th edition). Ed. Addison – Wesley Iberoamérica
COURSE EVIDENCE (Deliverables) **- Lab practice reports**						

10.-PROFESSOR'S PROFILE
Bachelor, Master or Doctorate degree in Chemistry, Chemical Engineering or related degrees. Specific knowledge in physical chemistry. Teaching experience in physical chemistry.

11.-AUTHOR OF THE LEARNING UNIT
Roberto Eduardo San Juan Farfán

12.-MODIFICATION AND UPDATE
March 6 ,2017

Haga clic aquí para escribir texto.