Basic Sciences

Division

Department of Chemistry

Physical Chemistry Lab I

CUCEI

UNIVERSIDAD DE GUADALAJARA
CENTRO UNIVERSITARIO DE CIENCIAS EXACTAS E INGENIERÍAS

1.- GENERAL INFORMATION				
Learning unit Physical Chemistry Lab I		**Department** Chemistry		**Format** Lab
Prerequisites(P) None	**Corequisites (CO)** None	**Ascribed Academy** Physical Chemistry	**Module** M1: Structure of Matter	
Type Basic, particular mandatory	**Lecture hours** None	**Practice hours** 51.	**Total hours** 51	**Credits** 3
Degree in which this class is taught: B.S in Chemistry.				

2.- GENERIC COMPETENCIES

Students…

- Identify the lab material and equipment as well as the classification of chemical substances.
- Know and apply the rules inside the lab.
- Carry out the corresponding practices to determine the physicochemical properties of a given substance.
- Interpret and explain the phenomena observed during the practice.
- Research information about the corresponding practice.
- Write a report explaining the phenomena that occurred during the practice.

Specific competencies

- Are able to handle lab equipment
- Are able to analyze in order to carry out the practice.
- Are able to use information and communication technological tools.
- Are able to identify and establish specific problems.
- Are able to carry out scientific research.
- Are able to put knowledge into practice.
- Have oral and written abilities.
- Are able to work in teams.
- -Have the ability to approach critically themselves and others.
- Have an ethical commitment.

3.- SPECIFIC CHARACTERISTICS OF THE COMPETENCIES

Knowledge	Students… ▪ Understand the importance of respecting the lab rules. ▪ Show a general view of the physicochemical properties of substances. ▪ Are able to handle lab equipment and material.

	▪ Are able to do detailed research about the corresponding lab practice. ▪ Write a report of the phenomena observed during the practice.
Skills	• Identify and propose a viable methodology to determine the physicochemical properties of some specific substances. • Research a specific topic in order to perform the lab practice adequately. • Write up a report about the phenomena observed during the practice • Identify and propose appropriate alternatives during the practice in order to improve the obtained results.
Aptitudes	• Identify and propose a viable methodology to determine the physicochemical properties of some specific substances. • Relate and apply knowledge in order to determine the physicochemical properties during the practice. • Propose appropriate alternatives to improve the lab practices. • Develop autonomous study habits.
Values	• Students develop and reaffirm values both personally and as a team: such as responsibility, honesty, tolerance, respect, solidarity, disposition, positive attitude and professional ethics.

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

This course content is focused on performing the following lab practices:

1. α and k coefficients.
2. Density.
3. Heat capacity.
4. Alcohol enthalpy.
5. Calorimetry.

6.- ASSESSMENT	
☑	Numeric grade
☐	
☐	

7.- GRADING CRITERIA OF THE LEARNING UNIT	
INDICATOR OF EVALUATION	**PERCENTAGE**
Practice	40
Practice report	40
Class participation and attendance	20

8.- REQUIRED MATERIAL (for students)	
☑	Logbook
☑	Articles and research report
☑	Lab practices workbook
☐	
☐	
☐	

9.-SPECIFIC CONTENT BY LEARNING UNITS						
Content unit	**Generic competency of the content unit**	**Topics**	**Class hours**	**Professor activities**	**Student activities**	**Bibliography**
Practice 1 α and k coefficients	Students interpret and explain the phenomena observed during the practice.	1) Volumetric dilatation and definition of □ and k	3 h	Professor… - Solves problems regarding the calculation of coefficients α and k. -Explains the procedure to calculate experimentally the values of coefficients α and k from theoretical formulas.	Students… -develop an experimental procedure to gather data on volumetric dilatation and then calculate the value of coefficients α and k.	Maron and Prutton *Fundamentos de Fisicoquímica* Limusa
		2) Determination of coefficient α	3 h			
		3) Determination of coefficient k	3 h			
Practice 2 Density	Know and follow the rules inside the lab.	1) Basic concepts	3 h	Professor… - Solves problems regarding the application of density -Explains the procedure to calculate the	Students… -develop an experimental procedure to calculate the density of different	Raymond Chang. *Fisicoquímica* 3rd edition Mc Graw Hill
		2) Methods to calculate the density of a solid.	3 h			
		3) Methods to calculate the density of a liquid.	3 hrs			

		4) Methods to calculate the density in gases.	3 hrs	density of liquids and solids.	liquids and solids.	
Practice 3 Heat capacity.	Students design a report to detail the phenomena occurred during the practice.	1) Definition and concepts of heat capacity. 2) Methods to calculate heat capacity. 3) Heat capacity at constant solid pressure. 4) Heat capacity at constant liquid pressure.	3 hrs 3 hrs 3 hrs 3 hrs	Professor… - Explains the concept of heat capacity. - Explains problems that involve the calculation of heat capacities of different solids and liquids.	Students develop an experimental procedure to calculate the heat capacity of different liquids and solids.	Smith Van Ness *Introducción a la termodinámica en Ingeniería Química* Mc Graw Hill
Practice 4 Alcohol enthalpy	Students carry out the practice to determine the physicochemical properties of a specific substance.	1) Combustion reactions 2) Calculation of enthalpy at constant pressure. 3) Hess's Law.	3 h 3 h 3 h	Professor… - Explains the concept of reaction and combustion enthalpy. - Solves problems to calculate enthalpies.	Students develop an experimental procedure to calculate the enthalpy of different alcohols through the heat transference	Gilbert W. Castellan *Fisicoquímica* 2nd Edition Addison Wesley Longman

					of combustion to heat liquid water.	
				- Explains the procedure to calculate reaction enthalpies through Hess's Law.		
Practice 5 Calorimetry	Students create a report to express the phenomena that occurred during the practice	1) Specific and latent heat	3 h	Professor… - Explains the concepts of latent and specific heats. - Explains the procedure to calculate constant volume enthalpy.	Students develop an experimental procedure to calculate the combustion heat of a substance on a constant volume inside a pump.	Ira N. Levine *Principios de Fisicoquímica* 6th Edition Mc Graw Hill
		2) Calculation of enthalpy on constant volume.	3 h			
		3) Constant volume calorimetry	3 h			

COURSE EVIDENCE

(Deliverables)

- **Lab practice reports**
- **Answered lab practice workbook**
- **Attendance to lab practices**

10.-PROFESSOR'S PROFILE

The professor should be specialized in some branches of chemistry. He/she should have experience in designing lab practices regarding the determination of physicochemical properties of specific substances. The professor should also be able to use electronic means to search for bibliographic information on different databases as well as to show expertise in developing didactic material.

11.-AUTHORS OF THE LEARNING UNIT

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12.-MODIFICATION AND UPDATE

March 8, 2017