CENTRAL UNIVERSITY OF KERALA
DEPARTMENT OF CHEMISTRY
M.Sc. CHEMISTRY

Course Code	Course Title	Contact hrs. / wk.				Credits
		Lect.	Lab	Tut	Total	
CHE 5291	Physical Chemistry Laboratory - I		5			2

Lec = Lecture, Tut = Tutorial, Lab = Practical

This is a participatory, experimental, and employability based skill development course.

Course objective:

Objective of the course is to develop practical and laboratory skills of the student in physical chemistry.

By completing this course, students will obtain the following course/learning outcomes:

- Understand the fundamental theories of experimental physical chemistry.
- Recognize the role of multidisciplinary streams starting with basic science to understand the key role of instruments in doing experimental physical chemistry.
- Develop problem-solving and troubleshooting ability in experimental physical chemistry, and to nurture experimental and analytical skills suitable for research in the area of physical chemistry.

Grading:

Laboratory Experiments – 20%
Record of observations and reporting – 10%
Viva evaluation – 10%
End Semester Assessment – 60%

CHE 5291 Physical Chemistry (Laboratory– I)

This laboratory course covers basic physical chemistry experiments employing minor or major equipment and computational facility that are available in the Department/sister Department.*

Syllabus Modules:

General Experiments: Phase diagram of a three-component system, Adsorption of acetic acid on charcoal, Kinetics of iodine clock reaction, Study of persulphate-iodide second order reaction, Determination of first order rate constant - acid hydrolysis of an ester, Critical solution

temperature (CST), Conductometric titrations of mixture of acids, Conductometric titration of a charge transfer complex, Estimation of CMC of a micelle from conductance measurements, Potentiometric titration of a redox reaction, Estimation of ferrous ions by potentiometry, Validation of Beer Lamberts law by FTIR spectrometer, Validation of Beer Lamberts law by UV-visible spectrometer.

Computational Chemistry Experiments: Study of normal modes, Determination of equilibrium constants, Determination of rate constants.

Supplementary experiments: Conductometric titrations of acid & base, Determination of second order rate constant – Base hydrolysis of ester, Study of an oscillating reaction, Determination of isoelectric point of amino acid by pH metric titration, Estimation of mixture of acids by pH metric titration by using NaOH, Estimation of phosphoric acid by pH metric titration, Equilibrium constants of tri-iodide and copper-ammonium complexes, Enthalpy change for tri-iodide formation, Determination of unknown sugar solution concentration by polarimeter, Determination of Activation energy and Arrhenius parameters, Open-ended lab experiment.

*Minimum of twelve experiments can be selected from general and computational chemistry experiments. Additional experiments can be selected from general or supplementary experiments or any other of course instructor's choice that falls under the title of the course for which procedure is well known in the literature:

References

1. *Laboratory Manual*, 2013, Department of Chemistry, Central University of Kerala.
2. A. J. Elias, *General Chemistry Experiments*, University Press, Hyderabad, 2002.
3. F. Daniels, J. W. Williams, P. Bender, R. A. Alberty, C. D. Cornwell, J. E. Harriman, *Experimental Physical Chemistry*, McGraw-Hill, 1962.
4. R. C. Das, B. Behera, *Experimental Physical Chemistry*, Tata McGraw-Hill, 1993.
5. D. P. Shoemaker, C. Garland, J. W. Nibler, *Experiments in Physical Chemistry*, McGraw-Hill, New York, 1996.
6. D. C. Young, *Computational Chemistry*, John-Wiley and Sons, NY, 2001.
7. MOPAC 6.0 *Manual and Computer program*, QCPE Ed., 2012.
8. PCMODEL *Manual and Computer program*, Serena Software, 2011