



FEDERAL UNIVERSITY OF CEARÁ
Provost Office of Research and Graduate Studies

COURSE PROGRAM

1. PROGRAM:		
Program	GRADUATE PROGRAM IN CHEMISTRY	
2. COMPONENT TYPE:		
Activity ()	Course (X)	Module ()
3. LEVEL:		
Master's Degree (X)	Doctorate (X)	
4. COMPONENT IDENTIFICATION:		
Name:	ADVANCED ANALYTICAL CHEMISTRY	
Code:	CEP9588	
Hours:	160 horas	
Credits:	10	
Optional course:	Yes ()	No (X)
Compulsory course:	Yes (X)	No ()
Area:	ANALYTICAL CHEMISTRY	
5. PROFESSOR:		
Profa. Dra. Elisane Longhinotti Profa. Dra. Gisele Simone Lopes Prof. Dr. Ronaldo Ferreira do Nascimento Profa. Dra. Wladiana oliveira Matos		
6. ABSTRACT:		
Chemical equilibrium and activity. Equilibrium in simple and complex systems involving acid-base reactions, heterogeneous systems and equilibrium of precipitation, Redox equilibrium. Equilibrium constants of complexation reactions. Graphical Methods. Practical applications of equilibrium.		
7. COURSE PROGRAM:		
UNIT 1 - Equilibrium and activity: Concepts of activity and ionic strength. Factors that affect the equilibrium. Mass and charge balances. UNIT 2 - Acid-Base Equilibrium: Acid-base theory. autoprotolysis and ionic product of water. Hydrogenionic concentration, pH. Strong acids and bases. Dissociation of weak acids and bases. Dissociation of salts. Effect of common ion and buffer solution. Graphical Methods UNIT 3 - Precipitation equilibrium: Solubility and solubility constants. Precipitation and dissolution conditions. Factors that influence solubility. Fractional precipitation. Graphical Methods UNIT 4 - Complexation equilibrium: equilibrium of complex formation. Equilibrium constants. Complexation of metal ions with EDTA, masking agents and pH control. Graphical Methods.		

UNIT 5 - Oxi-reduction equilibrium: General concepts. Spontaneous and non-spontaneous systems. IUPAC standards for electrochemical system. Nernst equation. Standard potential. Graphical Methods

UNIT 6 - Practical Applications of the equilibrium to analytical problems: case studies involving the equilibrium.

8. EVALUATION PROCESS:

- Theoretical test - 70%
- Seminars and activities - 30%
- Minimum attendance of 75% in all activities scheduled for the discipline

9. BIBLIOGRAPHY:

Basic

1. SKOOG, A. D., WEST, D. M., HOOLER, F. J. Fundamentos de Química Analítica. 8ª Ed. Thomson, 2006.

2. KOLTHOFF, I.M. Treatise on Analytical Chemistry, New York, Interscience, 1959.

3. GUENTHER, W. B. Quantitative Chemistry: Measurements and Equilibrium, Addison-Wesley Pub. Co., 1968.

4. BARD, A.J. Equilíbrio Químico. Harper & Row Publishers Inc. Texas. 1966

5. WISMER, R. K. Qualitative Analysis with Ionic Equilibrium. New York: Macmillan Publishing Company, 1991.

Complementary

1. **BUTLER, J. N. Ionic Equilibrium: Solubility and pH Calculations, 1st ed. John Wiley & Sons, 1998.**

2. HARRIS, Daniel C. Análise Química Quantitativa. 6ª ed. Ed. Livros Técnicos e Científicos. 2005.

4. FATIBELLO FILHO, Orlando. Equilíbrio iônico: aplicações em química analítica. São Carlos, SP: EdUFSCar, 2016.