



**PROGRAMS E BIBLIOGRAPHY**

<b>Subject</b>	
<b>Code</b>	<b>Name</b>
QA383	Electroanalytical chemistry

<b>Vector</b>
OF:S-5 T:002 P:000 L:000 O:000 D:000 HS:002 SL:002 C:002 AV:N EX:S FM:75%

<b>Pre requirements</b>
QA282

<b>Summary</b>
Introduction to electroanalytical chemistry. Potentiometry. Electrogravimetry, Coulometry. Voltammetry. Amperometry.

<b>Program</b>
Galvanic and electrolytic cells. Potentials in electrochemical cells and electrodes. Liquid junction potential. Activity and the influence on electrode potential. Thermodynamics of cells potentials. Nernst equation. Standard electrode potential. Electrical double layer. Currents in electrochemical cells. Ohmic potential drop. Polarization and sources of polarization. Faradaic and capacitive current. Mass transport phenomena. Reference electrodes. Metallic and membranes indicators electrodes. Selective coefficient. Instruments for potential measurement. Direct potentiometry. Operational pH definition. Potentiometric titration. Coulometry. Electrolysis at constant current. Electrolysis at Constant potential. Direct methods and coulometric titrations. Coulometric instrumentation. Potentiostat. Voltammetry. Excitation signals in voltammetry. Charge transfer kinetics. Voltammetric instrumentation. Cyclic voltammetry. Redissolution methods. Amperometry. Amperometric sensors. Amperometric titrations. Biosensors.

<b>Bibliography</b>
<ol style="list-style-type: none"><li>1. Skoog, D.A.; West, D.M.; Holler F.J.; Crouch, S.R., <i>Fundamentos de Química Analítica</i>, Translation from the 9<sup>th</sup> North American edition, Thomson Learning, São Paulo, 2014.</li><li>2. Skoog, D.A.; Holler, F.J. and Nieman, T.A., <i>Princípios de Análise Instrumental</i>, 6<sup>th</sup> edition, Bookman, Porto Alegre, 2009.</li><li>3. Harris, D.C., <i>Análise Química Quantitativa</i>, 8<sup>th</sup> edition, LTC, Rio de Janeiro, 2012.</li><li>4. Christian, G.D., <i>Analytical Chemistry</i>, 6<sup>th</sup> edition, Wiley, New York, 2004.</li><li>5. Bard, A.J.; Faulkner, L.R., <i>Electrochemical methods: fundamentals and applications</i>, 2<sup>nd</sup> ed., Wiley, New York, 2001.</li><li>6. Nicholson, R.S., Theory and Application of Cyclic Voltammetry for Measurement of Electrode Reaction Kinetics, <i>Analytical Chemistry</i> 37(11) (1965) 1351-1355.</li><li>7. Brett, A.M.O.; Brett, C.M.A., <i>Electroquímica, Princípios, Métodos e Aplicações</i>. Oxford University Press, Coimbra, 1996.</li></ol>

8. Kissinger, P. T.; Heineman, W. R. (editors); *Laboratory Techniques in Electroanalytical Chemistry*, 2<sup>nd</sup> edition, Marcel Dekker Inc., New York, 1996.
9. Sawyer, D. T.; Heineman, W. R.; Beebe, J. M.; *Chemistry Experiments for Instrumental Analysis*, Wiley, New York, 1984.

**Evaluation criteria**

For grading policy, see: Regimento Geral de Graduação, Seção I – Normas Gerais, Capítulo V – Da Avaliação do Aluno na Disciplina. Students are required to attend 75 % of the lectures. For further details, see: Regimento Geral de Graduação, capítulo VI, seção X, artigo 72.