Instructor: Professor Shane Ardo (ardo@uci.edu, x4-3796, 2131 NS2)
Office Hours: W 3:30 – 4:30 pm (2131 NS2) and F 12:30 – 1:30 pm (2131 NS2)

Teaching Assistant: William Gaieck (wgaieck@uci.edu, x4-1218, Ardo Labs in 596 RH)
Office Hours: M 5 – 6 pm (596 RH)

Meeting times:
Lecture: TTh, 8 – 9:20 am (120 SST (Social Science Tower)); final on Tues. 3/21 at 8 – 10 am
"Discussion": M 1 – 2:50 pm (251 RH (Rowland Hall)) or M 3 – 4:50 pm (251 RH)
Plus, advanced class on Wed. 3/22 at 1:30 – 3:30 pm or 4 – 6 pm
No class on Mon. 1/9 (first week), Mon. 1/16 (holiday), and Mon. 2/20 (holiday)
Hands-on Activities (bring PPE and laptop; absences excused in advance)

Course Objectives:
- To understand and explain the theory behind fundamental electrochemical processes
- To be able to design, perform, troubleshoot, and analyze electrochemical experiments
- To quantitatively and qualitatively assess problems, and empirical data from the literature
- To summarize and explain seminal and recent electrochemical literature and technologies

Required Resources:
Electrochemical Methods: Fundamentals and Applications (2nd edition)
Chapters Covered: A: 1, 15, 4, 5; B: 2, 13, 3, 6; Extra: 12, 9, 10, 16, 17, 18
Journal Articles and Additional Problems/Answers on course website
Bio-Logic software (http://www.bio-logic.net/softwares/ec-lab-software/)

Topics Covered:
A1,15 Review+ (Nomenclature, Balancing equations, Electrodes, Potentiostats, Diagrams)
A4,5 Mass Transfer (Nernst–Planck equation (migration, diffusion, convection), Fick’s laws of diffusion, Cottrell equation, Anson plot, Ultramicroelectrode (UME))
B2 Thermodynamics (Nernst equation, Underpotential deposition (UPD), Liquid-junction potential, Donnan potential, pH probe, Ion-selective electrodes (ISEs))
B13 Charged Interfaces (Ion activity, Diffuse double layer and models, Boundary layer)
B3,6 Electron Transfer Kinetics (Marcus–Gerischer theory, Butler–Volmer equation, Tafel equation, Catalysis and volcano plots, Cyclic voltammograms, Randles–Sevcik equation)

Grading:
40% Assignments (5): Activity write-up and several related problems due one week after odd-numbered activity (Mondays at 3 pm: 1/23, 2/6, 2/27, 3/13; and Wed. 3/22 by 4 pm)
20% Exam A (in class; Tues. 2/14)
20% Exam B (24 hours; take-home between Fri. 3/10 at 2 pm and Tues. 3/14 at 2 pm)
20% Presentation (10 min; spans last class (Thurs. 3/16) and final (Tues. 3/21 at 8 – 10 am))

Course Policies:
Late assignments and make-up exams are not accepted, although I will regrade exams.
UCI Policy on Academic Integrity and Honesty: http://senate.uci.edu/academic-integrity/