Course Outline

324-541 Electrochemical Analysis (3 credits, 3((3)-0-6))

Semester 2 Academic year 2021

Coordinator: Asst. Prof. Dr. Apon Numnuam (Office room: Ch307/1)

Lecturer: Asst. Prof. Dr. Pipat Chooto, Prof. Dr. Kwok Feng Chong,
Asst. Prof. Dr. Apon Numnuam and Dr. Itthipon Jeerapan

Class: Monday, Wednesday and Friday at 10.00 –11.00 am at Ch202 or arranged by instructors

Course description:

Principles and concepts in electrochemical analysis; applications of these techniques in polarography, coulometry, electrogravimetry, voltammetry, electrochemical impedance spectroscopy, recent applications of modern electrochemical techniques to environmental, clinical and food

Learning objectives:

1. To apply and integrate theory or reaction/interaction based on electrochemical techniques to environmental, clinical and food areas (PLO 1, 4)
2. To demonstrate and analyze data correctly based on electrochemical techniques to related area/work according to research methodology and quality assurance (PLO 2, 3, 8)
3. To be able to communicate and present correctly and precisely (PLO 5)
4. To demonstrate behaviors of morality and research ethics (PLO 7)

Topic:

Week	Hour	Topic	Instructor	%
1-4	10	1. Comprehensive theory 1.1 Introduction and Overview of Electrode Processes 1.2 Potentials and Thermodynamics of Cells 1.3 Kinetics of Electrode Reactions 1.4 Mass Transfer by Migration and Diffusion 1.5 Basic Potential Step Methods	Asst. Prof. Dr. Pipat Chooto	22.2
4-9	15	2. Electrochemical Sensor 2.1 Electrode material 2.2 Immobilization technique for recognition element	Prof. Dr. Kwok Feng Chong	33.4

		2.3 Transduction mechanism 2.4 Contemporary electrochemical sensor – examples		
9-12	10	3. Electrochemical Speciation : Application of 3.1 Polarography 3.2 Stripping 3.3 Differential Pulse 3.4 Coulometry 3.5 Chronopotentiometry 3.6 Chronoamperometry	Asst. Prof. Dr. Apon Numnuam	22.2
12-15	10	4. Recent advance in electrochemical research, wearable/implantable electrochemical biosensor and bioelectronics	Dr. Itthipon Jeerapan	22.2

Evaluation:

Assignments, presentation, examination including active learning: 33% (1^{st}-6^{th} week), 33% (7^{th}-10^{th} week), 34% (11^{th}-15^{th} week)

Recommended books:

1. A.J. Bard and L.R. Faulkner, Electrochemical methods, 2nd ed., John Wiley & Sons, Inc., New York, 2001.

2. D.T. Sawyer, A. Subkowiak and J.L. Roberts, Jr., Electrochemistry for Chemists, 2nd ed., John Wiley & Sons, Inc., New York, 1995.

3. F. Scholz, Electroanalytical Methods, Springer-Verlag, Berlin, 2002.

4. D.R. Crow, Principles and Applications of Electrochemistry, 3rd ed., Blackie Academic and Profession, Glasgow, 1994.