

ELECTROCHEMICAL ENGINEERING PRINCIPLES

1.1. Identification

University:	Università di Bologna - Alma Mater Studiorum										
School:	School of Engineering										
Course:	Electrochemical Engineering Principles										
ECTS:	6										
Semester:	<i>Winter</i>			X	<i>Summer</i>						
Category	<i>Fundamental course</i>					<i>Specialisation course</i>				X	
Module	<i>MFI</i>		<i>MFI</i>		<i>MFI</i>		<i>MSI</i>		<i>MSII</i>	X	<i>MSIII</i>
Teachers:	Serena Bandini										
Language:	<i>English</i>			<i>Italian</i>		X	<i>Swedish</i>			<i>Spanish</i>	

1.2. Learning-outcomes

- knowledge about the fundamentals of Electrochemistry and of Electrochemical Reactors
- knowledge about the main industrial electrochemical processes, about the electrochemical systems for energy storage and conversion and about the electro-membrane technology

1.3. Competencies

- **General**
 - to have critical understanding of technical and scientific tools
 - to work in an international context
- **Specific**
 - to know basic concepts of electrochemical systems
 - to know the fundamentals of thermodynamics and transport phenomena of electrolytic solutions and the fundamentals of electrode kinetics
 - to know basic elements of electrochemical reactor design
 - to analyse and discuss the most important industrial electrochemical processes and the electrochemical systems for energy storage and conversion
 - to analyse and discuss principles and applications of the electro-membrane technology

1.4. Contents

1. Basic concepts of electrochemistry.
2. Analysis of Electrochemical reactors.
3. Electrochemical processes: industrial applications.
4. Energy storage and conversion.

1.5. Teaching Methodology

- Lecture sessions
- Practical sessions: “cooperative work” for solving problems

1.6. Evaluation

- oral evaluation of the fundamentals of electrochemistry
- presentation and discussion of a detailed report about one electrochemical process (the topic is defined during the course)

1.7. Bibliography

- G.Prentice, Electrochemical Engineering Principles, Prentice Hall, 1991
- J.M. Bockris, A.K.N.Reddy, Modern Electrochemistry 1, Plenum Press, 1998
- J.Newman, K.E.Thomas-Alyea, Electrochemical Systems, John Wiley & Sons, 2004
- R.A.Robinson, R.H.Stokes, Electrolyte Solutions, Dover Publications
- D.Pickett, Electrochemical Reactor Design, Elsevier Sci.
- T.Fahidy, Principles of Electrochemical Reactor Analysis, Elsevier
- D.Pletcher, F.C.Walsh, Industrial Electrochemistry, Kluwer, 2nd ed. 1990