**Course SYLLABUS form**

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| **Basic data of the subject** |
| **Academic Unit:**  | **Faculty of Mathematics & Natural Sciences** |
| **Course title:** | **Corrosion and its prevention** |
| **Level:** | **Master** |
| **Course status:** | **Mandatory** |
| **Study year:** | **I** |
| **Number of hours per week:** | **2+2** |
| **Credit value – ECTS:** | **6** |
| **Time / location:** | **Thursday 10:30, class no: 1** |
| **Lecturer:** | **Prof. Dr. Fetah PODVORICA** |
| **Contact details:**  | **fetah.podvorica@uni-pr.edu** |
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| **Course description** | This course will help students to have information about different forms of corrosion and about methods of its prevention. |
| **Course objectives:** | The modul is prepared in order to introduce to the students of chemistry , chemical engineering, material sciences and metallurgy with theoritical and practical fundamental knowledge of corrosion and its prevention. The students will learn basis of electrochemistry, will be able to know the difference between galvanic cells and electrolysis and thats of corrosion, will know the principles that describe metal and material corrosion, will learn about methods for corrosion rate measurement, will learn about the metal passivation, will learn about methods used for protection of metals against corrosion. |
|  **Learning outcomes:** | *At the end of the courses the student will be able:**1. to know advanced principles of thermodynamics and kinetics of electrode processes**2. to use and interpret last results in the metal and material corrosion**3. to do measurements with most common methods for corrosion rate measurement**4. to learn the theory about metal passivation**5. to know latest methods for the protection of metals against corrosion.* |
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| **Contribution on student load (must correspond with learning outcomes)** |
| **Activity**  | **Hours** | **week** | **Total /hours**  |
| Lectures | 2 | 15 |  30 |
| Exercise theoretical/laboratory | 2 | 15 |  30 |
| Practice work |  |  |  |
| Contact with lecturer/consultations | 1 | 10 | 10 |
| Field exercises |  |  |  |
| Mid-terms, seminars | 2 | 2 | 4 |
| Homework | 1 | 10 | 10 |
| Individual time spent studying (at the library or home) | 2 | 10 | 20 |
| Final preparation for the exam | 2 | 15 | 30 |
| Time spent in evaluation (tests, quiz, final exam) | 2 | 5 | 10 |
| Projects, presentations, etc. | 2 | 3 | 6 |
| **Total** |  |  | **150** |
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| **Teaching methods**  | Lectures, discussions, exercises, consultations, homework, colloquies and exams. |
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| **Evaluation methods** | The first test is 15%, second test is 15%, attendance 5%, engagements in practical exercises 15% andfinal exam 50%. |
| **Literature** |
| **Basic Literature:**  | 1. P.A. Schweitzer. Fundamentals of corrosion: mechanisms, causes, and preventative methods. CRC Press Taylor & Francis Group, USA 2010. 2. R. Winston Revie, Corrosion and Corrosion Control : An introduction to Corrosiom Science and Engineering, 4th Edition Wiley 2008.3. Uhlig’s Corrosion Handbook , New York 2005. |
| **Additional Literature**  | M. Stratmann, G. Frankel, Corrosion and Oxide films, 2002, New York, USA. |

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| **Designed study plan:**  |
| **Week** | **Lectures which will be held** |
| ***First week:*** | Introduction and Overview of Electrochemical Corrosion |
| ***Second week:*** | Electrochemical Thermodynamics of Corrosion Reactions |
| ***Third week:*** | Graphical Representation of Electrochemical Equilibrium; Pourbaix Diagrams |
| ***Fourth week:*** | Electrochemical Kinetics of Single half-cell reactions |
| ***Fifth week:*** | Electrochemical Kinetics of Coupled half-cell reactions |
| ***Sixth week:*** | Galvanic Corrosion |
| ***Seventh week:*** | Corrosion of Active-Passive Type Metals and Alloys 1st mid-term evaluation |
| ***Eighth week:*** | Passivation of Metals, alloys and semiconductors |
| ***Ninth week:*** | Protective layers of metals against corrosion  |
| ***Tenth week:*** | Inhibitors |
| ***Eleventh week:*** | Electrochemical protection |
| ***Twelfth week:*** | Electrochemical Corrosion Rate Measurements |
| ***Thirteenth week:*** | Bateries and fuel cells  |
| ***Fourteenth week:*** | Localized Corrosion |
| ***Fifteenth week:*** | Corrosion at high temperatures2nd mid-term evaluation |
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| **Designed study plan:**  |  |
|  | **Exercises which will be held** |

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| Construction of Pourbaix Diagrams  |
| Rate determination of Iron corrosion in aqueous acid solution by linear voltametry |
| Rate determination of Zinc corrosion in aqueous acid solution by Impedance  |
| Rate determination of Iron corrosion in aqueous neutral solution by linear voltametry |
| Rate determination of Zinc corrosion in aqueous neutral solution by Impedance |
| Metals passivation |
| Inhibitors  |
| Modification of metal surface with organic film |
| Cathodic protection |
| Sacrificial anodes |
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| **Academic policies and rules of conduct:** |
| Attendance at lectures and exercises should be regular and scheduled time. Students must be in commensurate to the general rules of the university. For specific rules and specifics of organizing lectures and exercises, students are notified by the professor of the course. |