

**Course title:****Catalytic processes****Institute/Speciality:**

FACULTY OF CHEMICAL ENGINEERING AND TECHNOLOGY / Engineering of Technological Processes

**Erasmus subject code:**

WITCh ICHIP oIIS B8 15/16

**Number of contact hours:**

15 hours (lectures)

**Course duration:**

1 semester

**ETCS credits:**

1

**Course description:**

The course aims at a comprehensive understanding of the catalytic processes in chemical technology. Specific goals include gaining: - an understanding of catalysis basics; - an understanding of basic methods of catalysts preparation and modification; - an understanding of elementary steps in catalysis; - an understanding of theoretical modeling in catalyst design - an understanding of the catalyst characterization; - an understanding of the reaction mechanism during the catalytic processes; - an understanding of role of catalysis in industrial applications; - an understanding principles of catalyst design; - an understanding of catalytic reactors design

**Lectures content:** Introduction in Catalysis: General Principles of Catalysis, Thermodynamics and kinetics, History of catalysis, Importance of R&D in catalysis, Types of catalytic processes, Process selectivity / Homogeneous Catalysis: Enzymes as catalysts in organic synthesis / Heterogeneous Catalysis: Steps of catalytic reaction, Types of Catalysts: Transition metals, Oxide catalysts, Zeolites, Role of support, Adsorption and Reaction at Solid Surfaces, Mechanisms of catalytic process at surface / Heterogeneous Supported Catalysts / Catalysts characterization methods / Theoretical modeling in the search of prospective catalysts / Heterogeneous Catalytic Reactors / Catalyst Poisonin: / Design of catalytic process for novel chemical technology: Catalysts screening and selecting, Catalyst design principles, Industrial catalysis, Catalysts in Nanotechnology and Chemical Industry, Role of chemists and chemical engineers team work / Recent and future trends in Catalytic Processes: Role of catalysis in a national economy, Green technology, Photocatalysis, Microreactors, transportation biofuels

**Literature:**

[1 ] G. Ertl, H. Knözinger, F. Schuth, J. Weitkamp — Handbook of Heterogeneous Catalysis, Weinheim, 2008, Wiley-VCH  
[2 ] G. Ertl, H. Knözinger, J. Weit — Preparation of Solid Catalysts, Weinheim, 2008, Wiley-VCH

**Assessment method:**

Final test

**Prerequisites:**

Student should have basic knowledge from physical chemistry, organic chemistry and chemical technology

**Primary target group:**

all specialties students (Chemical Engineering / Chemical Technology)

**Lecturer:**

dr hab. inż. Izabela Czekaj

**Contact person:**

dr hab. inż. Izabela Czekaj (kontakt: iczekaj@chemia.pk.edu.pl)

**Deadline for application:**

15th of January for students applying for spring semester, 30th of August for students applying for winter semester

**Remarks:**

The course will start for at least 3-5 foreign students