Code: **QF835**

Name: **Processos Industriais**

Name in English: **Industrial Processes**

Name in Spanish: **Procesos Industriales**

Subject type: **Weekly**

Approval Type: **Grade and Attendance**

Characteristic: **Regular**

Frequency: **75%**

Period Type / Offering period: **Semester / All periods**

Requires Final Exam: Yes

Vectors

T	L	P	O	PE	OE	SL	WEEKS	CREDITS
4	**-**	**-**	**-**	**-**	**-**	**4**	**15**	**4**

Occurrence on curriculum: **05, 50**

Pre requirement: ***EQ582**

Summary: **Reactor Kinetics. Description and analysis of some processes of great importance found in chemical industries. Fermentations, petroleum refining, paper manufacturing, etc.**

Program:

1. Introduction to Industrial Reactors. Kinetics of homogeneous reactions. Interpretation of kinetic data from batch reactors. Determination of reaction kinetics by integral method. Determination of reaction kinetics by differential method. Batch reactors. Continuous reactors: Continuous stirred-tank reactors and tubular reactors. Reactor association. Autocatalytic reactions. Selection of operating conditions for series and parallel reactions. Deviations from Ideality. Heterogeneous reactions. Fixed-bed reactors. Fluidized-bed reactors. Three-phase reactors: slurry reactors and trickle-bed reactors.
2. Industrial Processes. Industrial processes for the production of Sulfuric Acid, Ammonia, Actives for the pharmaceutical industry, Biodiesel, Industrial Coal, Ceramics, Beer, Cement and Lime, Glues, adhesives and sealants, Ethanol, Phenol, Pig Iron, Industrial Gases, Vegetable Oils and Fats, Paper and Pulp, Perfumes and Flavors, PET, Polyolefins, Polyurethanes, Petroleum Refining, Soap, Shampoo and Conditioner, Silicones, Paints and Pigments, and Glass. Water and wastewater treatment.

Basic Bibliography

1) LEVENSPIEL, O. **Engenharia de reações químicas**, 3. Ed. São Paulo: Edgard Blucher, 2000. 578 p
2) FOGLER, S. **Elementos de engenharia das reações quimicas**, 3. Ed. São Paulo: LTC, 2002. 924
3) SHREVE, R.N.; BRINK Jr., J.A., **Indústrias de processos químicos**, 1. Ed Rio de Janeiro: Ed. Guanabara, 1997. 717 p

Supplementary Bibliography

1) HILL, C.G.; ROOT, T.W. **An introduction to chemical engineering kinetics of reactor design**, 1. Ed. New York: John Wiley & Sons, 1977. 594 p
2) FROMENT, G.F.; BISCHOFF, G.K. **Chemical reactor analysis and design**, 2 Ed. Cingapura: John Wiley & Sons, 1990.
3) BUTT, J. B.; **"Reaction Kinetics and Reactor Design",** Englewood Cliffs: Prentice-Hall, 1980.
4) FELDER, R.M.; ROUSSEAU, R.W. ; BULLARD, L.G. **Princípios elementares dos processos químicos**, 4 Ed., Rio de Janeiro: Livros Técnicos e Científicos, 2005. 616p
5) CROWL, D.A. **Segurança de processos químicos,** 3 Ed., Rio de Janeiro: Livros Técnicos e Científicos, 2015. 654p