Course Syllabi

1. INGE-00021 BALANCES OF MATERIAL AND ENERGY
2. Instructor:
   • Tsai Garcia Perez
3. Bibliography
   • Principio de los procesos químicos I Balance de Materiales y Energía, Hougen Watson Ragatz, 1982
   • Principios elementales de los procesos quimicos, Richard M Felder y Ronald W Rousseau, 2004
4. Specific Course Information
   a. This matter is aimed at understanding the fundamental techniques to define, calculate and measure the values of the variables a chemical process, as well as to propose and solve the equations that relate to those variables. In addition, the application of the laws of conservation of mass and energy to the analysis of manufacturing processes as a means of relating the variables of inputs of the processes allowing the evaluation and design of them. The course examines the procedures for writing material balances of individual units and multiple units of process through the approach and resolution of the equations that govern them in a systematic way. The subject allows applying knowledge and skills in mathematics, physics and chemistry, effectively, as basic tools for solving problems in the field of Chemical Engineering, as well as evaluating industrial processes with technical criteria to estimate their feasibility.
   b. Prerequisites:
      • MAES-00094 Comprehensive calculation
      • CCFF-00036 Physics II
      • CCFF-00040 Inorganic chemistry
5. Learning Objectives of the Course
   a. Study a systematic method of solving problems related to the material and energy balances of the processes of the chemical industry establishing the relationships between known and unknown variables, determining the equations that relate these variables and their method of resolution. At the same time it communicates effectively in oral and written form using an appropriate technical language. - Work with different systems of units in such a way that the solution of a To validate the solution of a quantitative problem and prove that it is logical. - To systematically analyze the elementary processes in the chemical industry by identifying the variables of the process; the laws of nature that govern the performance of the same; the physical properties of the materials involved and the relevant equations - To study the appropriate equations for the solution of the balances of materials in system s of a phase and multiphase. - Study the laws governing the balance of energy, as well as their application to the study and evaluation of the processes of the chemical industry.
   b. Learning Outcomes
      1. Communicate effectively in oral and written form using the appropriate technical language, either by working individually or in interdisciplinary and/or multi-ethnic teams.
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      3. Communicate effectively in oral and written form using the appropriate technical language, either by working individually or in interdisciplinary and/or multi-ethnic teams.
      4. Perform mass and energy balance calculations of chemical processes using up-to-date analytical

techniques to provide reliable results

5. Identify significant variables and relevant information (physical variable data, laws of thermodynamics, among others) for the control and evaluation of processes in the field of chemical engineering
6. Identify significant variables and relevant information (physical variable data, laws of thermodynamics, among others) for the control and evaluation of processes in the field of chemical engineering
7. Perform mass and energy balance calculations of chemical processes using up-to-date analytical techniques to provide reliable results
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9. Identify significant variables and relevant information (physical variable data, laws of thermodynamics, among others) for the control and evaluation of processes in the field of chemical engineering
10. Perform mass and energy balance calculations of chemical processes using up-to-date analytical techniques to provide reliable results

6. Course Topics
    1. Introduction to engineering calculations
    2. Processes and variable processes
    3. Basis of material balances
    4. One-phase systems
    5. Multiphase systems
    6. Energy and energy balance sheets
    7. Transient process balances