Minor in Pharmaceutical Engineering

Curriculum – Minor in Pharmaceutical Engineering

REQUIREMENTS

A total of 15 AUs shall constitute a Minor in Pharmaceutical Engineering and may be obtained over the duration of the student's respective degree course. To fulfill this requirement, students must take the following courses of our CBE curriculum:

1. Chemical Reaction Engineering I (CH 2020) – 3 AUs
2. Materials and Energy Balance (CH 1004) – 3 AUs
3. Chemical Engineering Unit Operations II (CH 3041) – 3 AUs
4. Chemistry of heterocyclic compounds (CH 4103) – 3 AUs
5. Formulation of Active Pharmaceutical Ingredients dosage forms (CH 4106) – 3 AUs

Students can also take an optional laboratory offered together with this course:

6. Pharmaceutical Engineering Laboratory (CH 4171) – 1 AU
DESCRIPTION OF MODULES

CH 2020 Chemical Reaction Engineering I

This course introduces students to chemical reaction engineering. Topics include reaction kinetics for single, multiple and equilibrium reactions taking place in batch reactors, Continuously Stirred Tank Reactors (CSTR) and Plug Flow Tubular Reactors (PFTR). Nonisothermal reactors, multiple steady states and transients will also be taught. Students will also learn about mass transfer and catalytic reactors. Examples from chemical and biological processing will be covered. Advanced topics such as nonideal reactors, bioreactors and environmental modeling will be taught.

CH 1004 Materials and Energy Balance

This subject focuses on the material and energy balances in chemical processes and lays foundation in thermodynamics, unit operations, kinetics, etc. It introduces the engineering approach to problem solving: breaking a process down into its components, establishing the relations between known and unknown process variables, assembling the information needed to solve for the unknowns, and finally obtaining the solution using appropriate computational methods.

CH 3041 Chemical Engineering Unit Operations II


CH 4103 Chemistry of Heterocyclic Compounds

The objective of the course is to give an insight into heterocyclic chemistry and the use of different classes of these compounds in active pharmaceutical ingredients. Heterocyclic compounds are of prime importance in the chemical industry, and heterocyclic chemistry is therefore a fundamental topic in the undergraduate courses. The emphasis of this course is on synthetic aspects, and it covers the essential details and basic principles with reference to all the important classes of heterocyclic compounds. It is the study of Heterocyclic organic compounds including their, methods of synthesis, reactions and their mechanisms. Three- four- five- and six-membered heterocyclic compounds with one heteroatom as well as five- and six- membered with two or three heteroatoms, particularly those containing nitrogen will be taught. The course includes synthesis of some naturally occurring heterocyclic compounds.

CH 4106 Formulation of Active Pharmaceutical Ingredients dosage forms

The objective of the course is to give an insight in drug formulation and the setting of quality specifications. Thus, the course is devoted to the objectives involved in bringing an active pharmaceutical ingredient into an effective and safe dosage form.
CH4171  Pharmaceutical Engineering Laboratory

This subject focuses on teaching and imparting to the students hands-on techniques in pharmaceutical engineering.

Upon successful completion of this course, students will be able to:

a) Acquire hands-on techniques in synthesis of organic compounds  
b) Acquire hands-on techniques in various characterization methods  
c) Acquire hands-on techniques in separation and purification methods

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