1. **Course number and name - CHBE 3225 – Separations Processes** ***(required)***

2. **Credits and contact hours** - 3 credit hours, 3 lecture hours (3-0-0-3)

3. **Instructor's or course coordinator's name -** Dr. Yonathan Thio

4. **Textbook, title, author, and year**
   Seader, Henley, Roper, "Separation Process Principles", 4th edition, John Wiley & Sons Inc. (2019)

5. **Specific course information**
   a. **Catalog Description –** Fundamentals of equilibrium-stage and continuous contacting operations. Applications of principles to distillation, absorption/stripping, extraction, absorption, and other separation technologies.
   b. **Prerequisites or co-requisites** –CHBE 3130 Chemical Engineering Thermodynamic II (grade "C" or better); CHBE 3200 Transport Phenomena I (grade "C" or better); CHBE 3210 Transport Phenomena II (pre-requisite with concurrency).
   c. **Required, elective, or selected elective course** (as per Table 5-1) – Required

6. **Specific goals for the course**
   a. **Specific outcomes of instruction**:
   By the end of this course, a student should be able to:
      1) Calculate the properties (e.g., compositions and flow rates) of product streams, as well as energy requirements, for single-stage operations such as flash tanks.
      2) Identify separations equipment of various types and their components.
      3) Design multistage separation systems for specific operations involving distillation, absorption, stripping, extraction/leaching, crystallization.
      4) Calculate the properties of membrane units for separations.
      5) Understand the design fundamentals for bioseparations. (Sutdnet
      6) Use computer modeling to design and simulate complex separation systems.
      7) Evaluate competing separation technologies on factors such as simplicity, reliability, and cost.
   b. **Connection with Student Outcomes**

CHBE 3225							
	Student Outcomes						
Course Outcomes	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Course Outcome 1	**X**	**X**					
Course Outcome 2	**X**			**X**			
Course Outcome 3	**X**	**X**				**X**	
Course Outcome 4	**X**	**X**				**X**	
Course Outcome 5	**X**	**X**		**X**		**X**	
Course Outcome 6	**X**	**X**		**X**		**X**	
Course Outcome 7	**X**			**X**		**X**	

Student Outcomes

(1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
(2) an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
(3) an ability to communicate effectively with a range of audiences
(4) an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
(5) an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
(6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
(7) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

7. **Brief list of topics to be covered**
    a. Introduction: overview and review of thermodynamics and transport
    b. Single-stage separations
    c. Separation cascades
    d. Liquid-liquid extraction
    e. Absorption and stripping
    f. Distillation
    g. Membrane separation
    h. Reverse osmosis
    i. Solid particle separation
    j. Crystallization