ChE 320: Chemical Process Analysis

Instructor: Dr. Aravind Suresh
Contact information: 2017 Durland Hall
1701A Platt St, Manhattan, KS 66506
(785) 532-2625
aravind@ksu.edu

Office hours:
There are four modes of communication available for contacting the instructor: regular e-mail, Canvas e-mail, online chatroom, and video conference. The latter two modes will be made available through Canvas. More details will be provided by the instructor by e-mail before the course begins. Interaction and discussion with the instructor is what separates this distance-learning course from a correspondence course. So, you are strongly encouraged to contact the instructor with questions about the material. Conversely, the instructor may initiate mandatory discussion sessions to gauge your understanding of the material and your progress in the course.


Course pre-requisites: Math 221 (Analytical Geometry and Calculus II), Chem 210 (Chemistry I) or 220 (Honors Chemistry I). Co-requisites: Math 222 (Analytical Geometry and Calculus III), Chem 230 (Chemistry II) or 250 (Honors Chemistry II). This requirement is strictly enforced.

Course purpose: ChE 320 prepares you to formulate and solve material and energy balances on chemical process systems and lays the foundation for subsequent courses in thermodynamics, unit operations, kinetics, and process dynamics and control. More fundamentally, 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.

Course objectives: By the end of the course, you should be able to do the following things:

- **Basic engineering calculations.** Convert quantities from one set of units to another quickly and accurately; define, calculate, and estimate properties of process materials including fluid density, flow rate, chemical composition variables (mass and mole fractions, concentrations), fluid pressure, and temperature.

- **Material and energy balance calculations.** Draw and label process flowcharts from verbal process descriptions; carry out degree-of-freedom analyses; write and solve material and energy balance equations for single-unit and multiple-unit processes, processes with recycle and bypass, and reactive processes.

- **Applied physical chemistry.** Perform pressure-volume-temperature calculations for ideal and non-ideal gases. Perform vapor-liquid equilibrium calculations for systems containing one condensable component and for ideal multicomponent solutions. Calculate internal energy and enthalpy changes for process fluids undergoing specified changes in temperature, pressure, phase, and chemical composition using steam tables and other data tables as needed. Incorporate the results of these calculations into process material and energy calculations.

- **Computation.** Use spreadsheets and equation-solving programs to solve material and energy balance problems.
POLICIES AND PROCEDURES

- **Academic integrity.** Kansas State University has an Honor System based on personal integrity, which is presumed to be sufficient assurance that, in academic matters, one's work is performed honestly and without unauthorized assistance. Undergraduate and graduate students, by registration, acknowledge the jurisdiction of the Honor System. The policies and procedures of the Honor System apply to all full and part-time students enrolled in undergraduate and graduate courses on-campus, off-campus, and via distance learning. The Honor System website can be reached via the following URL: [www.ksu.edu/honor](http://www.ksu.edu/honor). A component vital to the Honor System is the inclusion of the Honor Pledge, which applies to all assignments, examinations, or other course work undertaken by students. The Honor Pledge is implied, whether or not it is stated: "On my honor, as a student, I have neither given nor received unauthorized aid on this academic work." A grade of XF can result from a breach of academic honesty. The F indicates failure in the course; the X indicates the reason is an Honor Pledge violation. The use of or knowledge of another student using any unauthorized aids are considered violations of the honor code. Unauthorized aids include but are not limited to using former students’ homework solutions, solution manuals or solutions found online.

- **Course content.** Lectures will be recorded as modules and made available to you on Canvas. It is imperative that you watch the videos in a timely fashion as prescribed.

- **Homework.** You will submit homework assignments individually. The assignment schedule will be posted on Canvas. Additional assignments (individual or team-based) may be given at the discretion of the instructor.

- **Homework format.** Use engineering paper, one side of each page. Begin each problem on a new page. Box the final answers. Scan and upload each completed assignment to Canvas as a PDF document.

- **Late homework.** Completed assignments should be turned in on Canvas by the due date and time. Late assignments that are e-mailed to the instructor will receive a penalty of points. More than two late assignments will not be accepted from an individual.

- **Homework grading.** If you believe an error has been made in grading on a problem set, bring it to the attention of the instructor. If you believe that you should have gotten more points than you got for any reason other than a simple addition error, write a statement making your case and e-mail it to the instructor, who will make the final decision.

- **Examinations.** There will be two tests during the session and a comprehensive final exam. All tests will be closed-book, closed-notebooks. You will be allowed one 8.5 in. x 11 in. page with your own notes. If you are unable to take the test at those times (with a documented excuse – not just that you don’t want to) an alternate time will be scheduled for you to take the exam. Rescheduling must be done prior to the test except in the case of emergency issues. **You will need to find a proctor for each of the three examinations for this course.** Dates and times for the examinations will be announced before the course begins. Please check the following link for more information on the procedures that you need to complete from your side: [http://global.k-state.edu/students/services/testing/](http://global.k-state.edu/students/services/testing/)
• **Examination grading.** If you believe an error has been made in grading an examination, it must be submitted for a re-grade within a week of when it was returned. If you believe that you should have gotten more points than you got for any reason, write a statement making your case and e-mail it to the instructor.

• **Calculation of course grade.** A weighted average grade will be calculated as follows:
  - Midterm examinations 50% (25% each)
  - Final examination 35%
  - Homework and other assignments 15%

  Anticipated grading scale
  - > 90.0  A
  - 89.9 – 80.0  B
  - 79.9 – 70.0  C
  - 69.9 – 60.0  D
  - < 60.0  F

  The homework grades will only count if the average grade on the midterm examinations and the final exam is 60 or above—in other words, if you can’t pass the individual examinations, then you can’t pass the course. *Note:* The course grades are not curved. It is theoretically possible for everyone in the course to get an A (or an F). Your performance depends only on how you do, not on how everyone else taking the course does.

After the final letter grades have been posted on KSIS, you can write/type your appeal on the form posted on Canvas and e-mail it to the instructor. The instructor’s response to your appeal will be sent to you by e-mail.

Setting the grading scale is solely the instructor’s prerogative. The scale will be applied uniformly to all the students taking the course and will be made available on Canvas after the final letter grades have been posted on KSIS. Requests from students to modify or explain the grading scale will not be entertained under any circumstance, in person, over telephone or by e-mail.

• **Instructor’s commitment.** You can expect your instructor to be; courteous, well organized and prepared to answer questions clearly and in a non-negative fashion; to be available during office hours or to notify you beforehand if he is unable to keep them; and to grade uniformly and consistently according to the posted guidelines. You are strongly encouraged to ask questions of and discuss the subject matter with the instructor in class or during office hours.

• **Students with disabilities.** Students with disabilities who need access to technology should contact the Student Access Center and/or their instructor. Services are available to students with a wide range of disabilities including, but not limited to, physical disabilities, medical conditions, learning disabilities, attention deficit disorder, depression, and anxiety. If you are a student enrolled in campus/online courses through the Manhattan or Olathe campuses, contact the Student Access Center at accesscenter@k-state.edu, 785-532-6441. For the Salina campus, contact the Academic and Career Advising Center at acac@k-state.edu, 785-826-2649. If you require accommodations to complete any portion of the course, please inform the instructor within the first week of classes.

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