CBEN408 Natural Gas Processing
Spring Semester 2018

Instructor: John Jechura
Class Hours: T Th 11:00 am – 12:15 pm (BH 243)
Office Hours: T Th 1:00 – 3:00 pm & by appointment (AH 437)
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Course Description from Bulletin
Application of chemical engineering principles to the processing of natural gas. Emphasis on using thermodynamics and mass transfer operations to analyze existing plants. Relevant aspects of computer aided process simulation. Prerequisites: CHGN221, CBEN201, CBEN307, CBEN308, CBEN357, CBEN375, or consent of instructor. 3 hours lecture, 3 semester hours.

Text Book
Fundamentals of Natural Gas Processing, 2nd ed
Arthur Kidnay, William Parrish, Daniel McCartney
2011

Supplemental Text & Materials
GPSA Engineering Data Book, 13th ed.
2012

Course Objective
The objective of this course is to acquaint the student with the engineering & business fundamentals associated with the natural gas industry

• Emphasis will be placed on developing a basic understanding of the industry “from wellhead to burner tip”
• Develop a basic understanding of gas chemistry and resulting physical properties
• Develop an understanding of the processing steps needed to abide by transportation & usage requirements & specifications
• Simulation software for natural gas characterization, fractionation, & related operations will be utilized.

Topics
• Petroleum & natural gas overview
  o Sources of natural gas
  o Composition of natural gas
  o Principal products & markets
  o Product specifications
  o Combustion characteristics
• Review of major process equipment
  o Heat exchangers
  o Compressors
  o Pumps
  o Fractionation towers
• Overview & usage of simulation programs
• Gas processing operations
• Field operations & inlet receiving
  o Compression
  o Gas treating
  o Gas dehydration
  o Hydrocarbon recovery
  o Nitrogen rejection
  o Trace component removal
  o Liquids processing
  o Acid gas removal & disposal
  o Transportation & storage
• Liquefied natural gas (LNG)
• Capital costs
Grading Policies

<table>
<thead>
<tr>
<th>Grading Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety Topic</td>
<td>(0 to -10%)</td>
</tr>
<tr>
<td>Homework</td>
<td>30%</td>
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<tr>
<td>Short Quizzes</td>
<td>30%</td>
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<tr>
<td>Final Exam</td>
<td>25%</td>
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<tr>
<td>Simulation Project</td>
<td>15%</td>
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</tbody>
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The only formal exam will be given during the Final Exam week. If the student is unable to take the exam during this scheduled period then he/she must make special arrangements with the instructor to take the exam prior to the scheduled time.

There will also be 6 to 10 short quizzes given throughout the semester. The quizzes will be 10 minutes in length and given at the very beginning of the class. Quizzes will be unannounced. There will be no make-up quizzes. It will be up to the discretion of the instructor to excuse an absent student from a particular quiz. To be eligible for an excused absence the student must notify the instructor of the absence via email before the class period.

There will be about 6 to 12 homework assignments. Homework will be announced at least one week before it is due. Homework will be due by the end of the due date and is to be emailed to the instructor or submitted electronically by CANVAS. Late homework will not be accepted.

There will be one special project. A set of simulations (Aspen HYSYS or Aspen Plus) will be used to answer a set engineering-type questions concerning natural gas & NGL processing. Students may work in groups to do the simulation work, but each individual will be responsible for his/her own report.

Class will begin with a short safety topic. Each student will be responsible to provide at least one topic during the semester. Doing so will provide the credit toward this grade.

Policy on academic integrity/misconduct
The Colorado School of Mines affirms the principle that all individuals associated with the Mines academic community have a responsibility for establishing, maintaining and fostering an understanding and appreciation for academic integrity. In broad terms, this implies protecting the environment of mutual trust within which scholarly exchange occurs, supporting the ability of the faculty to fairly and effectively evaluate every student’s academic achievements, and giving credence to the university’s educational mission, its scholarly objectives and the substance of the degrees it awards. The protection of academic integrity requires there to be clear and consistent standards, as well as confrontation and sanctions when individuals violate those standards. The Colorado School of Mines desires an environment free of any and all forms of academic misconduct and expects students to act with integrity at all times.

Academic misconduct is the intentional act of fraud, in which an individual seeks to claim credit for the work and efforts of another without authorization, or uses unauthorized materials or fabricated information in any academic exercise. Student Academic Misconduct arises when a student violates the principle of academic integrity. Such behavior erodes mutual trust, distorts the fair evaluation of academic achievements, violates the ethical code of behavior upon which education and scholarship rest, and undermines the credibility of the university. Because of the serious institutional and individual ramifications, student misconduct arising from violations of academic integrity is not tolerated at Mines. If a student is found to have engaged in such misconduct sanctions such as change of a grade, loss of institutional privileges, or academic suspension or dismissal may be imposed.

The complete policy is online.

Disability support statement
The Colorado School of Mines is committed to ensuring the full participation of all students in its programs, including students with disabilities. If you are registered with Disability Support Services (DSS) and I have received your letter of accommodations, please contact me at your earliest convenience so we can discuss your needs in this course. For questions or other inquiries regarding disabilities, I encourage you to visit disabilities.mines.edu for more information.