**CHEM 4817/5817 Syllabus Fall 2011 (*Revised* 8/30/2011)**

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**Course Title:** Introduction to Industrial Chemistry

**Instructor:** Dr. I. O. Kady; Office: 431 Brown; Phone: 439-6910; Fax: 439-5835

 e-mail: Kadyi@ETSU.EDU.

**Office Hours:** Wednesday, Friday 9:20-10:20a.m.

**Objectives/** The objectives of this course are to bridge the gap between basic chemical

**Course** science and chemical engineering, and to lessen the lack of knowledge that

**Description:** most chemistry graduates have in this area. Attempts will be made to instill in future chemists the appreciation for both the manufacturing and economic problems facing chemical industry. For more details, see below.

**Textbook:** "Introduction to Industrial Chemistry" 3rd edition, by Alan Heaton.

In addition, the following references will be useful, and they will be kept on the reserve shelf in ETSU main library; you will be able to use them in the library only:

* Clauson, C. A., and Mattson, G., *Principles of Industrial Chemistry*.
* Levenspiel, O., *Chemical Reaction Engineering*.
* Moore, J. W., and Moore, E. A., *Environmental Chemistry*.
* Alloway, B. J., and Ayres, D. C., *Chemical Principles of Environmental Pollution.*

**Grading:** Your overall grade will be based on the following:

 Undergraduates: 3 exams (25% each); homework assignments (25%)

 Graduates: 3 exams (75%); homework (10%); review paper/presentation (15%)

 Grading Scale (**Undergraduate**):

 **A** > 93%; **A-**> 90%; **B+** > 87%; **B** > 84%; **B-** > 80%;

 **C+**> 77%; **C**> 74%; **C-** >70%; **D+** > 60%; **D** > 50%; **F** ‹ 50%

Grading Scale (**Graduate**):

 **A** > 93%; **A-** > 90%; **B+** > 87%; **B** > 84%; **B-** > 80%;

 **C+**> 77%; **C**> 70%; **F** ‹ 70%

**Schedule:** Aug 30-Sep 20 Chapters 1-5

 **Sep 27** **Exam I (**Chapters 1-5)

 Oct 4-Nov 8 Chapters 6 & 7

 **Nov 15 Exam II** (Chapters 6 & 7)

 Nov 22-Nov 29 Chapters 8, 9

 Dec 6 Graduate students’ presentations\*

 **Dec 13 Exam III** (Chapters 8, 9, and presentations)

***\*Graduate Students:*** *Each graduate student must submit a review paper by 22 Nov, 2011, on a topic that must be approved by me ahead of time. In addition, each graduate student must give a presentation on his/her paper during the last week of classes (Dec 6th).*

**Academic Integrity:** Please read and be familiar with the “Academic Integrity Policy” document posted under Course Information.

**Mental Health:** Students often have questions about mental health resources, whether for themselves or a friend or family member.  There are many resources available on the ETSU Campus, including: ETSU Counseling Center (423) 439-4841; ETSU Behavioral Health & Wellness Clinic (423) 439-7777; ETSU Community Counseling Clinic: (423) 439-4187.

* **If you or a friend are in immediate crisis, call 911.**
* Available 24 hours per day is the National Suicide Prevention Lifeline:

 1-800-273-TALK (8255).

**Use of** No programmable electronic devices are allowed in exams. That includes **Electronics:** programmable calculators, laptop computers, smart phones, …

**TOPICS TO BE COVERED IN THIS COURSE:**

 **Unit one (Chapters 1-5):**

 Overview of Chemical Industry:

 - Characteristics of the Chemical Industry

 - Basic Raw Materials for Industrial Chemicals

 - Research and Development

 - A Comparison between Academic and Industrial Chemistries

 - Chemical Patents and Literature

 - Applying for a job in Industry

 **Unit two (Chapters 6 & 7):**

 Chemical Engineering & Engineering of Chemical Reactions:

 - Economics of Chemical Processes

 - Material Balance

 - Energy Balance

 - Chemical Transport

 - Heat Transfer

 - Kinetics of Chemical Reactions

 - Separation Processes

 - Industrial Catalysis

 - Process Development and Quality Control

 **Unit three (Chapters 8 & 9):**

 Energy demand and environmental impact of chemical industry:

 - Energy requirement of chemical processes

 - Sources and cost of energy

 - Social Pressure on Chemical Industry

 - Chemical Pollution

 - Nuclear and Radioactive Wastes

 - Pollution Control

 **POSSIBLE TOPICS FOR TERM PAPERS:**

 **1. Cosmetics and toilet preparations**

 **2. Coal technology**

 **3 Ceramics**

 **4. Asbestos**

 **5. Dyes and pigments**

 **6. Flame retardants**

 **7. Explosives**

 **8. Flavors and fragrances**

 **9. Glass industry**

 **10. Fluorocarbons as aerosols and refrigerants**

 **11. Ozone layer depletion**

 **12. History of industrial chemistry**

 **13. Food additives**

 **14. Lubricating oils**

 **15. Industrial solvents**

 **16. Nuclear waste**

 **17. Plasticizers**

**18. Green-house effect**

**19. Photographic products**

**20. Industrial fermentation**

**21. Artificial sweeteners**

**22. Sugar industry**

**23. Coal liquefaction**

**24. Superconductors industry**

**25. Vitamins Industry**

**26. Lime, cement, and gypsum**

**27. Surfactants, soaps, and detergents**

**28. Adhesives**

**29. Petroleum refining**

**30. Foam Industry**

**31. Conductive Polymers**

**32. Recycling Solid Wastes in Auto Industry**

**33. Clean Up of Oil Spills**