

# Chemical Engineering Analysis

## CHEN 3650 Spring 2012 Course Syllabus

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**Instructor:** Dr. W. Robert Ashurst, 227 Ross Hall, 844-2559, ashurst@auburn.edu

Office Hours: M, W: 10:00 AM – Noon, Ross 227 and as arranged by appointment.

**GTA's:** Brian Lilly, lillybr@auburn.edu, Office Hours: T,R: Noon - 1:00 PM, F: 9:00 – 10:00 AM, Wilmore 194.

Wenjian Guan, wzg0011@auburn.edu, Office Hours: TBA.

**Lecture:** M, W: 9:00 – 9:50 AM, Ross Hall, Room 136 (McMillan Auditorium)

**Laboratory:** W: 3:00 – 5:45 PM, Ross Hall, Room 306 (Uthlaut Computer Lab).

**Bulletin:** Mathematical modeling, analytical, numerical and statistical analysis of chemical processes. Prerequisites: Completion of CHEN 3600 and CHEN 3620 with grades of C or higher.

**Objectives:** This course is intended to teach students methods of problem formulation to mathematically model and simulate any type of process or equipment based on fundamental transport, kinetic, thermodynamic and other chemical engineering principles.

**Required Text:**

[1] Hango and Cameron, *Process Modelling and Model Analysis*, Academic Press, San Diego, CA, 2001. ISBN 0-12-156931-4

**Required Resource**

[1] MATLAB<sup>®</sup> Student Edition Software Package.

**Strongly Recommended Text:**

[1] Cutlip and Shacham, *Problem Solving in Chemical and Biochemical Engineering with POLYMATH, Excel and MATLAB*, Second Edition, Prentice Hall PTR, Upper Saddle River, NJ, 2008.

**Recommended/Reference Texts:**

[1] Press et al., *Numerical Recipes in C: The Art of Scientific Computing*, Third Ed., Cambridge University Press, 2007.

[2] Rice and Do, *Applied Mathematics for Chemical Engineers*, John Wiley and Sons, Inc., 1995.

[3] Smith and Corripio, *Principles and Practice of Automatic Process Control*, 3rd Edition, John Wiley and Sons, Inc., 2006.

[4] Felder and Rousseau, *Elementary Principles of Chemical Processes*, 3rd Edition, John Wiley and Sons, Inc., 2005.

**Webpage:** Necessary course information will be posted on the web. You are expected to look at the web site before classes for new information.

<http://www.eng.auburn.edu/~ashurwr/classes.html>

**Grades:** The overall course grade will be determined by performance in both the lecture and laboratory. There is no distinction between laboratory homework or quizzes and lecture homework or quizzes.

Category	Percentage of Final Grade
Project Report	5%
Homework and Lab Assignments	10%
Quizzes	10%
Exam I	15%
Exam II	15%
Final Exam	45%
Optional Bonus	5%

**Course Project Report:** The course project report assignment will be announced during the first few weeks of the course. This semester long project is to be individual work. The final project report as well as any optional interim reports are to be provided in standard departmental reporting formats. Neither late nor handwritten reports will be accepted. All reports will be graded for technical merit and accuracy as well as writing quality.

**Quizzes:** Quizzes (announced or unannounced) may be given during the first or last portion of a lecture or laboratory. The duration of quizzes may vary from 5 to 20 minutes based on the complexity of the material. Quizzes may be closed or open book and may contain multiple choice, true/false, short answer questions, or problems similar to the homework and examples or problems to be worked on the computer in MATLAB<sup>®</sup>. Partial credit will be given if appropriate for the problem. The point value and time duration of quizzes can be variable.

**Homework:** Homework assignments are to be turned in at the beginning of class on the day they are due. No late homework will be accepted unless arrangements have been made with Dr. Ashurst before the due date. Homework is required to follow the standard departmental format where appropriate and standard MATLAB<sup>®</sup> Cell Mode/Publish format where applicable.

**Lab Assignments:** Laboratory assignments will generally consist of a central problem (with sub-parts) at a level generally more involved than a standard homework set. Students are expected to spend about one week per lab assignment and turn in the requested information (answers, plots, etc.) in standard homework/MATLAB<sup>®</sup> format as applicable. In all cases, hand drawn plots are not acceptable.

**Exams:** Exams will be conducted during laboratory times. Exams will be closed book, and additional calculator/portable electronics policies may be enforced. Exams may involve computer use. Due to space constraints (when computer usage is not required) it is likely that exams will be conducted in alternate locations (e.g., Ross 136) instead of the computer lab. Exams may involve questions of any type, including but not limited to: explain, multiple choice, free response and derive. Questions may be graded on a partial credit or no partial credit basis. The grading of exams for this course may take longer than the typical “week turn-around”.

**Optional Bonus:** All bonus material is due by the last class meeting. Details about the bonus problem will be given during the first few weeks of the course. There will be no other opportunities for bonus credit.

**Reference Materials:** Certain reference material may be placed on reserve in the RBD library. Check the course website for additional details.

**Make-up Classes:** In the event of a University-wide cancellation of classes (due to weather, for example), make-up classes as appropriate may be scheduled at irregular times or locations.

**Website and E-Mail:** Homework assignments and other course material will be accessed through the course website and/or handouts and/or lecture instruction. Students are expected

to check the course website and their e-mail regularly. The University recognizes e-mail as an official form of communication. Notification of significant changes in the content of the class website will be conducted through e-mail. *When sending e-mail to Dr. Ashurst, you must specify CHEN 3650 SP12 in the "subject" field (note the spaces and capitalization). When sending files to Dr. Ashurst, always prefix them with "username\_".* (For example, my file foo.m would need to be named ashurwr\_foo.m.) Failure to adhere to these e-mail policies voids your e-mail message. See additional handout for detailed policy on electronic communication.

**Unapproved Computer Activities:** It is a class policy that during class time (labs), students are expected to focus on the lectures and other class activities. **Students may not engage in any computer activities during official class time** not specifically endorsed by the instructor. This policy prohibits general emailing and web surfing not directly related to the course, working on assignments for other courses, playing games, texting, or using any software not directly related to the current lecture or lab activities. The instructor and/or GTA will note the name of any student determined to be in violation of this policy and a notation will be made in the grade sheet. Each violation will result in a loss of one letter grade for the course. There are **no exceptions** to this policy.

**Participation in Assessment Efforts:** Each Auburn student is expected to participate in the various University assessment efforts. Academic programs use various means to gather assessment information, including portfolios, performances, achievement tests, comprehensive examinations, surveys, interviews, focus groups, evaluation forms, and other methods. While enrolled, a typical student can expect to take part in one or more of these assessment activities. Participation in these activities may be a completion requirement for some degree programs. (Tiger Cub 2010, p 33)

**Electronic Device Policy:** Restricted electronic devices (such as cell phones, pagers, pen cams, etc.) may not be used at any time. Please turn off or set to silent mode any "signaling" devices. Restricted electronic devices must not be accessible during exams (please place in backpacks, etc.). Any restricted electronic devices visible during an exam or final will be considered an act of academic dishonesty. Disruptions of the class by "signaling" devices during examinations will result in loss of 10% of the exam credit.

**Attendance Policy:** College work requires regular class attendance as well as careful preparation. It is the expectation of Auburn University and Department of Chemical Engineering that students attend all their scheduled classes. Specific policies regarding class attendance are the prerogative of individual faculty members. This policy shall be presented to the class, in writing, at the beginning of the term and will govern the actions of the instructor in the course.

The attendance policy for CHEN 3650 is as follows: Students who have more than three (3) unexcused absences will automatically be assigned the grade of FA (failing due to excessive absences). An unexcused absence is defined as any absence not consistent with the definition of an excused absence provided in the Tiger Cub publication (Section 5.10.1-5.10.5). Documentation for excused absences must be provided to the instructor within one calendar week of the "may return to classes" date on the excuse. This policy will be enforced regardless of the performance of the student in coursework.

Please note: Attendance will be determined by various means including taking roll, taking quizzes, GTA observation, etc. Quizzes are frequently given at the beginning of class or lab (but may be given at any point in the class or lab), therefore, you will be considered absent

if you arrive to class after the quiz is collected.

**Lab Attendance Policy:** Roughly three hours per week are devoted to lab activities. During the lab times, you are expected to work on the lab assignment in the lab room. If you depart early, and have not completed and handed in your current lab assignment, you may be assigned an absence for that period. It is the expectation that you utilize the lab time, facilities and the presence of the course instructor/GTA to make progress on the lab assignments.

**Academic Honesty Policy:** Policies regarding academic honesty are specified in the Tiger Cub Student Handbook and the Department of Chemical Engineering policies and academic dishonesty will be reported to the Academic Dishonesty Committee. In order to articulate fully its commitment to academic honesty and to protect members of its community from the results of dishonest conduct Auburn University has adopted policies to deal with cases of academic dishonesty. These policies are intended not only to emphasize the imperative of integrity, but also to protect the rights of all members of the university community. The complete academic regulations concerning cheating are located in the Tiger Cub Student Handbook, Code of Laws, Title XII, Student Academic Honesty Code, Chapters 1200-1203.

The Departmental Honesty Statement is: By affixing my signature below, I acknowledge I am aware of the Auburn University policy concerning academic honesty, plagiarism, and cheating. This policy is defined in the current Tiger Cub Student Handbook, Code of Laws, Title XII, Student Academic Honesty Code, Chapters 1200-1203. I further attest that the work I am submitting with this exam is solely my own and was developed during the exam. I have used no notes, materials, or other aids except those permitted by the instructor.

The following information is the implementation and delineation of those policies by the above faculty member.

When a student is suspected of violating academic honesty standards, the faculty member will, as soon as reasonably possible, notify the student of the suspected infraction, seek the student's explanation, undertake any further investigation the faculty member considers appropriate, and initially determine whether a violation of the academic honesty policy has likely occurred.

If an act of academic dishonesty is determined to have likely occurred the matter will be turned over to the Auburn University Academic Honesty Committee

### **Forms of Academic Dishonesty**

*Plagiarism* is the inclusion of someone else's words, ideas, or data as one's own work. When a student submits work for credit that includes the words, ideas, or data of others, the source of that information must be acknowledged through complete, accurate, and specific references, and, if verbatim statements are included, through quotation marks as well. By placing his/her name on work submitted for credit, the student certifies the originality of all work not otherwise identified by appropriate acknowledgments. Plagiarism covers unpublished as well as published sources.

Examples of plagiarism include, but are not limited to: 1. Quoting another person's actual words, complete sentences or paragraphs, or an entire piece of written work without acknowledgment of the source; 2. Using another person's ideas, opinions, or theory, even if it is completely paraphrased in one's own words without acknowledgment of the source; 3. Borrowing facts, statistics, or other illustrative materials that are not clearly common knowledge without acknowledgment of the source; 4. Copying another student's essay test answers; 5. Copying, or allowing another student to copy, a computer file that contains another student's

assignment, and submitting it, in part or in its entirety, as one's own; or 6. Working together on an assignment, sharing the computer files and programs involved, and then submitting individual copies of the assignment as one's own individual work. Students are urged to consult with individual faculty members, academic departments, or recognized handbooks in their field if in doubt regarding issues of plagiarism.

*Fabrication* is the use of invented information or the falsification of research or other findings. Examples include, but are not limited to: 1. Citation of information not taken from the source indicated. This may include the incorrect documentation of secondary source materials; 2. Listing sources in a bibliography not used in the academic exercise; 3. Submission in a paper, thesis, lab report, or other academic exercise of falsified, invented, or fictitious data or evidence, or deliberate and knowing concealment or distortion of the true nature, origin, or function of such data or evidence; or 4. Submitting as your own any academic exercises (e.g., written work, printing, sculpture, etc.) prepared totally or in part by another.

*Cheating* is an act or an attempted act of deception by which a student seeks to misrepresent that he or she has mastered information on an academic exercise that he or she has not mastered. Examples include, but are not limited to: 1. Copying from another student's test paper; 2. Allowing another student to copy from a test paper; 3. Unauthorized use of course textbook or other materials such as a notebook to complete a test or other assignment from the faculty member; 4. Collaborating on a test, quiz, or other project with any other person(s) without authorization. 5. Using or processing specifically prepared materials during a test (e.g., notes, formula lists, notes written on the students clothing, etc.) that are not authorized; or 6. Taking a test for someone else or permitting someone else to take a test for you.

*Academic Misconduct* includes other academically dishonest acts such as tampering with grades or taking part in obtaining or distributing any part of an administered or unadministered test. Examples include, but are not limited to: 1. Stealing, buying, or otherwise obtaining all or part of an administered or unadministered test; 2. Selling or giving away all or part of an administered or unadministered test including questions and/or answers; 3. Bribing any other person to obtain an administered or unadministered test or any information about the test; 4. Entering a building or office for the purpose of changing a grade in a grade book, on a test, or on other work for which a grade is given; 5. Changing, altering, or being an accessory to the changing and/or altering of a grade in a grade book, on a test, a "change of grade" form, or other official academic records of the University that relate to grades; 6. Entering a building or office for the purpose of obtaining an administered or unadministered test; 7. Continuing to work on an examination or project after the specified allotted time has elapsed; 8. Any buying or otherwise acquiring any theme report, term paper, essay, computer software, other written work, and handing it in as your own to fulfill academic requirement; or 9. Any selling, giving, or otherwise supplying to another student for use in fulfilling academic requirements any theme, report, term paper, essay, computer software, or other written work.

**Policy Concerning Hardcopy Submission of Materials:** Unless otherwise indicated, all assignments are to be submitted as either a hardcopy or e-mailed as an electronic submission. All typed hardcopy submissions of any form must be initialed as per instructions provided in class. Personal work is initialed to indicate the item being submitted has been carefully proofread and represents the final (and presumably best) work of the individual. Un-initialed work may be little more than a rough draft or something mistakenly turned in. In CHEN 3600, it is assumed all work represents the students best effort and has been carefully proofread.

Typed assignments submitted in hardcopy form without appropriate initials are unacceptable. Group (team) assignments submitted in hardcopy without each team members initials is also unacceptable. Forgery of initials will be considered to be an act of academic dishonesty.

**Food or Drink:** There is to be no food or drink in the computer laboratory. Any visible food or drink items will be noted and associated with their owner and/or immediately disposed of. Names of students that bring food or drink into the lab will be reported to the Department Chair (and Engineering Network Services), and may result in having their computer accounts disabled.

**Other Policies:** If you have a conflict with Dr. Ashurst's office hours, an alternate time can be arranged. To set up this meeting, please contact Dr. Ashurst by e-mail. Assigned seating may be employed for any quiz or exam. Standard departmental calculator policies are in effect for every quiz and exam. Late assignments of any kind will not be accepted without prior arrangement. Quizzes, homework, lab reports and all other graded material except exams will be available for pick-up in the return boxes outside Ross 136 after grades have been assigned and recorded and an initial attempt for "in class" distribution. You are advised to keep all graded materials in case there is a question about your course grade. Graded in-class assignments and quizzes can be made-up **only for university excused absences**. University excused absences must be resolved within one calendar week after the student returns to class.

Students who need accommodations are asked to arrange a meeting during office hours the first week of classes, or as soon as possible if accommodations are needed immediately. If you have a conflict with the office hours, an alternate time can be arranged. To set up this meeting, please contact Dr. Ashurst by e-mail. If you have not established accommodations through the PSD office, but need accommodations, make an appointment with The Program for Students with Disabilities, 1228 Haley Center, 844-2096 (V/TT).