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# ChE 717 – Chemical Reaction Engineering

Fall 2024; 3 Credit Hours

TuTh 10:15-11:30am, 02232 EB3

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## Instructors

Phillip R. Westmoreland <[prwestmo@ncsu.edu](mailto:prwestmo@ncsu.edu)> - Instructor

Web Page: <http://www.che.ncsu.edu/westmoreland>

Phone: 919-515-7121

Office Location: 2036 EB1

Office Hours: 1:00-2:00pm TuTh or by appointment.

### Graduate Teaching Assistants:

- Mahsa Bagi, [mbagi2@ncsu.edu](mailto:mbagi2@ncsu.edu)
- Arpan Tapdiya, [agtapdiy@ncsu.edu](mailto:agtapdiy@ncsu.edu)
- Ghanesh Kesav, [gvenkat5@ncsu.edu](mailto:gvenkat5@ncsu.edu)

The TAs' duties are to grade homework and exams, to discuss the solutions with you after you have read them, and to discuss any other questions related to the class with you or to refer those to the instructor as needed.

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## Course Description

"Rates and mechanisms of homogeneous and heterogeneous reactions. Design, analysis and scale-up of batch and continuous chemical reactors."

This course is designed for the student to master selected advanced concepts in chemical reaction engineering, including:

1. Chemical reaction kinetics in chemical, material, and biological processes: Mechanisms, rate theories, thermochemistry, and catalysis;
2. Transport effects in reactor design and analysis, including the packed-bed reactor as a case-study motif;
3. Nonisothermal, dynamic, and mixing phenomena and analysis;

On completion of the course, the student will be able to design and analyze a variety of complex reacting systems in diverse areas of chemical and biomolecular engineering.

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## Course Meetings

Class will meet on Tuesdays and Thursdays, consistently with the NCSU Academic Calendar and any imposed cancellations. Class-content details are shown on the Moodle class page. The schedule is subject to change by the instructor or the university. In case of weather-related campus closings, we will normally proceed with class by using Zoom online format.

Class details will be shown and kept updated on the Moodle class page.

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## Textbook

**Textbook:** [Froment](#), [Bischoff](#), and [De Wilde](#), *Chemical Reactor Analysis and Design, 3rd Ed* (Wiley, 2011).

*This textbook is required.*

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## Course Structure

**Class Meetings.** Class will begin punctually at 10:15 am. You are expected to be present by then, whether in person or online.

Complete all reading and other assignments before class begins.

**Homework.** Homework will include (1) study of assigned material in the textbook and other sources and (2) problem solutions, individually prepared and submitted.

Submit your solutions through Moodle prior to the starting time of class, and be prepared to discuss the results in class. Your solutions should be neat, concise, grammatically correct, and careful about significant digits. Sign all homeworks as your honor pledge.

Selected assignments will be graded by the teaching assistants or graders on a zero to 10-point basis. You can discuss questions about grading with them, and the instructor will resolve any questions that remain concerning the homework after your discussion with the teaching assistant.

**Quizzes.** Some quizzes will be assigned and included in the homework grade average. Some will be electronically administered using Moodle, while others will be on paper.

**Exams.** We will have two in-semester exams. A final exam time is scheduled by the university in our regular classroom. Our final exam will be cumulative, emphasizing the last part of the class.

Exams may have closed-book sections. For open-book sections, you can have computer access (but no communications), printed notes, books, etc. I recommend that you focus on making a summary sheet. Full credit requires a complete and quantitatively correct solution. Sign all exams as your honor pledge.

**Field trips.** Non-scheduled class time for field trips or out-of-class activities is NOT required for this class. If any occur, this course will not require students to provide their own transportation.

## Other Course Policies

No eating, drinking, or phoning is allowed in the classroom. Really. Cell phone sounds should be turned off. If you must open your laptop or tablet during class, use it only for class purposes -- you know how easily you can be distracted by it, but you may not realize how much it distracts people beside or around you.

**What to expect from me.** My primary goal is to provide the opportunity and environment for your highest quality education and discovery. I will be courteous, respectful, and punctual, and well organized and prepared for the lectures. I will answer questions promptly and in a positive tone. I will make myself available to meet you outside of class time as needed, and I will respond promptly when you indicate your desire to meet me. I will inform you ahead of time regarding my plans for travel or time out of the office and will provide a suitable alternate class format when needed. I will also commit to a grading process that is fair, uniform and consistent. I will also listen carefully and give attention to your comments and suggestions for improving the class or overall learning environment.

**What I expect from you.** I expect you to display professional, ethical, equitable, and inclusive behavior at all times, and you should expect it of yourself. You should be respectful of your classmates and of me, and you should support respectful, professional behavior while discouraging unprofessional behaviors. You have in common that you all are elite intellectually and in terms of your achievement. At the same time, you should value that you are a very diverse group with a rich range of experiences and insights to contribute to the class and each other.

## Safety & Risk Assumptions

You need to be conscious of personal safety even in a classroom. Know where the emergency exits are. Exit in orderly fashion if necessary, and gather together in the Oval between outside EB3.

## Grading

### Grade Components

| Component        | Weight | Details  |
|------------------|--------|--|
| Homework/quizzes | 10%    | Electronic quizzes may be given in class or as homework. |
| Exams            | 30%    | Exam 1   |
|                  | 30%    | Exam 2   |
|                  | 30%    | Final Exam   |

## Letter Grades

Raw grade averages will be curved and translated to Standard NCSU Letter Grading:

97 ≤ A+ ≤ 100

93 ≤ A < 97

90 ≤ A- < 93

87 ≤ B+ < 90

83 ≤ B < 87

80 ≤ B- < 83

77 ≤ C+ < 80

73 ≤ C < 77

70 ≤ C- < 73

67 ≤ D+ < 70

63 ≤ D < 67

60 ≤ **D-** < 63

0 ≤ **F** < 60

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## Requirements for Credit-Only (S/U) Grading

In order to receive a grade of S, students are required to take all exams and quizzes, complete all assignments, and earn a grade of C- or better. Conversion from letter grading to credit only (S/U) grading is subject to university deadlines. Refer to the Registration and Records calendar for deadlines related to grading. For more details refer to <http://policies.ncsu.edu/regulation/reg-02-20-15>.

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## Requirements for Auditors (AU)

Information about and requirements for auditing a course can be found at <http://policies.ncsu.edu/regulation/reg-02-20-04>.

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## Policies on Incomplete Grades

If an extended deadline is not authorized by the instructor or department, an unfinished incomplete grade will automatically change to an F after either (a) the end of the next regular semester in which the student is enrolled (not including summer sessions), or (b) the end of 12 months if the student is not enrolled, whichever is shorter. Incompletes that change to F will count as an attempted course on transcripts. The burden of fulfilling an incomplete grade is the responsibility of the student. The university policy on incomplete grades is located at <http://policies.ncsu.edu/regulation/reg-02-50-3>.

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## Late Assignments

If you cannot submit a solution on time, submit it as soon as possible after the due date through Moodle. Late submissions will be accepted only if work on grading the other solutions has not progressed significantly. In other words, there are no guarantees that late solutions will be accepted, but we will accommodate these when and if we can. Should you encounter an extenuating circumstance that prevents you from the timely submission of your work, consult with Professor Westmoreland as soon as possible to make another arrangement.

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## Attendance Policy

Attendance and participation at all lectures is crucial to your success and is expected. Be early for class and settle in by 10:10am. Late arrivals are disruptive, whether in-person or online.

For any Sec 001 classes held online, I will pick three people per class meeting to represent the class and participate by video.

For complete university attendance and excused-absence policies, please see <http://policies.ncsu.edu/regulation/reg-02-20-03>

If you know you will miss a class for a legitimate reason, you need to inform me beforehand as to why you will be missing; email is fine.

Makeup work is by arrangement with the instructor or the TAs.

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## Academic Integrity

Students are required to comply with the university policy on academic integrity found in the Code of Student Conduct found at <http://policies.ncsu.edu/policy/pol-11-35-01>, the Pack Pledge, as well as the statement that "Violations of academic integrity will be handled in accordance with the Student Discipline Procedures (NCSU REG 11.35.02)."

If you should misrepresent someone else's work as your own, that is a violation of academic honesty. No sharing of files is allowed. If you share your own work with someone else in a way that they can submit it as their own, that is a violation of academic honesty. (In contrast, sharing your **understanding** in class and while working on homework is at the heart of education.)

If you are found to be in violation, University procedures will come into play and you will receive a zero for the assignment or exam. If two violations occur, you will automatically fail the course.

Confidence in your integrity is a key criterion for anyone who works with you, in the university and outside it. No talking or communication is allowed with anyone except the instructor and the TAs during the completion of tests or quizzes. For homework assignments, you are strongly encouraged to work with your classmates in study groups, always being sure to carry out your own work so you can learn from the experience.

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## Honor Pledge

You must indicate "I have neither given nor received unauthorized aid on this test or assignment" by signing every test or assignment.

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## Digital Course Components

Students may be required to disclose personally identifiable information to other students in the course, via digital tools, such as email or web-postings, where relevant to the course. Examples include online discussions of class topics, and posting of student coursework. All students are expected to respect the privacy of each other by not sharing or using such information outside the course.

**Digital Course Components:** Class meetings will be recorded on Panopto for current and future educational purposes. By your participation in this recorded course, you are providing your permission to be recorded.

We will use Moodle forums for online discussions, and you will submit problem-set assignments electronically.

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## Accommodations for Disabilities

Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with the Disability Resource Office at Holmes Hall, Suite 304, Campus Box 7509, 919-515-7653. For more information on NC State's policy on working with students with disabilities, please see the Academic Accommodations for Students with Disabilities Regulation (REG02.20.01) (<https://policies.ncsu.edu/regulation/reg-02-20-01/>).

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## Non-Discrimination Policy

NC State provides equal opportunity and affirmative action efforts, and prohibits all forms of unlawful discrimination, harassment, and retaliation ("Prohibited Conduct") that are based upon a person's race, color, religion, sex (including pregnancy), national origin, age (40 or older), disability, gender identity, genetic information, sexual orientation, or veteran status (individually and collectively, "Protected Status"). Additional information as to each Protected Status is included in NCSU REG 04.25.02 (Discrimination, Harassment and Retaliation Complaint Procedure). NC State's policies and regulations covering discrimination, harassment, and retaliation may be accessed at <http://policies.ncsu.edu/policy/pol-04-25-05> or <https://oied.ncsu.edu/divweb/>. Any person who feels that he or she has been the subject of prohibited discrimination, harassment, or retaliation should contact the Office for Equal Opportunity (OEO) at 919-515-3148.

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## Supporting Fellow Students in Distress

Rudyard Kipling: "For the strength of the Pack is the Wolf, and the strength of the Wolf is the Pack."

As members of the NC State Wolfpack community, we each share a personal responsibility to express concern for one another and to ensure that this classroom and the campus as a whole remains a safe environment for learning. Occasionally, you may come across a fellow classmate whose personal behavior concerns or worries you.

When this is the case, I would encourage you to report this behavior to the NC State Students of Concern website: <http://studentsofconcern.ncsu.edu/>. Although you can report anonymously, it is preferred that you share your contact information so they can follow up with you personally.

Last modified: Saturday, August 17, 2024, 4:45 PM

### ◀ Announcements

Jump to...

[Overview of planned course schedule ▶](#)