ChE365 – Chemical Engineering Computing
Fall 2025
Otto H. York Department of Chemical & Materials Engineering
New Jersey Institute of Technology

Course Schedule: Wednesdays 6:00 PM - 10:05 PM at Tiernan 411
Zoom/Office Hours: Wednesday 4:00-5:00 PM. Other times by appointment. Note, you *must* let me know ahead of time if you plan on joining an online session, otherwise I won't be expecting you.
Instructor: Dr. Roman Voronov, Associate Professor
Instructor Contact: Tiernan Hall 378, 1.973.642.4762 (voicemail=slow), rvoronov@njit.edu (fast). Please include the course number and problem number your question is about in the subject of your email. Note, please avoid sending internal messages through 3rd party platforms like Moodle or Canvas.
Instructor Webpage: http://chemicaleng.njit.edu/people/rvoronov.php

Join the Department's Linked in Profile and Group for networking opportunities:
https://www.linkedin.com/in/njitcme/
https://www.linkedin.com/groups/8907579/

Teaching Assistant: Haq, Muhtasim <mah239@njit.edu>

Please add ChE365 in the subject of your emails

Catalog Description: https://catalog.njit.edu/search/?P=CHE%20365

Specific goals for the course

a. The student will be able to

1. Master basic programming proficiency
2. Describe and interpret error and convergence
3. Solve Root searching problems using Bracketing and Open Methods, while assessing the trade-offs between them
4. Apply Optimization methods in order to search for maxima or minima of a function.
5. Represent and solve a system of linear equations in matrix form
6. Fit data using Linear Regression
7. Interpolate Numerically using Newton and Lagrangian Interpolating Polynomials
8. Integrate functions Numerically
9. Differentiate functions Numerically
10. Solve Ordinary Differential Equations Numerically

11. Utilize advanced engineering software packages

12. Work on group exercises and apply a range of numerical methods to evaluate solutions to chemical engineering problems

13. Self-acquire Advanced Engineering Software Skills

14. Communicate Project Results in a Technical Writing Report Format

b. This course explicitly addresses the following student ABET outcomes: 1, 3, 5, 7

Textbooks:
1) Applied Numerical Methods with MATLAB for Engineers and Scientists / Edition 5 by Steven Chapra. ISBN10: 126416260X | ISBN13: 9781264162604. Alternatively, you may be able to get away with using the cheaper international or older editions, at your own risk. https://www.mheducation.com/highered/product/applied-numerical-methods-matlab-engineers-scientists-chapra/M9781264162604.html Or, you may optionally purchase the electronic version of this book.

Recommended/Alternative Resources
1) free MATLAB textbook (see video description) about numerical methods in chemical engineering with supporting YouTube lecture videos: https://www.youtube.com/watch?v=OUPgLw56-p0&list=PLRihodfxzBsVb_xaas2pufgNCxt8oOjSs

2) You already have the electronic copy of this book through NJIT libraries, so do NOT need to buy the hard copy (unless you really want to). Introduction to Chemical Engineering Computing 2nd Edition by Bruce A. Finlayson. ISBN-13: 978-1118888315; ISBN-10: 1118888316.

3) Numerical Methods for Chemical Engineers Using Excel, VBA, and MATLAB by Victor J. Law. ISBN-13: 9781466575349; 2) Numerical Methods for Engineers - 7th edition ISBN13: 9780073397924; ISBN10: 007339792X

4) Website with lots of Matlab examples: http://matlab.cheme.cmu.edu/

Required Software: Latest versions of **Matlab (must be installed prior to the first-class period!)**, COMSOL, MS Office, Adobe Reader (all can be downloaded from NJIT IST webpage). Student Mall labs and ChE department PC lab have most of the software. Please see Highlander Pipeline for Matlab tutorial and example programs.

Mathworks Grader: Students are required to create a free account at https://grader.mathworks.com/ and register for the Che365 course there.

Grading (curved at the end of the course, if needed):
HOMEWORK (HW) — 5%
QUIZES – 15%
PROJECT — 10%
LABS:

#	GROUP CONTRIBUTION	INDIVIDUAL CONTRIBUTION
1	4.50%	0.50%
2	4.00%	1.00%
3	3.50%	1.50%
4	3.00%	2.00%
5	2.50%	2.50%
6	**0.00%**	**7.50%**
7	2.00%	3.00%
8	1.50%	3.50%
9	1.00%	4.00%
10	0.50%	4.50%
11	0.25%	4.75%
12	**0.00%**	**12.50%**

Grade Cut-offs

Percent	Grades
>= 90%	A
>= 85%	B+
>= 80%	B
>= 75%	C+
>= 70%	C
>= 60%	D
< 60%	F

Important University Dates (Add/Drop/Refund/Last Day to Withdraw/Recess/Finals):
http://www.njit.edu/registrar/calendars/
http://www.njit.edu/registrar/exams/finalexams.php

A VERY *ROUGH* AND *PRELIMINARY* SCHEDULE FOR THE SEMESTER:

Class #-Date	Computing Method	LAB #
1-Sep 3	INTRO TO COMPUTERS & CHE MODELING	x
2-Sept 10	CH 2-3: CHE COMPUTING FUNDAMENTALS	x
3-Sept 17	CH 4: ROUND OFF AND TRUNCATION ERRORS, CONVERGENCE	1
4-Sept 24	CH 5: ROOTS BRACKETTING METHODS	2
5-Oct 1	CH 6: ROOTS OPEN METHODS	3
6-Oct 8	CH 7: OPTIMIZATION	4
7-Oct 15	CH8-9: LINEAR SYSTEMS	5
8-Oct 22	MIDTERM	6
9- Oct 29	CH14: CURVE FITTING	7
10-Nov 5	CH17: INTERPOLATION **(AICHE Conference Travel)**	8
11-Nov 12	CH 19-20: NUMERICAL INTEGRATION	9
12-Nov 19	ADVANCED SOFTWARE / PROJECTS (**SELECTBIO Conference Travel**)	x
13-Nov 26	Friday Classes Meet (No Class!)	x
14-Dec 3	CH 21: NUMERICAL DIFFERENTIATION	10

15-Dec 10	CH 22: ORDINARY DIFFERENTIAL EQUATIONS – INITIAL VALUE PROBLEMS	11
17-Dec 17	*LIKELY* FINAL EXAM DATE	

Course Policies and Expectations

Academic Integrity and Honor Code

Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the Academic Integrity policy that is found at: NJIT Academic Integrity Code.
It is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing, or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university.
The NJIT Honor Code is upheld on all issues related to the course. Students are expected to be familiar with the code and conduct themselves accordingly. Any violations will be referred immediately to the Dean of Students.

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Generative AI Policy

This course expects students to work without the use of generative AI tools (e.g., ChatGPT, Copilot, Bard, Claude, etc.) in order to develop their own programming and problem-solving skills. AI usage is prohibited under all circumstances, unless explicitly authorized in writing by the instructor for a specific assignment. Unauthorized use of AI will be treated as an academic integrity violation.
Students may not come to class with AI-generated notes, AI-generated code, or pre-written code of any kind. All code must be developed in class during the lab or exam.

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Religious Observances

Students observing religious holidays that conflict with class requirements must notify the instructor in writing by the end of the second week of class and no later than two weeks before the anticipated absence. Reasonable accommodations will be provided so that students can complete missed assignments, quizzes, labs, or exams. Students will not be penalized for properly documented observances, and confidentiality will be maintained.

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Homework, Exams, and Assignments

- Homework and exams will be assigned through Canvas (https://canvas.njit.edu/). Please check Canvas and your email often for assignments, quizzes, solutions, and announcements.
- Homework must be physically submitted to the TA in class on the due date. If it is not turned in to the TA, the grade is zero. The online version of homework is for practice only and carries no credit.
- Absolutely no late work is accepted unless explicitly stated otherwise.
- Your grade is based on the best attempt submitted before the deadline. Canvas may display later attempts, but only on-time grades count.
- Submitted code must run without errors to receive partial credit.
- Even though homework is assigned through Canvas, students must still bring a hard copy of their solutions to class and show them to the TA for credit.
- When writing code, you may not “simplify” your assignment if your input data happens to fall within a single case. Code must be general enough to handle all possible inputs.

- If cheat sheets are permitted, they must be handwritten (not typed or photocopied). They cannot contain computer code or homework solutions.
- Students may not use course materials from previous semesters — even their own from when they previously took this course. Doing so constitutes cheating.
- Students may not share course materials externally (Chegg, CourseHero, GitHub, Google Drive, etc.), even after course completion.

Grading and Grade Boundaries

- Letter grades are assigned automatically by Excel, and are final without negotiation.
- There may be a gray area between grade categories. If you fall on a border, whether you receive the higher or lower grade depends on whether your performance has been improving or declining over time and on your class participation.
- Group contribution grades in labs may depend on peer evaluations.

Attendance and Participation

- Students must be present in class to receive credit for quizzes, labs, assignments, or tests.
- Experience shows that students who do not attend regularly perform poorly.
- Lecture examples may not be posted online; you are responsible for all material covered in class.
- Active learning environment: Labs are interactive assignments during class. Participation counts toward your grade.
  - In group format, discussion is limited to groupmates.
  - In individual format, you may only ask the TA or instructor.
  - Labs may be computer-based or paper-based (e.g., write/debug code on paper without computer access).
- A portion of your group lab grade depends on how your groupmates grade your contribution. Groups are determined by the instructor.

Exams, Proctoring, and Device Policy

- All exams and assignments may be monitored via Zoom proctoring. Students may not leave the Zoom session intentionally during an exam or lab. Doing so constitutes cheating.
- If a student is disconnected from Zoom due to a crash or technical issue, they must immediately stop all work and notify the instructor before resuming. Otherwise, it is cheating.
- Students must share their screen on Zoom during proctoring and may not stop sharing or obscure any part of their screen (e.g., covering with windows or boxes). Attempts to hide windows or quick-switch to AI/code resources are considered cheating.
- Phones may be collected during in-class assignments and exams.
- Students may not use secondary communication devices (second phones, smartwatches, tablets, etc.) at any time. Leaving the classroom (e.g., to the bathroom) to access such devices is cheating.
- Students may not come to class with pre-written code, whether typed, handwritten, or saved on a device or cloud service. All code must be written during the assignment or exam in class.
- Students may not talk or text on phones during individual assignments (quizzes, labs, or exams), even if they finish early.

Lab Completion and Leaving Early

- Students who finish a lab and wish to leave early must show the Matlab Grader submission screen with the grade received. That displayed grade will be their final grade. If they show nothing, the grade is zero.

- Once checked out, students may not communicate with classmates who are still working (e.g., sending them solutions).
- Students may not leave the classroom for the bathroom without permission. Only one student may be out at a time; others must wait.

Canvas Quizzes

- If a student finishes quizzes early, they may not open email or unrelated windows on their computer.
- To gain permission to leave or use their computer for other purposes, they must first show the instructor that all quiz attempts are completed and display the grades received.

Location and Monitoring Requirement

- Students must be physically present in class (or in the live monitored Zoom session) to receive credit for any quiz, lab, or exam.
- Working remotely, unmonitored, while the assignment window is open is considered cheating and results in an automatic zero.

Make-Up Sessions and Extenuating Circumstances

- If classes are canceled due to weather, make-up sessions will be scheduled on a Saturday (TBA).
- Students will receive a zero for missed quizzes, labs, or exams unless there is an officially documented excuse from the Dean of Students.
- Instructors may not accept medical or personal documentation directly; all documents must go through the Dean of Students Office.

Class Conduct

- Online synchronous sessions require webcams ON at all times. Recording is prohibited. Virtual backgrounds are allowed if non offensive.
- Cell phones must be off during class unless specifically permitted. Laptops/tablets are allowed only for course work.
- Seating charts may be assigned at the instructor's discretion.
- Eating and drinking in class are subject to the instructor's approval.

Authority on Course Policies

Only the instructor may set or modify course policies. Statements made by TAs, classmates, or others do not override the syllabus or instructor's instructions. Students are responsible for following the policies in this syllabus and direct communications from the instructor.

Office Hours

Office hours are your opportunity to ask questions, address language or comprehension issues, and discuss your performance. Attending office hours shows commitment and positively affects evaluation. Do not wait until the end of the semester.

Verification of Presence

Students must complete the Verification of Presence/Academic Engagement assignment in Canvas during the first week of class. Failure to complete this check-in may affect enrollment status and financial aid.

Disability Support Services

Students requiring accommodations should contact the Associate Director of Disability Support Services, Fenster Hall Room 260. A Letter of Accommodation Eligibility must be presented to the instructor.

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Final Notes

- Extra credit may be assigned at the instructor's discretion, but no additional assignments will be offered after the semester ends.
- Students may not leave lab early without checking out with the TA. Leaving without checkout will result in loss of credit and may trigger a cheating investigation.
- Students are responsible for all course material whether or not it is posted online.
- Most important: Have fun while learning!

Most important: Have lots of fun!