

Fall 2019

# CHE 626-101: Mathematical Models in Chemical Engineering

Sagnik Basuray

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## **CHE 626 – Mathematical Methods in Chemical Engineering**

**Fall Semester 2019**

### **1. Logistics**

***Instructor:***

Dr. Sagnik Basuray, 361 Tiernan Hall  
sagnik.basuray@njit.edu

***Class Time:*** Thursday: 6:00 PM – 9:05 PM

***Class Location:*** ECEC 115

***Office Hours:*** Tuesday: 5:00 PM – 6:00 PM, appointments by email

***Text:*** Handouts, and presentations will be available on Canvas

***Communication:*** A canvas website for the course will provide information as and when required. Other than normal office hours, you can meet me anytime by appointment.

***Reference Books:*** Applied Partial Differential Equations with Fourier Series and Boundary Value Problems, 5<sup>th</sup> edition by Richard Haberman,

### **2. Course Information**

***Course Description:*** The purpose of this course is to develop mathematical skills specific to the types of problems encountered in engineering, specifically chemical engineering. The course will concentrate on both the specifics of the mathematical techniques and the practice of developing mathematical models from physical systems. The course will emphasize on the following: ordinary differential equations, Sturm-Liouville problems arising from partial differential equations, Perturbation approaches to some nonlinear systems of chemical engineering interests, use of Laplace transforms especially the Residue Theorem for inversions and some numerical methods. Techniques covered will include mathematical modeling, scaling, dimensional analysis, regular and singular perturbations, multiple scales, asymptotic analysis, stability analysis.

***Tentative list of Topics to be covered:***

Concept of differential equations

- First order differential equations
- Linear second order differential equations
- Sturm-Liouville problems
- Fourier Series and integrals
- Partial differential equations and applications
- Applications of concepts include mathematical modeling, scaling, dimensional analysis.
- Regular and singular perturbations

### **3. Course Policies**

***GRADING***

Mid-Terms: 50% (2 midterms with each worth 25 %) (Open Notes, Homework and material handed out in class)

Final Exam: 40% (Open Notes, Homework and material handed out in class)

Project: 10%

Homework Policy: Mandatory completion and submission to the instructor at the beginning of the next class but no marks is assigned to the homework. Negative marking of -1 will be given to anyone not submitting the homework

***FINAL PROJECT:*** Will be announced in class

### ***Statement of Academic Integrity***

*Academic integrity is fundamental to the activities and principles of a university. All members of the academic community must be confident that each person's work has been responsibly and honorably acquired, developed, and presented. Any effort to gain an advantage not given to all students is dishonest whether or not the effort is successful. The academic community regards breaches of the academic integrity rules as extremely serious matters. Sanctions for such a violation may include academic sanctions from the instructor, including failing the course for any violation, to disciplinary sanctions ranging from probation to expulsion. When in doubt about plagiarism, paraphrasing, quoting, collaboration, or any other form of cheating, consult the course instructor.*

### **4. Plagiarism and Academic Integrity**

The approved “[University Code of Academic Integrity](#)” is currently in effect for all courses. Should a student fail a course due to a violation of academic integrity, they will be assigned the grade of “XF” rather than the “F,” and this designation will remain permanently on their transcript.

All students are encouraged to look at the [University Code of Academic Integrity](#) and understand this document. Students are expected to uphold the integrity of this institution by reporting any violation of academic integrity to the [Office of the Dean of Students](#).

The identity of the student filing the report will be kept anonymous. NJIT will continue to educate top tier students that are academically sound and are self-disciplined to uphold expected standards of professional integrity. ***Academic dishonesty will not be tolerated at this institution.***

### **5. Student Disability Services**

NJIT is committed to providing students with documented disabilities equal access to programs and activities. If you have, or believe that you may have, a physical, medical, psychological, or learning disability that may require accommodations, please contact Student Disability Services. Information on the self-identification, documentation and accommodation process can be found on the web page at <http://www.njit.edu/counseling/services/disabilities.php>.

### **6. Getting Help - General**

The IST Helpdesk is the central hub for all information related to computing technologies at NJIT. This includes being the first point of contact for those with computing questions or problems.

There are three ways to contact the Helpdesk:

1. Call 973-596-2900, Monday - Friday 8 am - 7 pm.
2. Go to Student Mall Room 48. Monday - Friday 8 am - 7 pm
3. Log a Help Desk Service Request online – <https://ist.njit.edu/support/contactus.php>.

### **7. Getting Help - Canvas**

In addition to the Helpdesk, NJIT has a number of resources available to help you learn/use Canvas. All can be found in the Canvas guides located at <https://community.canvaslms.com/community/answers/guides/>