

MATH 671: Asymptotic Methods I

Fall 2025 Course Syllabus

NJIT Academic Integrity 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 code of integrity policy that is found at: NJIT Academic Integrity Code.

Please note that 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. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu

COURSE INFORMATION

Course Description: Asymptotic sequences and series. Use of asymptotic series. Regular and singular perturbation methods. Asymptotic methods for the solution of ODEs, including: boundary layer methods and asymptotic matching, multiple scales, the method of averaging, and WKB theory. Asymptotic expansion of integrals, including Watson's lemma, stationary phase, Laplace's method, and the method of steepest descent

Number of Credits: 3

Prerequisites: [Math 645](#) or [Math 545](#), and [Math 656](#)

Course-Section and Instructors:

Course-Section	Instructor
Math 671-001	Professor M. Booty

Office Hours for All Math Instructors: [Fall 2025 Office Hours and Emails](#)

Required Textbook: There is no required textbook. A list of reference texts will be given for different topics during the course.

University-wide Withdrawal Date: The last day to withdraw with a W is **Monday, November 10, 2025**. It will be strictly enforced.

POLICIES

DMS Course Policies: All DMS students must familiarize themselves with, and adhere to, the [Department of Mathematical Sciences Course Policies](#), in addition to official [university-wide policies](#). DMS takes these policies very seriously and enforces them strictly.

Grading Policy: The final grade in this course will be determined as follows:

Hand-in Homework	70%
Final Cumulative Exam	30%

Your final letter grade will be based on the following tentative curve.

A	88 - 100	C	62 - 67
B+	82 - 87	D	55 - 61
B	75 - 81	F	0 - 54
C+	68 - 74		

Attendance Policy: Attendance at all classes will be recorded and is **mandatory**. Please make sure you read and fully understand the [Math Department's Attendance Policy](#). This policy will be strictly enforced.

Religious Observance: NJIT is committed to supporting students observing religious holidays. Students must notify their instructors in writing of any conflicts between course requirements and religious observances, ideally by the end of the second week of classes and no later than two weeks before the anticipated absence.

Homework: Homework will be assigned and collected throughout the semester. There will be a cumulative final exam, but homework examples will be set in lieu of a midterm. Clear explanations are expected in all submitted work.

Exams: There will be a final exam during the final exam week, with format that is yet to be determined.

Final Exam Period	December 14 - 20, 2025
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Make sure you read and fully understand the [Math Department's Examination Policy](#). This policy will be strictly enforced.

Makeup Exam Policy: There will be **NO MAKE-UP QUIZZES OR EXAMS** during the semester. In the event an exam is not taken under rare circumstances where the student has a legitimate reason for missing the exam, the student should contact the Dean of Students office and present written verifiable proof of the reason for missing the exam, e.g., a doctor's note, police report, court notice, etc. clearly stating the date AND time of the mitigating problem. The student must also notify the Math Department Office/Instructor that the exam will be missed.

Cellular Phones: All cellular phones and other electronic devices must be switched off during all class times.

ADDITIONAL RESOURCES

Further Assistance: For further questions, students should contact their instructor. All instructors have regular office hours during the week. These office hours are listed on the Math Department's webpage for [Instructor Office Hours and Emails](#).

Accommodation of Disabilities: Disability Support Services (DSS) offers long term and temporary accommodations for undergraduate, graduate and visiting students at NJIT.

If you are in need of accommodations due to a disability please contact Chantonette Lyles, Associate Director of Disability Support Services at **973-596-5417** or via email at lyles@njit.edu. The office is located in Kupfrian Hall, Room 201. A Letter of Accommodation Eligibility from the Disability Support Services office authorizing your accommodations will be required.

For further information regarding self identification, the submission of medical documentation and additional support services provided please visit the Disability Support Services (DSS) website at:

<https://www.njit.edu/studentsuccess/accessibility/>

Important Dates (See: [Fall 2025 Academic Calendar, Registrar](#))

Date	Day	Event
September 1, 2025	Monday	Labor Day
September 2, 2025	Tuesday	First Day of Classes
September 8, 2025	Monday	Last Day to Add/Drop Classes
November 10, 2025	Monday	Last Day to Withdraw
November 25, 2025	Tuesday	Thursday Classes Meet
November 26, 2025	Wednesday	Friday Classes Meet
November 27 to November 30, 2025	Thursday to Sunday	Thanksgiving Recess - Closed
December 11, 2025	Thursday	Last Day of Classes
December 12, 2025	Friday	Reading Day 1
December 13, 2025	Saturday	Saturday Classes Meet
December 14 to December 20, 2025	Sunday to Saturday	Final Exam Period

Course Outline

Week #	Subject Topic
1-2	<i>Asymptotic sequences and representation vs. convergent series. Definitions, notation, and examples.</i>
3-5	<i>Asymptotic expansion of integrals: Watson's lemma and Laplace's method; method of steepest descent; stationary phase. Rigorous results and examples.</i>

6-7	<i>The Liouville-Green (or WKB) approximation for solution of linear second order ODEs with large parameter or large x. Examples.</i>
8-10	<i>Perturbation of algebraic equations. Regular vs. singular perturbation. Boundary layer solution of ODEs and matched asymptotic expansions. Uniform approximation and the WKB method. Examples.</i>
11-13	<i>The method of multiple scales for approximate solution of weakly nonlinear ODEs. Comparison with other methods. Examples.</i>
14	<i>Additional topics and further examples.</i>

*Updated by Professor M. Booty - 2025
 Department of Mathematical Sciences Course Syllabus, Fall 2025*