

MATH 451-H02: Methods of Applied Mathematics II (Capstone II) *Spring 2019 Course Syllabus*

NJIT Academic Integrity Code: All Students should be aware that the Department of Mathematical Sciences takes the University Code on Academic Integrity at NJIT very seriously and enforces it strictly. This means that there must not be any forms of plagiarism, i.e., copying of homework, class projects, or lab assignments, or any form of cheating in quizzes and exams. Under the University Code on Academic Integrity, students are obligated to report any such activities to the Instructor.

COURSE INFORMATION

Course Description: Combines mathematical modeling with physical and computational experiments conducted in the Undergraduate Mathematics Computing Laboratory. Effective From: Spring 2009.

Number of Credits: 3

Prerequisites: Math 331 with a grade of C or better, Math 337 with a grade of C or better, and Math 340 with a grade of C or better.

Course-Section and Instructors

Course-Section	Instructor
Math 451-H02	Professor M. Siegel

Office Hours for All Math Instructors: [Spring 2019 Office Hours and Emails](#)

Course Materials: PDF files will be uploaded on Moodle.

University-wide Withdrawal Date: The last day to withdraw with a W is **Monday, April 8, 2019**. 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:

Projects and Class Participation	70%
Final Report and Presentation	30%

Exam: There will be one comprehensive final exam. Exams are held on the following days:

Projects: Projects will be given from solving the system of equations and numerical integrations using matlab to solving the Navier-Stokes equations using computational fluid dynamics (CFD) solvers.

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.

Makeup Exam Policy: To properly report their absence during a midterm or final exam, please review the required steps under the DMS Examination Policy found here:

- http://math.njit.edu/students/policies_exam.php

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

ADDITIONAL RESOURCES

Math Tutoring Center: Located in the Central King Building, Lower Level, Rm. G11 (See: **Spring 2019 Hours**)

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**.

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

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 Fenster Hall Room 260. 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:

- <http://www5.njit.edu/studentssuccess/disability-support-services/>

Important Dates (See: **Spring 2019 Academic Calendar, Registrar**)

Date	Day	Event
January 22, 2019	T	First Day of Classes
February 1, 2019	F	Last Day to Add/Drop Classes
March 17 - 24, 2019	Su - Su	Spring Recess - No Classes, NJIT Open
April 8, 2019	M	Last Day to Withdraw
April 19, 2019	F	Good Friday - No Classes, NJIT Closed
May 7, 2019	T	Friday Classes Meet/ Last Day of Classes
May 8 & 9, 2019	W & R	Reading Days
May 10 - 16, 2019	F - R	Final Exam Period

Course Outline

Week	Topic
Week 1-2	Dynamics and stability of ultra-thin liquid films driven by intermolecular forces.
Week 2-3	van der Waals molecular forces: rupture and dewetting of ultra-thin liquid films. Experiments, modeling and simulations.
Week 3-4	Contact line dynamics: contact angle, numerical simulations of ultra-thin liquid films when including the contact angle.
Week 5-6	Ultra-thin liquid bilayer films: dewetting of metallic thin films to produce fully alloyed Ag/Au nanoparticles. The two-phase flow model for the dewetting of metallic bilayer films.
Week 7-8	Numerical simulation of the dewetting of Ag/Au metallic thin films; investigating the role of individual layer thickness and lateral and vertical stacking sequence.
Week 9-10	Studying the size and compositional distribution of the Ag/Au nanoparticles.
Week 10-12	Comparison of the computational results with experimental observations and measurements.
Week 12-13	Thermal effects: dependence of the viscosity and surface tension on the temperature.
Week 13	Preparing the final report and presentations.

*Updated by Professor M. Siegel - 1/21/2019
Department of Mathematical Sciences Course Syllabus, Spring 2019*
