



**John A. Reif, Jr. Department of Civil & Environmental Engineering**

**Resilient Systems Planning and Design**  
(Thursdays from 6:00 PM to 8:50 PM)

**Course Description:**

This course provides students and practitioners with an overview of resilient systems planning and design with a focus on floodproofing. This course reviews conventional responses to disasters and floods, the limitations of traditional resilience approaches, and recent developments in floodproofing solutions according to the requirements and recommendations provided by the FEMA (Federal Emergency Management Agency) and ASCE (American Society of Civil Engineers). The course further discusses the impacts of disasters on infrastructures, communities, and economies as well as presents contemporary considerations in resilience risk management, planning, and design. The course also examines how to assess, measure, model, and quantify resilience. Case studies of critical infrastructure resilience, floodproofing, and other natural disaster-related events, impacts, and strategies are discussed in this course.

**Course Pre-requisites:**

Graduate standing and basic knowledge of probability and statistics.

**Course Lecture Hours and Credits:**

This is a three-lecture hours and three-credits course.

**Course Learning Outcomes:**

The learning outcomes include:

1. Develop an understanding of resilient systems and the associated planning and design considerations and how they apply to flood risk
2. Describe and assess the resilience of infrastructure systems and communities
3. Conceptualize and apply the main principles of flood risk management
4. Understand the different types of floodproofing systems and their design and construction requirements
5. Recognize the emerging developments and the future of resilient systems and flooding planning and design

**Course Instructor:**

Rayan H. Assaad, PhD, A.M.ASCE (Website: <https://sciis.njit.edu>)

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Office Hours: Thursdays 4:00 PM to 5:30 PM or by e-mail or appointment. Feel free to stop by my office at any time of your convenience. I will try to meet you immediately unless I have a conflicting scheduled meeting or a very pressing deadline.

### **Course Textbooks:**

There is no required textbook for this course. However, the following book is recommended:

- FEMA P-259 (2012). "[Engineering Principles and Practices for Retrofitting Flood-Prone Residential Structures](#)" (Third Edition).

### **Other References and Reading Material:**

Additional references and reading material (such as ASCE and FEMA resources) might be provided to enhance the understanding of the course's material, the covered topics, and the discussed concepts.

### **Canvas and Technology Requirement:**

All course materials will be available on Canvas. It is the student's responsibility to check the course page on Canvas regularly. Students are expected to have a working computer to participate in this course. It is highly recommended that students bring their personal computer (i.e., laptop) to the class. If you do not have a computer, please contact the Dean of Students or Library.

### **Course Requirements:**

- Assignments: Each student will be requested to submit four (4) assignments. All due dates are already noted in the below course schedule.
- Midterm: Each student is expected to take one (1) in-class midterm scheduled during class time as noted in the below course schedule.
- Presentation: Each student is expected to present one project/presentation. All due dates are already noted in the below course schedule.

### **Course Grade Breakdown:**

Homework	35%
Mid-Term (In-Class)	35%
Student Project/Presentation	30%

### **Course Grading:**

Cumulative points in all course requirements will be rounded to the next highest whole number (for example 84.1 will be rounded to 85 and 95.7 will be rounded to 96). Afterwards, the student's final grade will be determined according to the following scale:

≥90	A
≥85 and ≤89	B <sup>+</sup>
≥80 and ≤84	B
≥75 and ≤79	C <sup>+</sup>
≥70 and ≤74	C
<70	F

### **Withdrawals:**

To ensure consistency and fairness in application of the NJIT policy on withdrawals, student requests for withdrawals after the deadline will not be permitted unless extenuating circumstances (e.g., major family emergency or substantial medical difficulty) are documented. The course Professors and the Dean of Students are the principal points of contact for students considering withdrawals.

### **Course Specific Policies:**

- Eating and use of cell phones are strictly prohibited during class time.
- Professional conduct in all matters related to class activities (i.e., sitting, talking, and discussing matters) is required at all times.
- The specific nature of this class demands active participation during class discussions. The objective of these discussion is to enrich the course environment, enhance student learning experience, foster critical thinking, and strengthen your communication skills. Thus, please get engaged and know that you are NOT being evaluated at all on the answers you provide in class. Also, please realize that there is no reason to take a back seat and be shy as there is no embarrassment whatsoever from any reasonable attempt to provide an answer.
- Students are required to attend all lectures to maximize their benefit and are required to arrive on time to minimize disturbance to the learning environment. Unexcused absence will result in a zero being assigned for any required in-class course task (including exams and midterms), and no make-up will be given. Bearing the aforementioned in mind, some absences can be excused due to reasons beyond a student control (i.e., a surgery or accident for example). In such unlikely event, immediate communication with the Instructor may help generate some timely solutions that cannot work out afterwards.
- You need to complete ALL course requirements in order to earn a passing grade.
- All homework and presentations should be computer typed in a neat and organized manner.
- Homework is due at 11:59 PM according to the below course schedule. Late submissions will be penalized 10% of the points for each day late, up to 48 hours; after which the assignment will be recorded as a zero with no exceptions. Having a prior excused absence from attending a specific class does not warrant missing a submission date. Post excused absence – if any – will be handed on case-by-case basis.
- Poor performance in the class (for example, not submitting two assignments or recording less than 50% in two assignments or obtaining a grade less than the average grade of the class minus twice the standard deviation, etc.) automatically warrants an academic alert. If your performance deems you under two academic alerts, you should automatically provide an improvement plan that is accepted by the Instructor.
- The most reasonable human attention is provided in grading all course requirements but in the unlikely event that something is overlooked one way or the other, there will be no problem whatsoever to revise your grade on such submission.

### **Students with Disabilities:**

NJIT is fully 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 the Office of Accessibility Resources and Services (<https://www.njit.edu/studentssuccess/node/5>).

### **Copyright:**

All course content (including this syllabus, lecture materials, homework assignments, and exams) is protected content. Students should not make copies of any course materials or distribute these materials in the public domain.

**Academic Integrity:**

*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: <http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf>.*

*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](mailto:dos@njit.edu)*

**Tentative Course Outline/Schedule\*\*:**

\*\*The Instructor reserves the full right to amend or change this tentative schedule, according to class progress, with consultation with the students

<b>Week</b>	<b>Date</b>	<b>Topic</b>	<b>Notes</b>
1	Thursday, January 18th, 2024	Course Introduction + Module #1: Natural Hazards	-
2	Thursday, January 25th, 2024	Module #2: Flood Regulatory Requirements	-
3	Thursday, February 1st, 2024	Module #3: Flood Retrofitting and Floodproofing Measures - Elevation, Relocation, Demolition, and Dry Floodproofing	-
4	Thursday, February 8th, 2024	Module #4: Flood Retrofitting and Floodproofing Measures - Wet Floodproofing, Barriers, and Protection of Service Equipment	Assignment 1 due by 11:59 PM
5	Thursday, February 15th, 2024	Module #5: Economics of Flood-Decision Making	-
6	Thursday, February 22nd, 2024	Module #6: The Benefit Cost Model	-
7	Thursday, February 29th, 2024	Module #7: Benefit-Cost-Analysis for Flood Mitigation Projects	-
8	Thursday, March 7th, 2024	Module #8: Risk and Uncertainty Modeling	Assignment 2 due by 11:59 PM
9	Thursday, March 14th, 2024	Spring Recess – No Class	-
10	Thursday, March 21st, 2024	No Class – Students Prepare for Midterm	-
11	Thursday, March 28th, 2024	Midterm Exam (in-class)	-
12	Thursday, April 4th, 2024	Module #9: Flood Risk Management and Assessment	-
13	Thursday, April 11th, 2024	Module #10: Flood Hazard Modeling	Assignment 3 due by 11:59 PM
14	Thursday, April 18th, 2024	Module #11: Flood Loss Estimation	-
15	Thursday, April 25th, 2024	Student Projects/Presentations (in-class)	Presentation file due on Canvas by 5:00 PM
16	Thursday, May 2nd, 2024	No Class (Reading Period)	Assignment 4 due by 11:59 PM

## **Spring 2024 University Calendar**

January	15	Monday	Martin Luther King, Jr. Day
January	16	Tuesday	First Day of Classes
January	20	Saturday	Saturday Classes Begin
January	22	Monday	Last Day to Add/Drop a Class
January	22	Monday	Last Day for 100% Refund, Full or Partial Withdrawal
January	23	Tuesday	W Grades Posted for Course Withdrawals
January	29	Monday	Last Day for 90% Refund, Full or Partial Withdrawal, No Refund for Partial Withdrawal after this date
February	12	Monday	Last Day for 50% Refund, Full Withdrawal
March	4	Monday	Last Day for 25% Refund, Full Withdrawal
March	10	Sunday	Spring Recess Begins - No Classes Scheduled - University Open
March	16	Saturday	Spring Recess Ends
March	29	Friday	Good Friday - No Classes Scheduled - University Closed
March	31	Sunday	Easter Sunday - No Classes Scheduled - University Closed
April	1	Monday	Last Day to Withdraw
April	30	Tuesday	Friday Classes Meet
April	30	Tuesday	Last Day of Classes
May	1	Wednesday	Reading Day 1
May	2	Thursday	Reading Day 2
May	3	Friday	Final Exams Begin
May	9	Thursday	Final Exams End
May	11	Saturday	Final Grades Due
May	-	TBA	Commencement