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COASTAL ENGINEERING

Fall 2025

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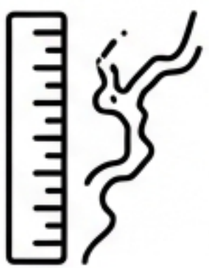
Our Nation’s Coastal Footprint

40%

of the U.S. population lives in coastal areas.

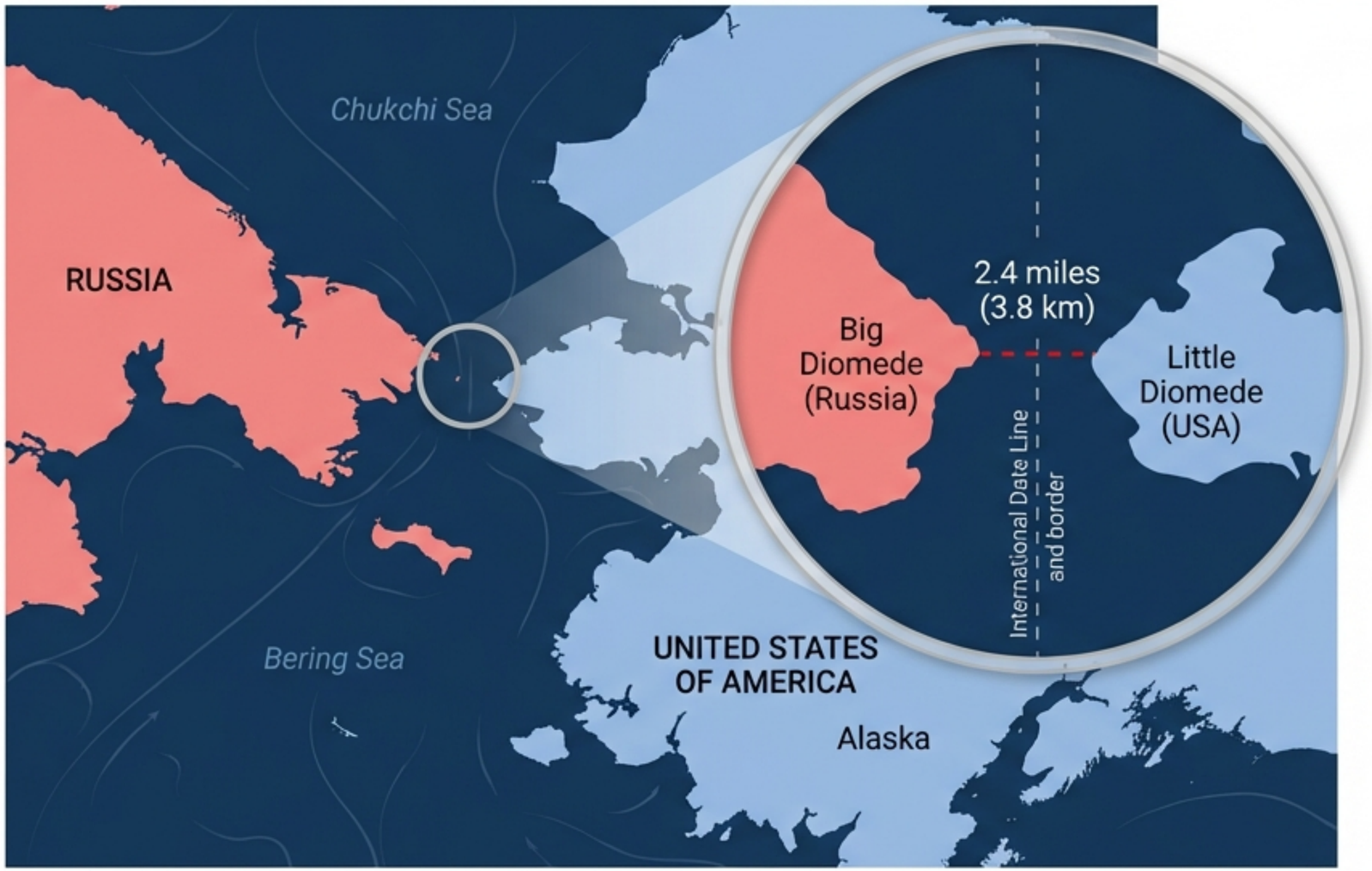


100,000 miles

of total coastline (Atlantic, Gulf, Pacific, Alaska, Hawai’i, Great Lakes).

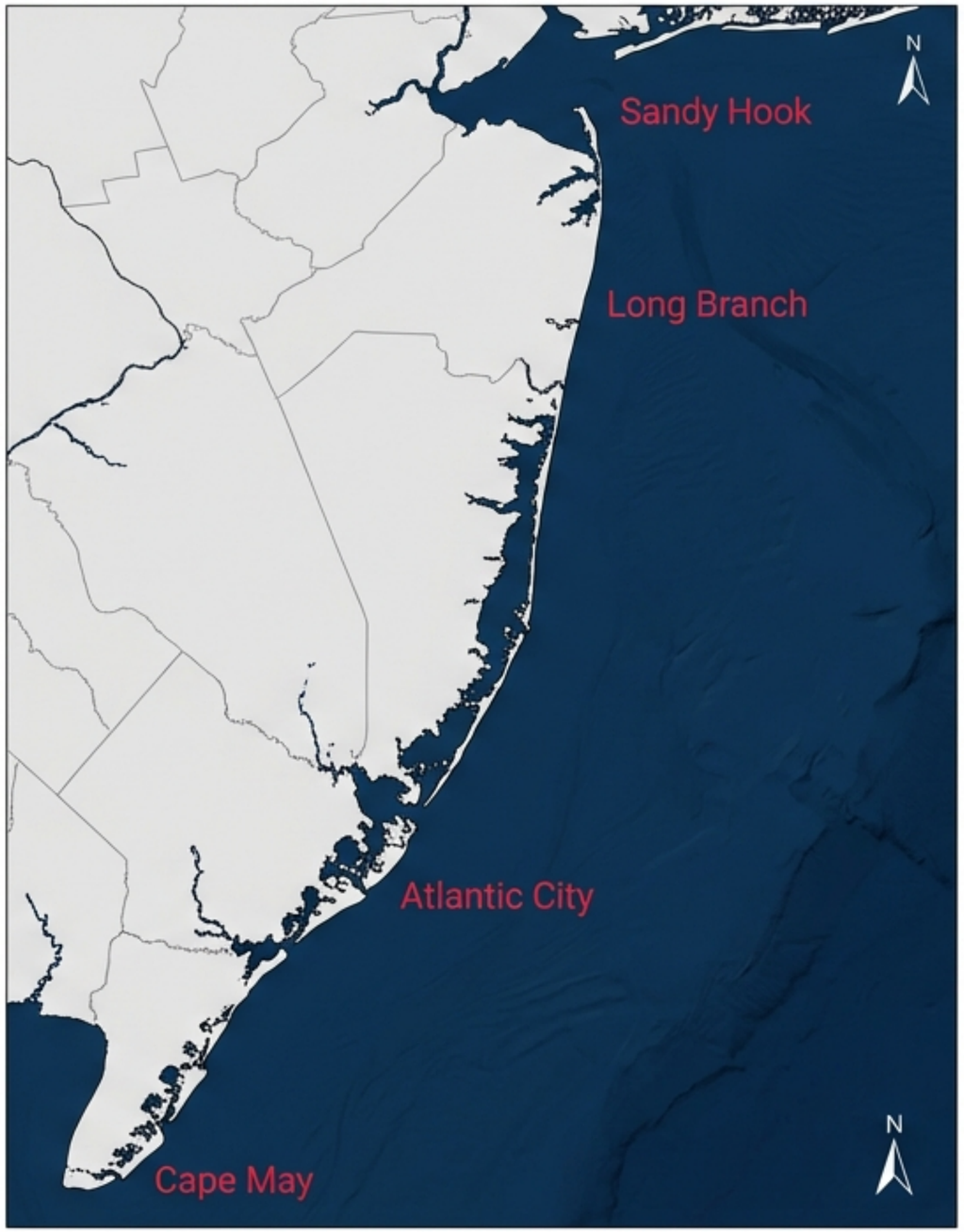
Source: U.S.G.S.

A Global Perspective



The world is smaller than it appears on a standard map. The shortest distance between the U.S. U.S. and Russia is only 2.4 miles, bridging the gap across the Bering Strait.

Map source: Wikipedia

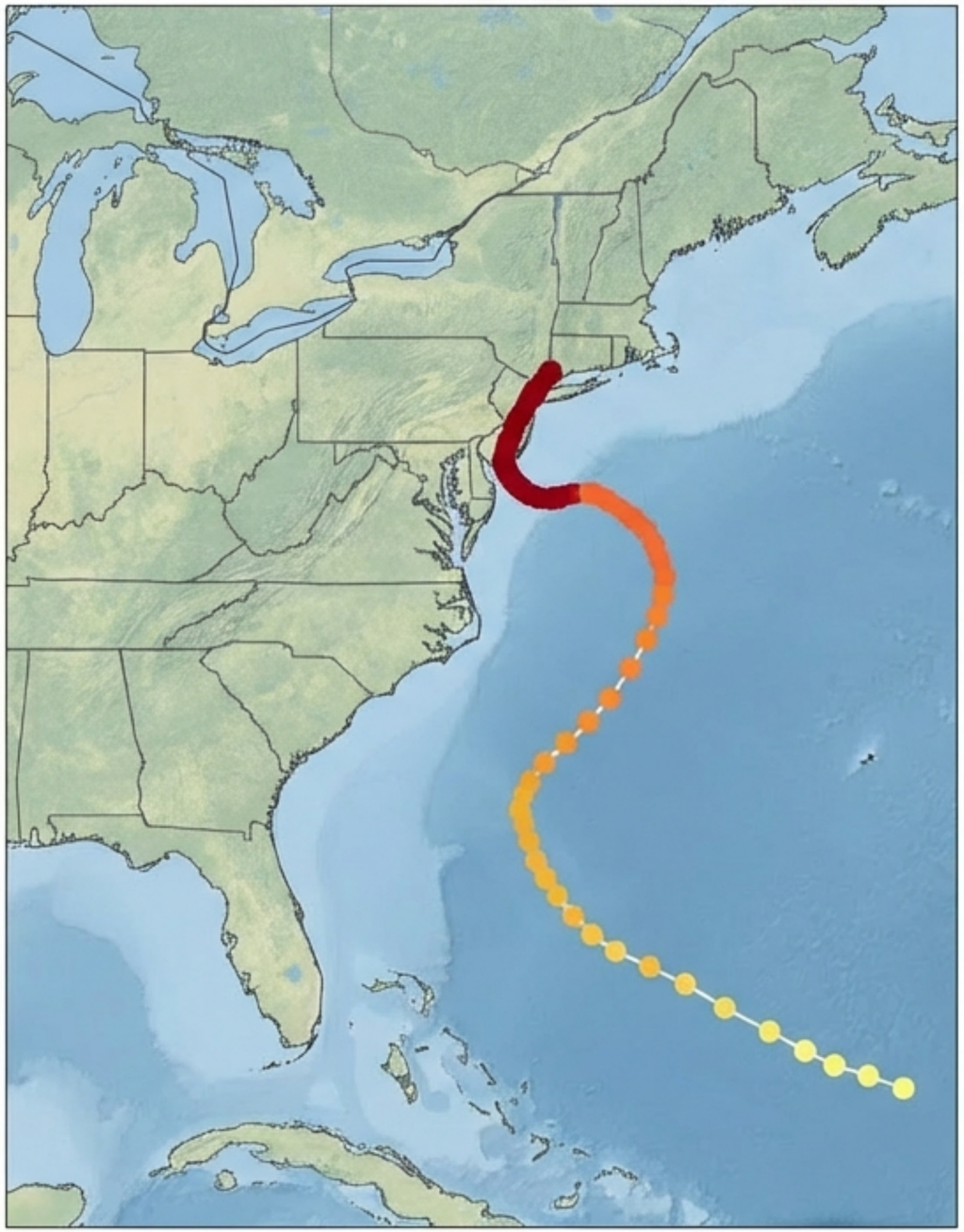


Academic Editorial

Local Context: The P1umbi of New Jersey Shore

New Jersey is defined by its dynamic interaction with the Atlantic Ocean. The state features a complex system of barrier islands and coastal cities connected by critical infrastructure like the Garden State Parkway.

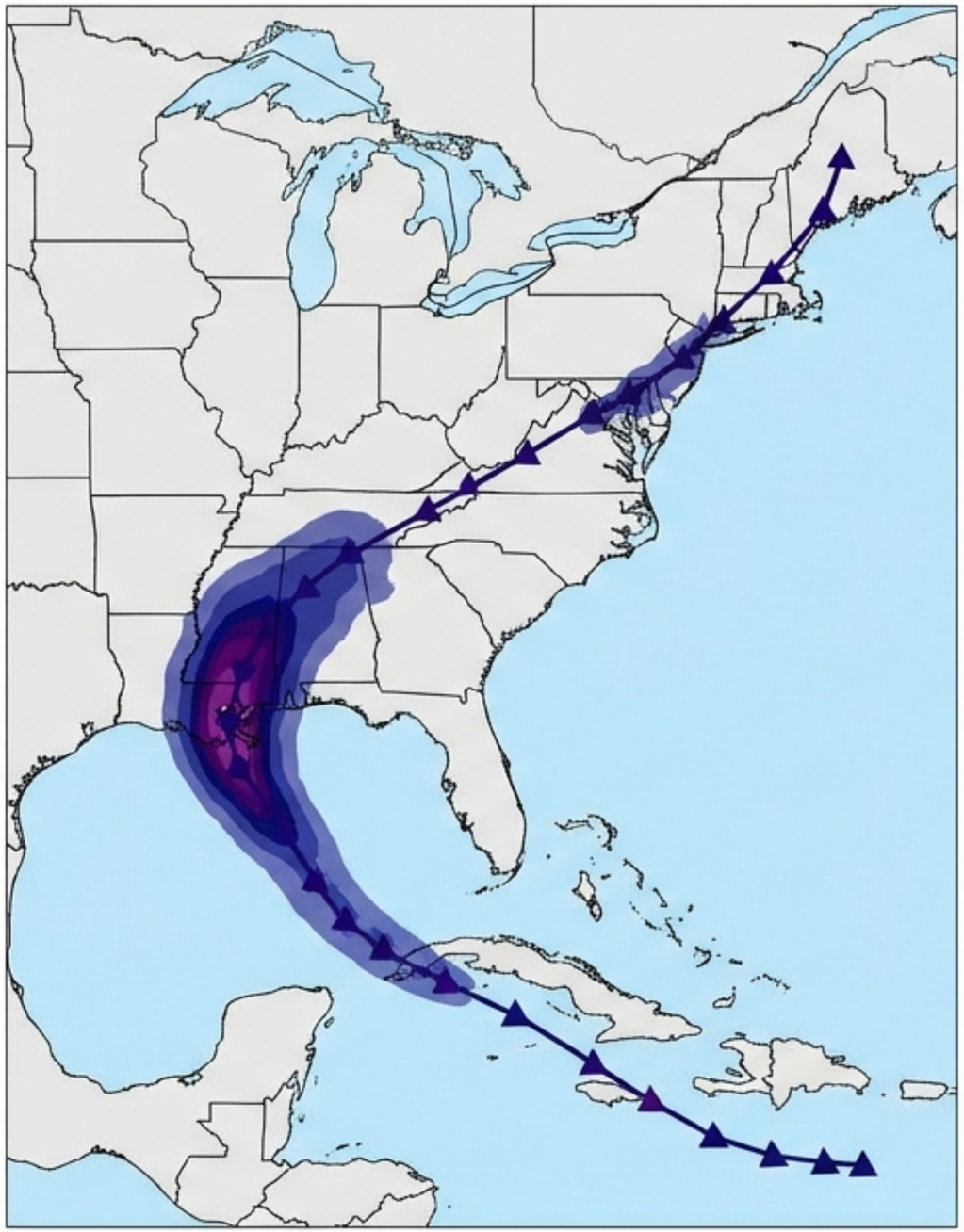
Source: U.S.G.S.



Academic Editorial

Case Study I: The Threat of Storm Surge

Event: Superstorm Sandy (October 2012)
Sandy illustrated the devastating power of the ocean moving inland. The storm abruptly veered toward the Greater New York City area, driving a record-breaking **Storm Surge** that overwhelmed coastal defenses.



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Case Study II: The Threat of Torn Torrential Rain

Event: Hurricane Ida (August-September 2021)
Unlike Sandy, Ida's primary weapon was water from above. Even as a remnant storm, it delivered torrential rainfall across New Jersey and New York, triggering widespread and severe **Flash Flooding** in areas far from the coastline.

Academic Editorial

Part I: Understanding Coastal Processes

Introduction

Foundational concepts and scope

Tides

Gravitational forces and patterns

Estuarine Processes

Mixing of freshwater and saltwater

Waves

Energy transfer and wave dynamics

Coastal Processes

Sediment transport and landform change

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Part II: Engineering & Management Solutions

Topic 6: Grey/Hard Coastal Structures

Topic 7: Green/Soft Coastal Structures (Nature-Based Solutions)

Topic 8: Contemporary Coastal Management

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Essential Knowledge Base & Textbooks

Library E-Book	Coastal Engineering: Processes, Theory and Design Practice (3rd Ed.) - Reeve et al. (2018)
Library E-Book	Introduction to Coastal Engineering and Management (3rd Ed.) - Kamphuis (2020)
Library E-Book	An Introduction to Coastal Engineering - Isaacson (2024)
Library E-Book	Living Shorelines - Bilkovic et al. (2017)
On Reserve	Handbook of Coastal Engineering - Herbich (2000)
On Reserve	Estuary and Coastline Hydrodynamics - Ippen (1966)
On Reserve	Environmental Oceanography - Beer (1997)
Open Source	USACE Coastal Engineering Manual (CEM) (2002)

Course Instructor

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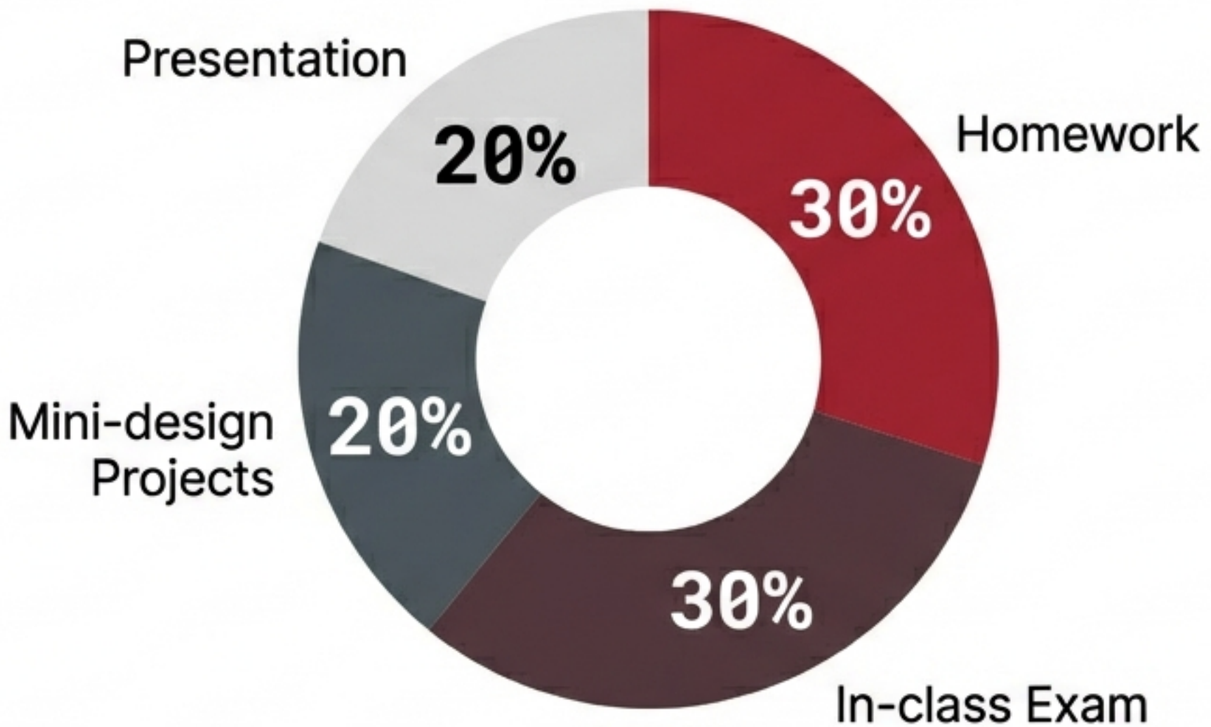
Office Hours: By appointment

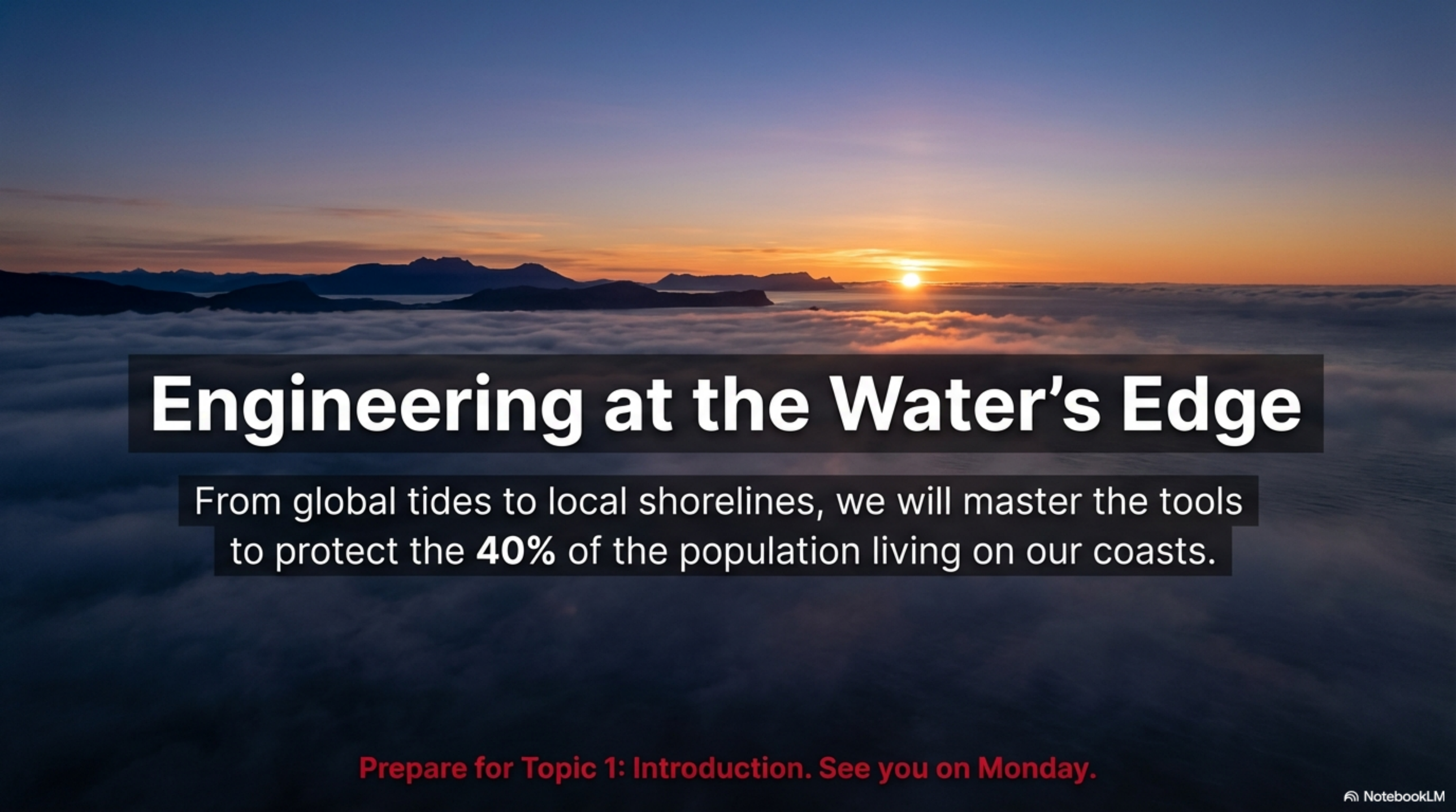
Schedule & Evaluation

Logistics

- Class Time: Mondays, 6:00 PM - 9:00 PM
- Location: Busch Campus, Weeks Hall 402

Evaluation




Engineering at the Water’s Edge
From global tides to local shorelines, we will master the tools to protect the **40%** of the population living on our coasts.
Prepare for Topic 1: Introduction. See you on Monday.
NotebookLM