

# Signal Processing for Underwater Acoustics

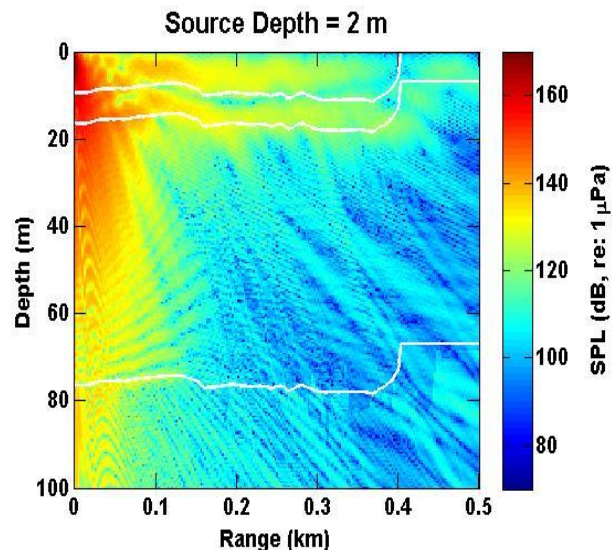
## Offered as ECE 579, Winter Quarter 2022

**Instructor:** Prof. Lisa Zurk

**Email:** [zurkl@uw.edu](mailto:zurkl@uw.edu)

**Time:** MWF 4:30 – 5:20 pm

**Location:** MGH 085



The ocean covers the majority of the planet and drives many of its ecosystems, ecosystems that are increasingly threatened. Sound is used as a primary modality to evaluate ocean status since it travels quite far underwater. It is also often generated by ocean species (for example, whale calls) and ocean processes. In the ocean, acoustic information arrives at the receiver distorted by the medium and corrupted by noise. Even when the signal is deterministic, a complete description must minimally be a statistical one. If information regarding the medium or the form of the signal is available, it should be included in the processing. Signal processing is conventionally divided into three tasks: detection, estimation, and classification. In this class, we will cover all three stages and provide a statistical framework for describing system performance in terms of the probability of detection versus probability of false alarm for vessels with listening arrays. Aspects of the ocean, such as the sound speed profile and bottom layer(s) will be discussed and their effect on detection presented. In addition to the basics of ocean acoustics, current and emerging topics will be presented.

**Prerequisites:** background in the wave equation (solving ODE/PDEs) and statistics, and signal processing.