



OIST SEED PROGRAM

ACTIVITY MENU BOOK

BIOLOGY



COMPUTER SCIENCE



1. Simple DNA Extraction from fruits

Experiment with the principles of how DNA is separated from cells using familiar fruits.

Duration: 1 hour~

Capacity: 20

Venue: OIST Campus

2. Enzymatic Reactions

How do you imagine proteins? Proteins are important biomolecules that have fundamental and diverse functions in a variety of biological phenomena. In this session, we will use DNA methylases and restriction enzymes to identify the specific DNA methylases that we offer. Learn about substrate specificity, an important feature of enzymes.

Duration: 1 hour~

Capacity: 20

Venue: OIST Campus

3. Fertilization of *Oikopleura dioica*

Oikopleura are caecilians that live in the open waters of the world's oceans. In the session, you will learn about the biology of the ostracoda and the benefits of studying them. In the lab, you will observe the culture of ostracods and practice fertilization.

Duration: 1 hour~

Capacity: 20

Venue: OIST Campus

1. Robotics

How do you get a robot to move on its own? Robots have an abundance of sensors and actuators, but how can we connect and coordinate them to accomplish something? We invite you to try out your robot and see if it behaves as you envisioned.

Duration: 1 hour~

Capacity: 20

Venue: OIST Campus



ECOLOGY AND EVOLUTION



1. Measuring Biodiversity

What is biodiversity? How can it be measured? And what kind of research is currently being conducted?

We will attempt to measure biodiversity using insect samples and other research equipment. Let's compare methods of measuring biodiversity.

Duration: 1 hour~

Capacity: 20

Venue: OIST Campus

2. Simulating Evolution

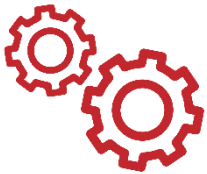
You will learn about how life evolved out of one isolated event and eventually developed into the many complex organisms we see around us today.

Duration: 1 hour~

Capacity: 20

Venue: OIST Campus

ENGINEERING AND APPLIED SCIENCE



1. Electronics Activity

Technology is a big part of our daily lives, but what are the underlying mechanisms that make electronic devices function?

We will begin with a brief introduction to the basic building blocks of analog electronic circuits, and then show through a hands-on circuit-building demonstration that it is possible to create very useful circuits using common circuits and even a few components.

Duration: 1 hours

Capacity: 20

Venue: OIST Campus

2. Behavior of Granular matter

Granular materials are a fascinating subject of study because of their propensity to fracture and fragment when subjected to external forces. This unique behavior is an important research topic in fields such as geology, materials science, and civil engineering.

We will demonstrate experiments that approach the study of granular materials in novel ways and discuss how granular materials respond to different types of stresses.

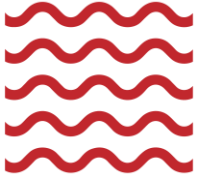
Duration: 1 hour~

Capacity: 20

Venue: OIST Campus



MARINE SCIENCE



1. Oceanographic Experiments

Let's learn about marine science through experiments. At OIST's Marine Science Station, we will show you the different types of experiments that OIST scientists are conducting. You will get up-close encounters with many different marine species and experience the state-of-the-art flume tanks.

Duration: 1 hour~

Capacity: 20

Venue: OIST Marine Science Station

2. Ocean Acidification Experiment

Let's examine the pH of seawater. In this experiment, we will demonstrate how the pH level of seawater, which is slightly alkaline, changes to acidic as it absorbs CO₂.

Duration: 1 hour~

Capacity: 20

Venue: OIST Campus

3. Detecting microplastics

Let's learn about the issues associated with microplastic pollution and attempt to detect microplastics that have made their way into the ocean. We will take sea water sample for analysis, process them in OIST's chemistry lab, and attempt to detect environmental microplastics in the water using infrared (IR) spectroscopy.

Duration: 1 hour~

Capacity: 20

Venue: OIST Campus

NEUROSCIENCE



1. Bending Your Brain

Explore brain plasticity and learning using Perceptual Shift Goggles. In this activity, participants will consider how to measure, collect, and analyze experimental results. Participants design and implement their own experimental design.

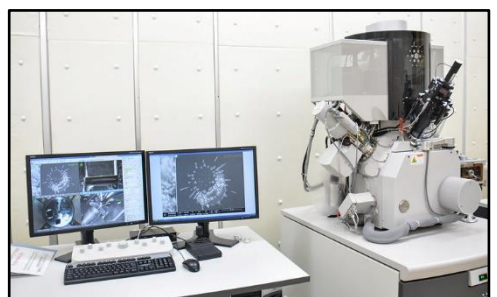
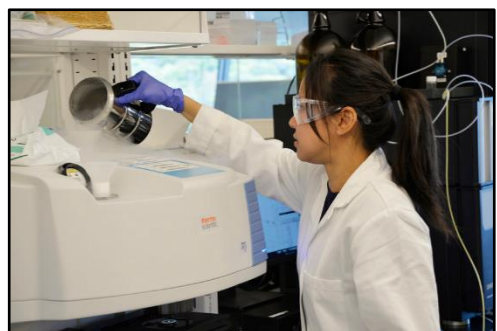
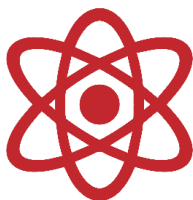
Duration: 1 hour~

Capacity: 20

Venue: OIST Campus



PHYSICS



1. Superconductivity activity

We will learn about superconductivity, a quantum phenomenon, and how superconductivity can be used as a means of levitating objects visible to the naked eye through the Meissner effect.

Duration: 1 hour~

Capacity: 20

Venue: OIST Campus

2. Studying Worthington Jet

Let's study a simple fluid phenomenon.

Depending on the height of the drop falling in a bucket of water, we can see different things. If it is dropped from high enough, we can see small droplets of water spewing out, a phenomenon called the Worthington Jet. We will observe this phenomenon, try to model it, and then learn the basic physics necessary to create accurate models.

Duration: 1 hour~

Capacity: 20

Venue: OIST Campus

3. Optical Tweezers

The fact that light carries momentum is pretty much known to everyone. This means that light can "push" matter as it passes through it. But can you believe that you can actually use light to capture and manipulate small particles through space? Try capturing and manipulating beads using an advanced optical tweezers setup.

Duration: 1 hour~

Capacity: 20

Venue: OIST Campus

4. How a microscope works

How does a microscope work?

On an optical table, we will assemble a simple microscope from lenses and optomechanical elements. Then learn about optics and optical aberrations by testing the strength and weakness of the lenses you have designed.

Duration: 1 hour~

Capacity: 20

Venue: OIST Campus

5. The World of Microscopy

Let's get a hands-on experience of various techniques for sample preparation and observation using electron microscopes. Enjoy exploration of the microscopic world!

Duration: 1 hour~

Capacity: 20

Venue: OIST Campus