



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

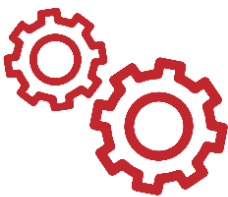
Venue: OIST Campus



ECOLOGY AND EVOLUTION



ENGINEERING AND APPLIED SCIENCE



1. Measuring Biodiversity

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

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



3. Laser – Tissue Interactions

The definition of the acronym word LASER will be explained in detail, introduced, and the Emission of Radiation. Given the atomic structures and electronic transitions, photon emission (production) process will be explained.

The engineering side of the medical applications which are commonly used in today's treatments will be explained and LASIK surgery, laser hair removal, Photodynamic Therapy, etc. will be mentioned as some real life examples .

Depending on the availability, some optical components will be introduced, and a laser alignment demonstration will be held as a hands-on activity. Or a special lab tour might be provided.

Duration: 1 hour~

Capacity: 20

Venue: OIST Campus



4. Medical Imaging Technologies

The students will learn about the general working principles of most commonly used imaging techniques such as X-ray CT, PET, US and MR. Some physical effects and their applications such as Photoelectric Effect and photo multiplier tubes (PMT) will be explained. General knowledge about image formation and camera types will also be explained.

Duration: 1 hour~

Capacity: 20

Venue: OIST Campus



5. Quantum Cryptography

Quantum nature of light will be explained in the lecture in combination with some main concepts such as cryptology, quantum, quantum cryptology and the application methods. Some advanced level of information about photons and photonic science will also be explained from the engineering window.

An experimental demonstration will be performed as a hands-on activity.

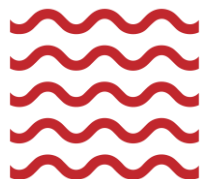
Duration: 1 hour~

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.

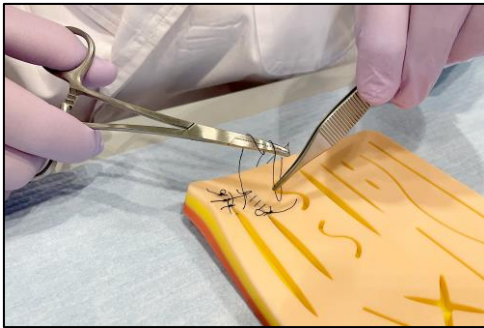
Duration: 1 hour~

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

2. Medical Suturing

This valuable skill might be useful for the students planning a career in either of the following disciplines; Medicine, Pharmacy, Neuroscience, Psychiatry, or even in some engineering disciplines such as Biomedical Engineering or Material Science.

The participants will learn about medical sutures and suturing techniques.

During the activity, the participants will perform the experiment.

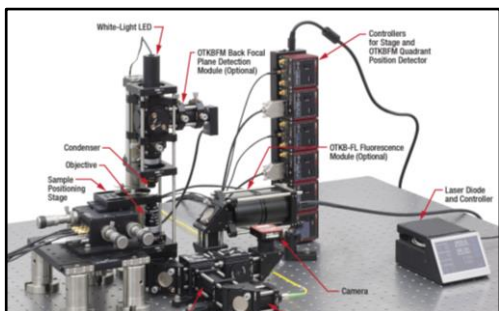
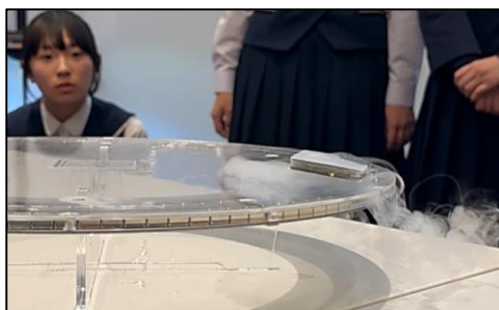
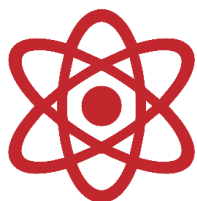
Duration: 1 hour~

Capacity: 20

Venue: OIST Campus



PHYSICS



1. 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

2. 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

3. Optical Tweezers

The fact that light carries momentum is pretty much known to everyone. This means that light can “push” the matter as it travels through it. But can you believe that we can actually use light to trap small particles and manipulate them through space? Let's try to trap and manipulate them using an advanced optical tweezers setup.

Duration: 1 hour~

Capacity: 20

Venue: OIST Campus

4. How a microscope works

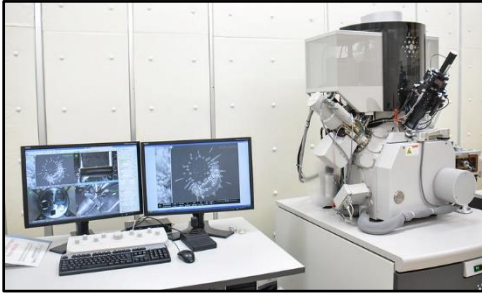
How does a microscope work?

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