

▼Four areas of interest to choose from and one national license

Biology,
Chemistry, and
Environmental
Science

Students study subjects such as genetics, bioscience, pharmaceuticals, and medicine; and technologies for improving immunological functions, and methods to prevent cancer using microbes. Some students research environmental matter that are beneficial and harmful to human life. They also study environmental protection through decomposition and detoxication of environmental pollutants.

Mechanics
and
Materials

Students learn about the physiological mechanisms of the human body, organs, tissues, and cells. We teach principles of diagnosis and treatment to clarify the causes of diseases based on these mechanisms. They also study design and production of equipment used in medical care.

Electricity,
Electronics, and
Information
Technology

Students learn technology used for measuring the various vital signs of the human body, and the electronics and information technologies for imaging the structure and function of the body. They also study surgical robots with the latest functions and safety.

Regenerative
Medicine

Students learn molecular biology, biotechnology and cell manipulation for regeneration methods of dis-functionalized tissues and organ through lectures and experiments. Some students research bio-artificial hybrid organs and their related materials combining the advantages of living cells and artificial materials.

Clinical
Engineers

Clinical engineers are specialists in medical science responsible for the operation and maintenance of life sustaining medical devices alongside a team of doctors and nurses.

▼Research and Activities of BME Contributing to the Region

- Our department displays an exhibit at the annual 'Interesting Experiences Day' at Okayama Research Park. Guests visit the booth and experience using medical devices such as an electric scalpel and pulse oximeter. We explain our program, research, and interact with guests. (R)
- Our department regularly holds an 'OUS BME Exchange Meeting' promoting information exchange between researchers and users of medical devices through "seeds and needs" activities, which contribute to maintaining valuable contact with regional companies.



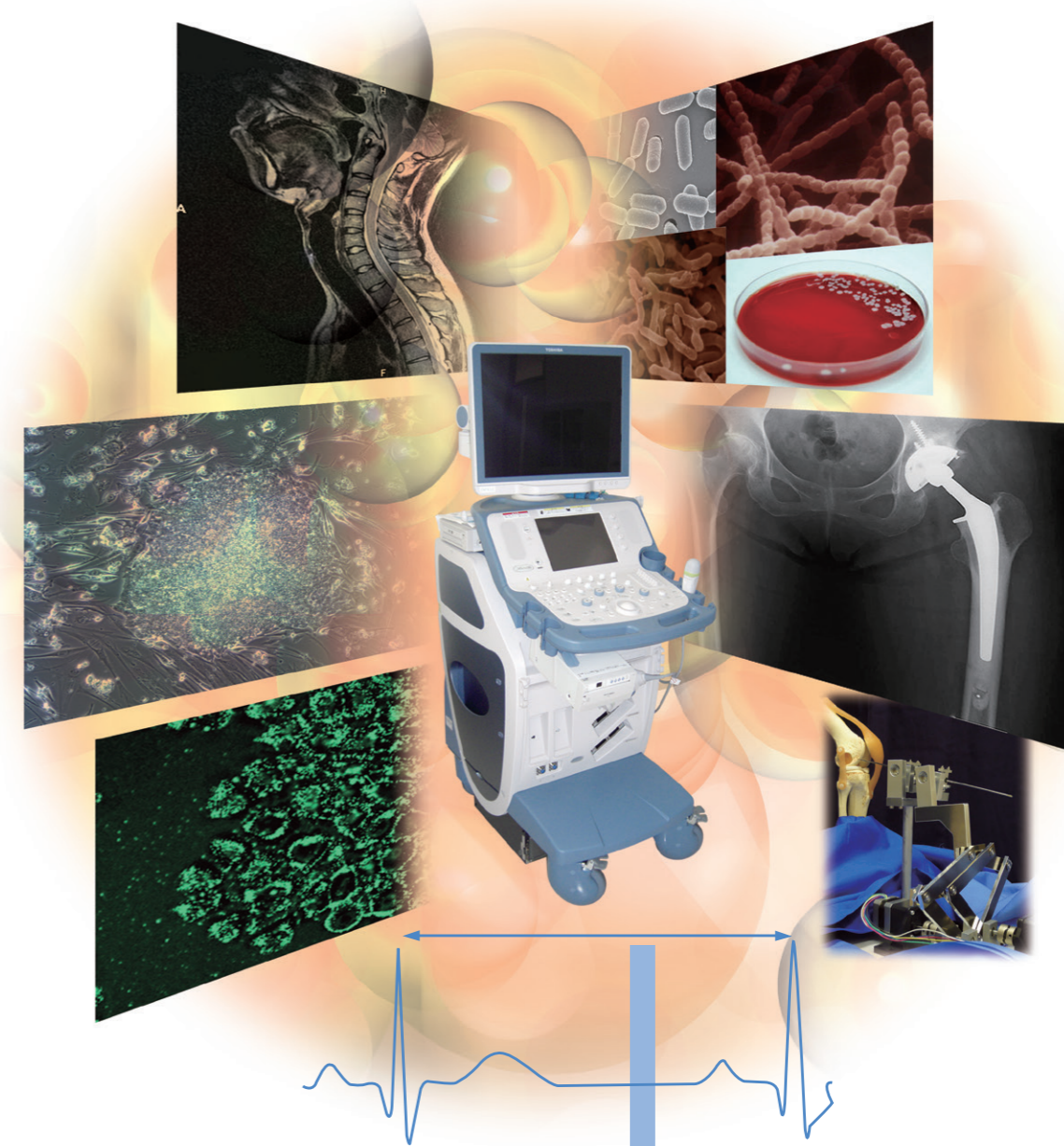
▼Facilities and research environment

- State of art research carried out in laboratories in Building B1 on 3rd floor (L)
- Latest equipment used in all three courses (M)
- Careful guidance by experienced teachers fostering development of individuals who will actively work in clinical engineering, biomedical engineering, and regenerative medicine (R)

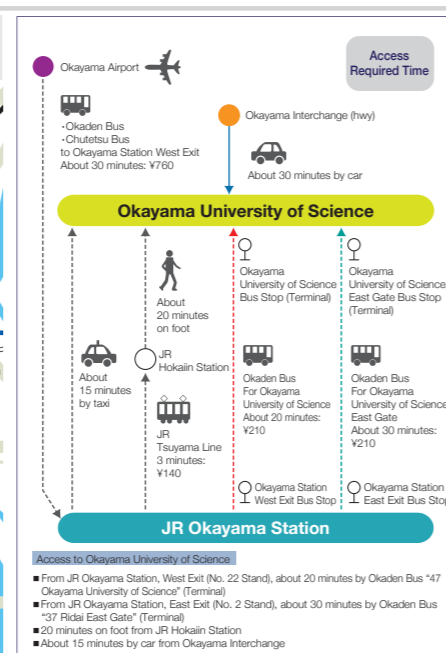
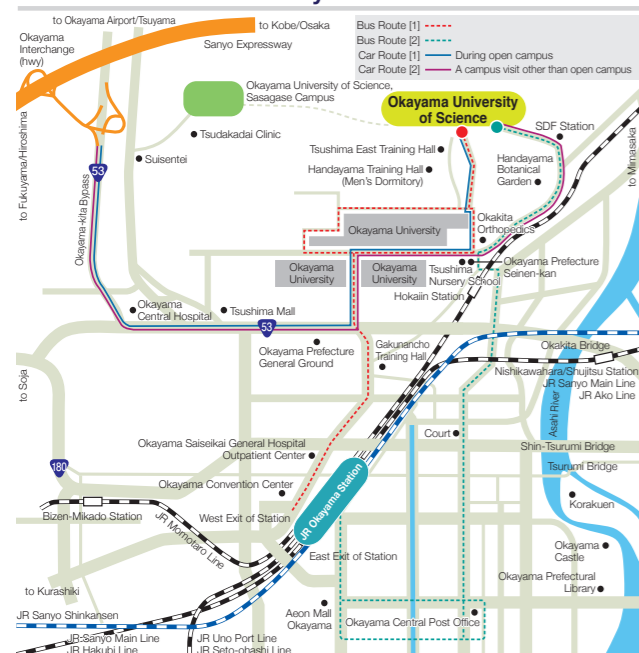


Department of Biomedical Engineering

Faculty of Engineering,
Okayama University of Science
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Access to the University



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Education and Research in Combined Areas
of Medical Science, Biology and Engineering

Department of Biomedical Engineering

Key Points of Department

- Provides education and research in the interdisciplinary areas of medical science, biology and engineering.
- Three course areas: Biomedical Engineering, Clinical Engineering, and Regenerative Medicine.
- Eight laboratories focusing on a variety of research areas allowing students to pursue careers matching their interests.
- Active international exchange programs, accepting many students from overseas.
- Graduates from Clinical Engineering Course work in many hospitals and clinics throughout Japan.

Engineering insight is indispensable for medical progress!!

Today's medical care is supported by people with expertise in both engineering and medical science who skillfully operate medical devices and/or advance the research and technology of those devices. Moreover, engineering-based technology greatly contributes to regenerative medicine which has been an area of increased interest for development and application in clinical treatment. This department offer students skills in biomedical engineering, clinical engineering, and regenerative medicine engineering, a new area where engineering, medical science and biology merge to foster "engineers contributing to medical care".

Ultrasonic blood flow image utilizing the Doppler effect

Dialyzer (artificial kidney)

Force measuring device during surgery

Mouse embryos

Cell manipulation

Ventricular assist devices (VAD)

Artificial hip

Biomedical Information

Genetic Engineering and Molecular Biology Laboratory
Studies function of beneficial bacteria and its application to human health and environmental preservation.

Human Environmental Science Laboratory
Analyzes role essential elements in the natural environment play and their effects on organisms. Performs studies on degradation/detoxification of environmental pollutants.

Biomechanics and Tissue Engineering Laboratory
Studies relationship between strength, stiffness/softness of human tissue and diseases. Evaluates response of living tissue to mechanical stress and its application to clinical diagnosis & medical treatment.

Biomaterials and Artificial Organs Laboratory
Developing technique to artificially control cellular function by converting protein into living cells. Engineering efficient blood filtration device.

Biomedical Information Engineering Laboratory
Studies process of biomedical information of human body to determine structure and function. Studies optimizing operation of life-supporting devices such as artificial lungs.

Medical Engineering Laboratory
Developing medical devices such as artificial lung and operational robots for functionality and safety for patients.

Regenerative Medicine and Engineering Laboratory
Engineering highly functional cells and tissue for regenerative medicine through molecular biology and cell culture technology. Researching prevention of malignant cancer.

Micro & Nano Physiology Laboratory
Developing composite materials and small equipment for culturing, manipulating and evaluating cells and tissues for future medicine and medical care.

※Students may start graduation research at Okayama University of Science Research Institute of Technology (capacity available)

Available Licensure and Qualifications

Eligibility

Eligible for Clinical Engineer National Examination

Licensure

Junior High School Instructor, Class 1 License (Technology) / Junior High School Instructor, Class 1 License (Engineering) / Primary School Instructor, Class 2 License / Museum Curator Certification
Teacher Training Application in progress. Scheduled start date of course is subject to change resulting from review by the Ministry of Education, Culture, Sports, Science and Technology.

Study Content and Related Qualifications

Biomedical Engineer, Class 1 / Biomedical Engineer, Class 2
Clinical Incubation Specialist / Cell Cultivation Specialist



After Graduation

Successful students qualify to become engineers and scientists in biomedical companies and research laboratories, and clinical engineers in hospitals and clinics. To acquire advanced skills and knowledge, students are encouraged to enter our graduate program.

Curriculum

Students are enrolled in one of the following courses from their 2nd academic year: 1) Biomedical Engineering(BE), 2) Clinical Engineering(CE), or 3) Regenerative Medicine(RM).

1st Year

Study basic subjects; decide course of study and future career

2nd Year

Enter chosen course; take subjects in areas of interest
(If they satisfy the requirements about accomplishment of their subjects in each course, they can change their course after the first assignment.)

3rd Year

Begin preliminary studies for 'Graduation Thesis' in assigned laboratories.

4th Year

BE and RM courses: Start 'Graduation Thesis' to solve practical research questions.
CE course : Start clinical training in hospitals and prepare for national examination to be taken at end of academic year.

The department provides a curriculum for four research fields and one national license based on student's interest

● Subjects for students interested in biology, chemistry, environmental science(BE & RM Course)

1st year : Biochemistry, Basic Chemistry, Public Health...
2nd year : Pharmacology, Molecular Biology...
3rd year : Life Environmental Science, Cell Biology...

● Subjects for students interested in mechanics, materials(BE Course)

1st year : Biomaterial Engineering, Bio-Physical Engineering...
2nd year : Mechanical Engineering, Applied Mechanics, Therapeutic Devices...
3rd year : Biomechanics, Artificial organ...

● Subjects for students interested in electric, electronics, information(BE Course)

1st year : Electrical Engineering, Information Processing...
2nd year : Electronic Engineering, Biomedical Measurement Engineering, Introduction to Diagnostic Devices...
3rd year : Systems Engineering, Engineering for Biomedical Safety...

● Subjects for students having interest in Regenerative medicine(RM Course)

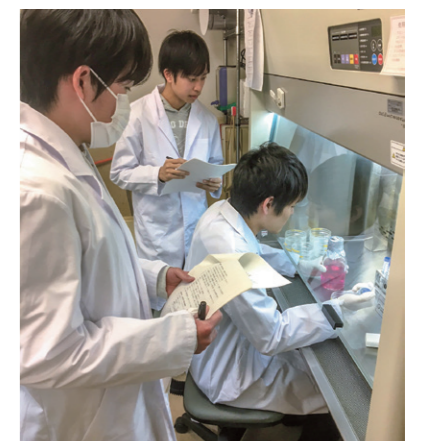
1st year : Physiology, Anatomy, Biochemistry...
2nd year : Pathology, Molecular Biology...
3rd year : Cell Biology, Biotechnology, Regenerative Medicine Engineering...

● CE Course

Students learn the subjects that are necessary for national examination for clinical engineer. In their 3rd year, they take practical training subjects using various medical devices at our Biomedical Science Educational Center.



Students learning mechanics and operation of medical equipment (CE Course).



Practical training in cell culture technology (RM Course).