Artificial Organs Engineering

Lecture (Code:1371, 1st-year 4 units, 2nd-year 2 units)
Practice (Code:1372, 1st-year 2 units, 2nd-year 2 units)
Lab (Code:1373, 1st-year 2 units)

1. Instructors
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2. Course Description and Timetable
   Lecture
   Goals/Outline
   This course intends to provide an opportunity to learn the state of the art design of the various artificial organs clinically used to help temporarily or permanently the failing organs (heart, lung, kidney, pancreas etc). Especially, the course reviews the current status of the clinical circulatory support devices, both extracorporeal and implantable systems, used to bridge the patients to heart transplantation, to recovery or as a destination therapy. The classes will be organized based on the top-rated presentations by the instructors invited from overseas from basic science points of view as well as clinical aspects.
   Available programs:
   - Lecture: Once a week as announced
   - Special Lecture: Three times a year
   - Seminar: Once a month, third Friday of the month
   - Journal Club: Every Monday 15:00-17:00
   - Conference: Every Friday 15:00-17:00

   Practice
   Goals/Outline
   In order to increase the understanding toward artificial organ and transplantation therapies, recommend literature search as needed. Facing the data acquisition in animal experiments and clinical studies, practice programming, data handling and manipulation. Also practice presentation of materials in the domestic as well as overseas conferences in English. If possible, write scientific papers in English.
   Available programs:
   - Literature search: As needed
   - Research presentation: Once a month, third Friday of the month
   - English journal club: As needed
   - Program practice: As needed
   - Data acquisition, analysis, presentation: As needed

   Wet Lab work
   Goals/Outline
   In order to get used to handling and getting adjusted to the mechanical circulatory support devices in the real world, students are recommended to participate in the hand-on the devices developed in the laboratory in the in vitro simulation system and actual animal experiments. For the adult size devices, 70-80 Kg calves are
used to actually implant the devices, while for pediatric size devices, 10-15 Kg goats are used. By participating in the in vivo animals experiments, students are exposed to learn how to handle animals, data acquisition and analysis, explanting the devices, necropsy and histological analysis of real tissue samples.

Available programs:

- Experimental work with circulatory model: As needed
- Implant and explant experiences
  - With calves and goats: As needed
- Data acquisition, analysis: As needed
- Pathological work: As needed

3. Format

The classes will be organized on a small number basis, and constructed on lectures, special lectures, seminars, and research presentations in English to explore the current status and future perspectives of artificial organs engineering. By inviting guest speakers from overseas, the classes, lectures and research presentations will be run mainly in English to expand the horizons in cutting edge technologies of artificial organs engineering. Overseas students are welcome to register the courses.

4. Venue

Classes will be organized using the conference room on the 3rd floor of the research institute. The practice and wet lab work will be run in the research laboratories of Artificial Organs Facility located in the basement floor of the Research Institute. Prior to the classes, confirm the location of classes through the instructor.

5. Grading

The students will be evaluated based on the reports and conference presentations.

6. Notes

Concerning the wet lab work, due to strict regulation in animal care, extreme caution is required in handling animals. In vivo experiments will be scheduled according to delivery of animals, so pay attention to the schedule passed on to you through campus mail.