Experimental Practice in Earth Science in Faculty of Integrated Human Studies, Kyoto University.

Katsuya Kaneko[1], Mamoru Kato[2], Takahiro Ohkura[3], Naoto Ishikawa[4], Satoshi Sakai[5], Hiroki Kamata[6]

[1] School of Earth Sciences, IHS, Kyoto Univ., [2] IHS, Kyoto Univ., [3] AVL, Kyoto Univ., [4] Graduate School of Human and Environmental Studies, Kyoto Univ., [5] Earth Sci. IHS,Kyoto Univ, [6] Earth Sci., Integr. Human Stud., Kyoto Univ.

http://www.gaia.h.kyoto-u.ac.jp/

School of Earth science, Faculty of Integrated Human Studies (IHS), Kyoto University, offers courses of experiments on earth science primarily for the first and second year undergraduate students in the university. In these courses, we aim to stimulate their interests in earth sciences by introducing various fields of researches; positive and enjoyable experiences with scientific experiments should motivate them to study basics of natural sciences and to pursue research opportunities in the next level. The courses are given in different styles in the first and second semesters; first-hand experiences in earth sciences through a series of short lab works are offered in the first semester. In the second semester students pursue one topic of their interest throughout the semester. We offer two separate weekly sections, in Mondays and Tuesdays, to satisfy to high demand. Classes are taught by IHS faculties as well as those from inside and outside of Kyoto Univ.

We introduce contents of the classes in the followings.

The first semester - 'Try anything !'

In the first semester, the purpose of the course is that students enjoy various experiments and have wide viewpoint on earth science. In both Mondays and Tuesdays, 7 instructors carry 7 experiments that finish in two sessions. Seven groups with about 10 students are formed before the first session. Each group makes a different experiment in 2 sessions and then makes a next other experiment. In these manners, each group experiences 5 experiments in the course. Unfortunately the semester is not long enough to have all the 7 experiments.

In the first semester, 2001, 77 students took the course in both Mondays and Tuesdays. The themes of the experiments were in the following: analysis of solar flare, level measurement, measurement of cloud temperature, measurement of geomagnetism, measurement of permeability of sediments, geological field excursion, and megascopic and microscopic observation of rocks in the class in Mondays; measurement of solar rotation, measurement of gravity with pendulum, analysis of fossils, megascopic and microscopic observation of rocks, learning of chaos from calculation and kneading pie, analysis of waveform record of earthquake, fluid dynamic experiment of convection in Tuesday.

The second semester - 'make your own research !'

In the course in the second semester, students themselves plan experiments, carry out them, and interpret experimental results. Only the students taking the courses in the first semester can attend the course in the second semester. In both Mondays and Tuesdays, 7 instructors propose 7 themes of experiments and help the experiments by the students. In most of the experiments, the instructors themselves do not know how results are obtained perfectly. We expect that students think logically on experimental results, and do trial and error rather than get well-known good results. 7 groups with 6-8 students who interested in the same theme carry out the experiment throughout the semester (10-12 sessions). All the students present the experimental results in the final session.

In the second semester, 2001, 67 students in Mondays and 54 students in Tuesdays took the course. The themes of the experiments were in the following: analysis of solar flare, diastrophism analysis with level measurement, analogue experiment of ground fluidization, analysis of magnetic mineral in sediments, field excursion on volcanology, geological dating with radiolarians, making of volcano-pathfinder in Mondays; observation of solar black spot, field measurement of gravity anomaly, observation and analysis of earthquake, continuous measurement of GPS, synthesis of amino acid on the origin of life, measurement of atmospheric methane concentration in Kyoto city, model experiment of fault movement of earthquake in Tuesdays.

In the joint meeting, we will introduce detailed contents of the course by some examples of the experiments.