Activity of National Institute of Technology, Fukushima College

Human resources training on the decommissioning of nuclear power plant, based on study for graduation - Interdisciplinary challenge from Fukushima -

National Institute of Technology, Fukushima College
Shigekazu SUZUKI
Contents

- Outline of National Institute of Tech.
- Nuclear Decommissioning Network of the National Institute of Technology
- Education program on decommissioning
- KOSEN International Summer School
- Creative Robot Contest for Decommissioning
National Institute of Technology (KOSEN) was established in 1962, Total number: 51 Colleges, NIT-FC is one of them.
Outline of Fukushima KOSEN

**Department (Number of Students)**
- Mechanical Engineering (200) --- 40/each year
- Electrical Engineering (200)
- Chemistry and Biochemistry (200)
- Civil Engineering (200)
- Communication and Information Science (200)

**Advanced Course (Number of students)**
- System Engineering for Industrial Technology (32)
- Business Communication (8)
- Special Course for Regional Rehabilitation (10)

**Number of Staffs (As of April 1, 2016)**

<table>
<thead>
<tr>
<th>Position</th>
<th>Number</th>
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<tbody>
<tr>
<td>President</td>
<td>1</td>
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<tr>
<td>Professors</td>
<td>30</td>
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<tr>
<td>Associate professors</td>
<td>36</td>
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<tr>
<td>Assistant professors</td>
<td>3</td>
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<td>Research associate</td>
<td>7</td>
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<td>Special appointed professors</td>
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<tr>
<td>Subtotal of professors</td>
<td>81</td>
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<tr>
<td>Administrative staffs</td>
<td>44</td>
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<tr>
<td>Total</td>
<td>125</td>
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Department of Mechanical Engineering

The department of Mechanical Engineering aims to train students to become engineers who will be able to cope with the development of science and technology in the various fields of industry.

The department of Mechanical Engineering welcomes students who:

1. have strong interest in manufacturing machinery such as robots and automobiles
2. have a desire to study the mechanisms of machinery and related technologies in great depth
3. are interested in technologies that are both useful to humans and environment-friendly

Department of Electrical Engineering

In this department, students study basic subjects essential to electrical, electronics, and information engineers. The curriculum is arranged around three major fields of study: electric power systems, electronics, and information processing.

The department of Electrical Engineering welcomes students who:

1. are capable of engaging in teamwork to undertake experiments related to electricity, electronics and manufacturing
2. are interested in designing, building and operating electronic circuits and computer programs
3. wish to become the kind of engineers that build infrastructure such as electricity, communication and information technology
Department of Chemistry and Biochemistry

The aim of the curriculum of the Department of Chemistry and Biochemistry is the training of materials engineers who will be able to play an active role in a wide range of fields from the chemical, pharmaceutical to food industries, which develop and produce various functional, electrical and electronics industries.

The department of Chemistry and Biochemistry welcomes students who:

1. wish to become engineers capable of manipulating substances at the molecule-atom level
2. have a strong interest in new materials and biotechnologies
3. wish to contribute to the resolution of environmental problems by applying their knowledge and skills in chemistry

Department of Civil Engineering

The department of Civil Engineering aims to promote ‘suitable development’ and foundation of infrastructure elements which will allow society to coexist in ‘symbiosis’ with all living things. A variety of subjects relating to the environment have been newly added to existing civil engineering courses.

The department of Civil Engineering welcomes students who:

1. are interested in construction technologies for roads, bridges, ports and lifelines
2. place importance on ensuring harmony between urban planning and natural environment
3. wish to contribute to the development of local communities through construction technologies

Communication and Information Science

Aspiring to train human resources capable of thriving in the business sector, The Department of Communication and Information Sciences conducts research and provides education in business, English, information and other fields related to communication sciences.

The department of Communication and Information Science welcomes students who:

1. have a broad interest in the mechanism and movements of society and economy
2. wish to acquire a higher level of ability in foreign languages to take an active part in international society at large
3. wish to acquire information technology and contribute to industrial society
The Nuclear Decommissioning Network of the KOSEN
The Nuclear Decommissioning Network of KOSEN

- **Project**: Basis research and human resource development, such as for the nuclear power plant decommissioning
- **Member**: President and professor of the KOSEN, professor of University and academic experts of an industry related to nuclear power, which was agreed for the purpose of the consortium
- **Chairman**: Nakamura president of Fukushima KOSEN
- **Secretariat**: Fukushima KOSEN

<table>
<thead>
<tr>
<th></th>
<th>Number of organizations</th>
<th>Number of enrollees</th>
<th>Number of president</th>
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<tbody>
<tr>
<td>KOSEN</td>
<td>31</td>
<td>67</td>
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<td>University</td>
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<tr>
<td>Company</td>
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<tr>
<td>Municipality</td>
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<td><strong>Total</strong></td>
<td><strong>47</strong></td>
<td><strong>86</strong></td>
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As of October 2016
Research cooperation
Education and human resource development cooperation
Education program on decommissioning
Course on “Decommissioning Technology”

1st grade: Nuclear power plants

2nd grade: Radiation and radioactivity
- Robotics at Fukushima-Daiichi

3rd grade: Decommissioning and the Society,
- Robotics for decommissioning

4th grade: Reactor decommissioning,
- Internship

5th grade: Nuclear accidents,
- Graduation researches

Effective subject

Mechanical Engineering
Electrical Engineering
Chemistry and Biochemistry
Civil/Environmental Engineering
Business Communication

Basics for Nuclear power plants

Basics on radiation and radioactivity
2015
- 3rd grade: (Decommissioning and the Society) 60 students
- 4th grade: (Reactor decommissioning) 10 students

2016
- 2nd grade: (Radiation and radioactivity) 63 students
- 3rd grade: (Robotics for decommissioning) 96 students
- 3rd grade: (Decommissioning and the Society) 71 students
- 4th grade: (Reactor decommissioning) 36 students

**total 266 students**

Visit JAEA Naraha Remote Technology Development Center

Visit JAEA Fukushima Environmental Safety Center

Temporary storage area tour, Radiation measurement practice, Lecture

**Important to see the site directly**
A complex type internship
- A complex type cooperation experience learning with KOSEN, companies and local governments -

Usual internship
- Improvement of professional knowledge
- Understanding of company activities

Complex type internship
- Improvement of professional knowledge
- Understanding of company activities
  +
- Understanding of local government activities
- Communication with local citizens

Engineer of training which has a compound eye and the public communication skills
2015
- Tokyo Power Technology (Radiochemical analysis, 2 students)
- KURION (Contaminated water treatment, Robot, 4 students)
  → 9/14 Lecture, 9/20～27 Technical training (USA, Richland, Denver)
- JAEA (4 students)
- University of TOKYO Uppsala summer school (Sweden, 2 students)
- University of TOKYO Tokai summer school (2 students)
2016

- University of TOKYO International summer school
  (USA, Richland-PNNL/KURION, Huston-NASA, 2 students)
- University of TOKYO Naraha summer school (2 students)
- Decommissioning technology Study at KURION
  (Tritium removal, 1 student)
- Fukushima Daiichi Nuclear Power Station (5 students)
  Fukushima KOSEN (2 students)
  Tsuruoka KOSEN (Yamagata, 2 students)
  Niihama KOSEN (Ehime, 1 student)
- Iwaki city Nuclear Power Division (2 students)
- KOSEN International Summer School
  (USA, Richland/Hanford B reactor, Silicon Valley)
  Fukushima KOSEN (1 student)
  Ibaraki KOSEN (Ibaraki, 2 students)
  Kagawa KOSEN (Kagawa, 2 students)
  Kitakyushu KOSEN (Fukuoka, 1 student)
- JAEA (4 students)
KOSEN International Summer School
- Competition in cooperation KOSEN
- 8 students applicants
→ 6 students selected by evaluation of the report

Schedule

September 18 (Sunday)
- Visit to America
- Study on the history of Hanford (The Reach museum)

September 19 (Monday)
- Hanford site B Reactor tour
  → Interviewed by the DOE PR division
- Study on the PNNL
  Research and development decontamination and environmental recovery, Public involvement
- Decommissioning technology Study at KURION
  Glassification, Remote control, Tritium removal
The Reach museum
Description from the volunteer
B Reactor tour

Interviewed by the DOE PR division

National Park Service
U.S. Department of the Interior
U.S. Department of Energy

B Reactor
Manhattan Project
National Historical Park
Description of PNNL

Glassification technology study

Contaminated water treatment technology study
September 20 (Tuesday)
- Move from Richland to Silicon Valley
- Create a presentation
- Interaction with entrepreneurs

September 21 (Wednesday)
- Stanford University tour
- Create a presentation
- Presentation (Interviewed by Nikkei)

September 22 (Thursday)
- Move from Silicon Valley to Narita
- It was very interesting to be able to tour the facility for the war that the Hanford Site.
- Decontamination and decommissioning, waste disposal could be re-confirmed that the world is the scale of the problem.
- The first time the United States Travels was able to feel the difference of culture with Japan.
- I hope that a problem about the atomic energy is resolved quickly.
Creative Robot Contest for Decommissioning
The outline of the contest implementation

Name: The 1st Creative Robot Contest for Decommissioning
Time: Saturday December 3rd, 2016
Place: JAEA Naraha Remote Technology Development Center
Organizers:
  Ministry of Education, Culture, Sports, Science and Technology
  Decommissioning human resource development consortium
Auspices: METI, NDF, IRID, Japan Science and Technology Agency
  Fukushima pref., Iwaki city, Hirono town, Naraha town
  JAEA
Supporters: IHI, ATOX, Joban Engineering
Secretariat: National Institute of Technology, Fukushima College
Administrator:
  The executive committee of Creative Robot Contest for
  Decommissioning
Environment of the Field

Each team selects a field from the two options below with the assumption that it is the Fukushima Daiichi site.

1. Mock up stairs  
2. Step Field
Environment of the Field

- Complete darkness
- Impossibility to see the robot body directly while operating it remotely
- Radio wave does not reach because there is a thick wall of concrete
- There is a limit for the control of cameras and semi-conduct instruments due to the influence of strong radiation

Tasks for the Robots

(Mock-up Stairs)
- Carry 5kg object from 1st floor to 2nd floor and return to the original position on 1st floor
- Detect an unknown object on 2nd floor
- Others related to the tasks for decommissioning

(Step Field)
- Detect the shape, the area and the up-and-down of step field
- Detect an unknown object which is set in the field
- Others related to the tasks for decommissioning
• 15 teams
  - 11 colleges of National Institute of Technology
    Hakodate (Hokkaido, 2 teams),
    Sendai (Miyagi, 2 teams),
    Tokyo (Tokyo),
    Maizuru (Kyoto),
    Kouchi (Kouchi),
    Kumamoto (Kumamoto)
  - 1 Tokyo Metropolitan College of Industrial Technology
    (Metropolitan KOSEN)
  - 1 Osaka Prefecture University College of Technology
    (Osaka Prefecture KOSEN)
Naraha Summer School

- September 1st: Visit Fukushima Daiichi
- September 2nd: Study of decommissioning at Naraha Remote Technique Development Center
Summary

- With a mission to Fukushima revival, technology grows up with a person through a technical challenge, and the safe abolished furnace work of the Fukushima Daiichi advances by continuing developing

- Specialty and ability of overlook the whole
- Flexibility to think about plural scenarios
- Ability to cooperate across the field
- Challenge mind and the executive ability

I want to educate the student who learned the ability mentioned above continuously
Thank you for your attention