

HSI Report: Building Structures and Seismic Resistant Technologies

University News | September 14, 2021

The Hokkaido Summer Institute (HSI) 2021 “Building Structures and Seismic Resistant Technologies” course was designed to introduce the participants to the theory and method of designing earthquake-resistant structures. Dr. Kazutaka Shirai (Associate Professor of Hokkaido University’s Faculty of Engineering, Building Structure Control Laboratory) introduced key concepts through lectures and experiments over the course of 4 days (August 23-26, 2021).



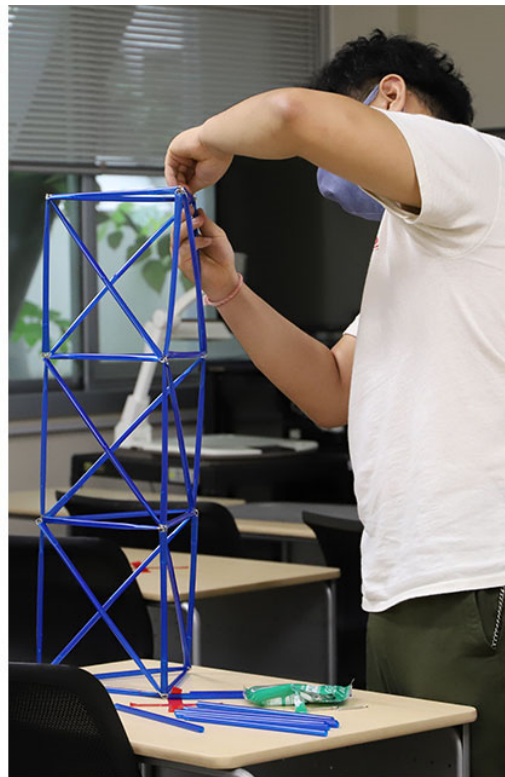
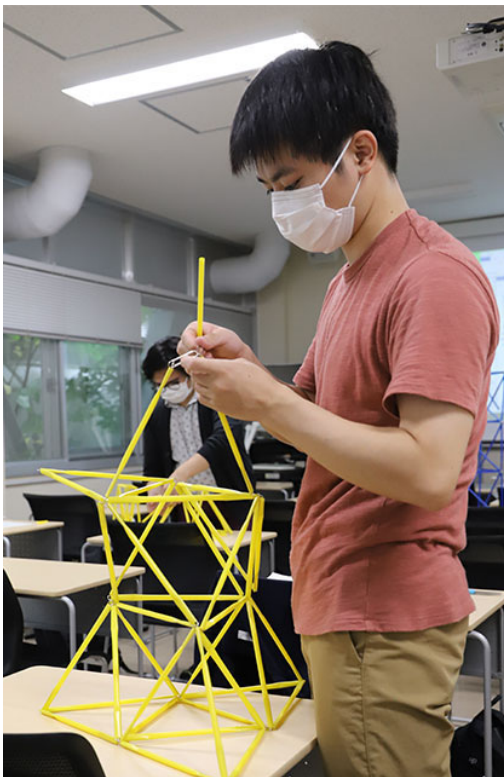
Associate Professor Kazutaka Shirai giving a lecture.

Seismic resistant technologies have been developed and re-developed in search for the most ideal earthquake-proof construction, especially in the earthquake-prone Japan. In his lectures, Dr. Shirai revisited past earthquakes and had the participants look at some noteworthy

Japanese buildings from the perspective of their seismic retrofits and elements surrounding the buildings.

“In assessing the best features to apply to a building, we also need to consider aspects other than the superstructure, like the soil,” explained Dr. Shirai in one of his presentations. He also introduced some low-cost and sustainable seismic vibration control materials, such as the application of scrap rubber pads made of tires of automobiles.

Naturally, the course did not entirely consist of lectures. Course participants were able to get several hands-on experiences. From the shaking table test experiment, the truss structure building activity, to learning how to use a numerical simulation software in analyzing structures; through these activities, students learnt various factors that may or may not contribute to a building’s resistance towards earthquakes.



Students building truss structures. They competed to see who could make the structure with highest endurance through a simple vibration test.

Keishi Tateda is an undergraduate student in mechanical engineering from University of California, San Diego, USA. In his first HSI experience, he decided to take this course as a part of his interest-exploration quest. “To be honest, I have minimal knowledge and background in earthquakes and seismic-resistant structures. But through this course, I gained a lot of new things and had a great time, especially in the truss structure activity.”

Tateda was not the only participant without prior knowledge of seismic-resistant engineering. This year, the course was also attended by students from the School of Science and Graduate School of Medicine. Despite having lesser knowledge in the subject in comparison to their classmates of engineering background, they were still able to clearly grasp the concepts introduced by the facilitator. Every student went through trial-and-error to achieve their best result in applying what they had been learning in the course.



Dr. Kazutaka Shirai explaining the mechanics and purpose of friction damper through a shaking table test experiment. Students applied the dampers and observed how the vibration responses were reduced.

This year’s HSI marked Dr. Shirai’s third year of holding this course. Last year the course had to be held online due to the early period of the Coronavirus pandemic. This year, while the majority of HSI courses are still held online, Dr. Shirai managed to bring it back to its on-site form, maintaining the proper measures for preventing the Coronavirus spread.

Dr. Shirai did admit that most of the applicants from overseas universities had to cancel their applications. “However, all this years’ participants, including those with non-engineering backgrounds, participated very well. It was shown through their presentations and nicely written assignments.” said Dr. Shirai. “They presented good designs of truss buildings which was not an easy task. It is difficult to build a 3D model. Yet, they came up with good designs.”

The “Building Structures and Seismic Resistant Technologies” is planned to be offered in the upcoming years’ HSI; Professor Shirai gladly welcomes anyone who is interested and curious in the subject.

To receive information about HSI 2022, sign up for a reminder through the following link:

<https://hokkaidosummerinstitute.oia.hokudai.ac.jp/E-Notices/>

Written by Aprilia Agatha Gunawan