Student Training Program for Radiation Safety in Hanyang University: Research Internship, Problem-based Learning, and Colloquium

Junik Cho, Euidam Kim, Euna Lee, Wonhyeong Lee, Chae-eon Kim, Jongeun Kim, Jiwon Choi, and Yoonsun Chung*

Department of Nuclear Engineering, Hanyang University, Seoul

Introduction

- Great potential of radiation and its applications in modern technology
- Persisting major barriers to the active use of this technology: the need for radiation safety and social considerations
- Growing social considerations about radiation due to serious events such as Fukushima accident and the radon bed mattress incident
  → Need of **radiation safety and experts for radiation**
- Providing radiation safety education and training to students
  → To meet public demand for radiation safety and professionals

Education and training program for nuclear engineering students supported by **K-CLOUD** (KHNP-Creative & Leading Open-innovation for Ultimate R&D) of KHNP (Korea Hydro & Nuclear Power)

NUROP (Nuclear Undergraduate Research Opportunity Program)

- The purpose of NUROP internship
  - Improving practical research skills, creativity, and teamwork
- For 4 semesters, **42 students from 9 universities** selected among **72 applicants**

Table 1. The number of total/selected applicants and the duration of the NUROP internship program for each semester

Semester	2021 summer	2021 winter	2022 summer	2022 winter	Total
Total applicants	19	26	12	1	72
Selected applicants	10	11	12	9	42
Duration	4 weeks	4 weeks	4 weeks	6 weeks	-

- Intern students
  - Assigned to an affiliated laboratory and received mentorship from senior graduate students
  - Created research posters to present at the end of the program

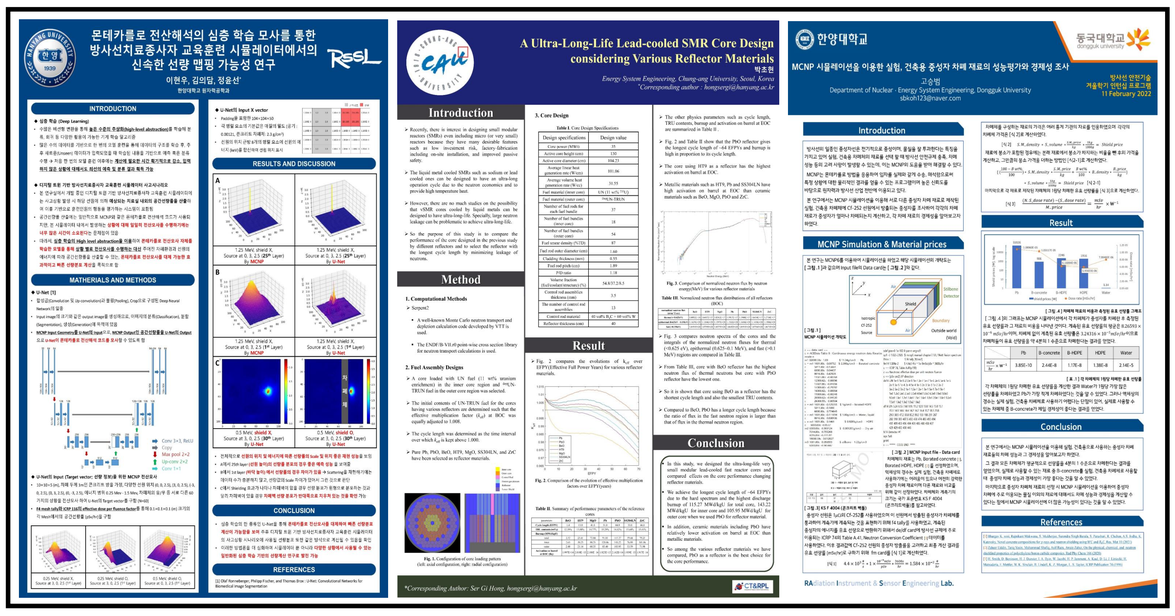

Fig. 1. The example of research posters by NUROP students

- Out of the 22 graduated participants in NUROP
  15 (68.2%) students proceeded to graduate school
  → 14: nuclear engineering, 1: mechanical engineering
- **High satisfaction** with the overall program
  → Strongly agree: 29(76.3%), Agree: 8(21.1%), Neutral: 1(2.6%)

IC-PBL (Industry-Coupled Problem-Based Learning)

- **IC-PBL class:** An educational model at HYU
  - Solving practical problems of the real world through collaboration between industry, local communities, and research institutes
    → Promoting problem-solving ability, practical research capacity, and interdisciplinary research capacity
- Curriculum of the IC-PBL
  1. Shielding evaluation of radiation-related facilities using the **MCNP code**
  2. **3D modeling** to design the shielding of a radiation treatment room with a linear accelerator
     → Modeling and printing their own designed room

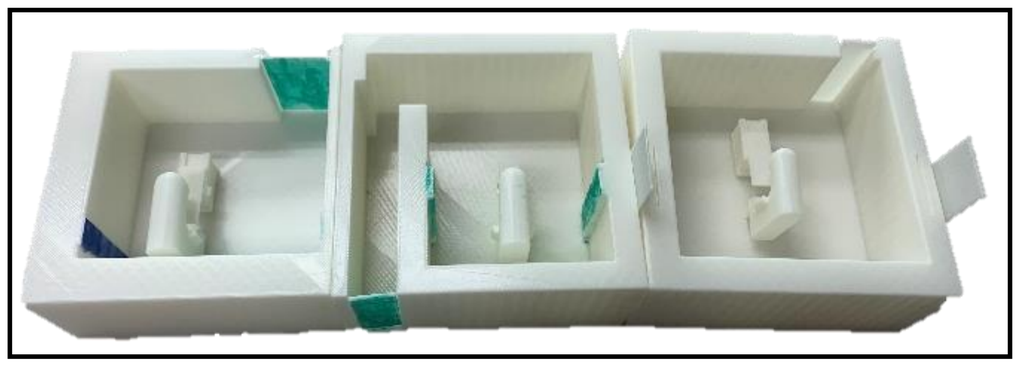

Fig. 2. The 3D printed output of medical shielding design created by students in the IC-PBL class

- **High satisfaction** with the overall program
  → Strongly agree: 13(61.9%), Agree: 7(33.3%), Neutral: 1(4.8%)

Radiation Safety Technology Colloquium

- **Graduate course** in the Department of Nuclear Engineering at HYU
- **Inviting radiation safety experts** from various fields
  - Regulation, research, industry, and medical
  → Discussing the latest trends, issues, overall radiation safety technology
  → Fostering networking opportunities with experts
- Conducting both online platform and offline
  → Online lecture provided for pre-registered students from other universities
- Compiling lecture notes into books and distributing to other universities
- **High satisfaction** with the overall program
  → Strongly agree: 31(83.8%), Agree: 5(13.5%), Neutral: 1(2.7%)

Conclusions

- Developing and implementing the education and training program at HYU supported by K-CLOUD of KHNP
  → Meeting the increasing demand for radiation safety experts
- NUROP, IC-PBL class, and radiation safety technology colloquium
  → **Providing opportunities** for active learning, career exploration, and the development of problem-solving and practical research skills
  → **Excellent satisfaction** with all programs
- Expecting significant impact on student improvement and career choice in the future radiation safety field

Acknowledgement

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