

International Collaboration and Innovative Learning: A Successful COIL Course on Product Development with STIHL

Authors: Prof. Dr. Hendrik Rust, Prof. Dr. Christian Braun, Moritz Brüstle, Prof. Dr. Yi-Juen Chen, Prof. Jyh-Cheng (Jason) Yu, Prof. Tsung-Liang (Anthony) Wu

Karlsruhe University of Applied Sciences (HKA) and National Kaohsiung University of Science and Technology (NKUST) have successfully completed the first collaborative online international learning (COIL) course called "Product Development" during the winter term 2022/2023. The course was jointly developed by professors from both universities and covered product design, development, and marketing. The unique cross-cultural learning experience enabled students to develop professional and intercultural competencies. The core assignment was given by STIHL, a German company that treated students as authentic consultants, giving them clear demands and deadlines to follow. The COIL course provided a valuable opportunity for students to learn from diverse peers and instructors and prepared them for the global workforce.

COIL Courses as an Opportunity for Innovative Teaching and Learning

COIL courses are an innovative approach to higher education that provide students with the opportunity to participate in intercultural learning experiences from the comfort of their own homes. These courses are typically developed collaboratively by professors from different universities and enable students to learn from a diverse group of peers and instructors. COIL courses can help students to develop their intercultural competencies, expand their understanding of different cultures and perspectives, and enhance their language skills. Additionally, these courses can prepare students for the global workforce and provide a unique and valuable educational experience that can broaden their horizons. Overall, COIL courses offer a modern, dynamic and impactful way for students to learn and grow.

This product development course marks the beginning of the implementation of COIL at HKA.

STIHL as an authentic client

What made this course even more special was the fact that the core assignment was given by STIHL, manufacturer of outdoor power equipment and world market leader for chainsaws. A representative of the company attended one of the first virtual lectures and presented the specifics to their assignment. STIHL took the role of the customer and treated the students like authentic consultants. As such, clear demands and deadlines were presented to which students had to adhere.

STIHL's "Urban Garden" project is on a mission to revolutionize the future of gardening! With a focus on innovative equipment, the project aims to understand the evolving needs of urban gardeners and provide them with the tools they need to create their green oasis.

STIHL saw a great opportunity to create a think tank that gives them valuable insight into the next generation of customers. Furthermore, this COIL project offered the advantage of including different cultural perspectives. Since STIHL also has a branch in Taiwan, the ideas and concepts of aspiring Taiwanese Engineers are interesting to the company.

This was not the first time that STIHL and HKA have worked together. Projects between various STIHL departments and various faculties of HKA have been successfully carried out for many years.

Professors' experience and profiles

This course was a joint effort by three Taiwanese and two German professors.

Prof. Dr. Hendrik Rust: PhD in Mechanical Engineering and gained his experience in various positions in a medium-sized company and two corporate groups. Most recently, he was managing director of a German global market leader. In the last 20 years, Hendrik Rust has invited, pre-developed, discarded or brought to market numerous products.

He is now lecturing Product Development and Entrepreneurship at HKA .

Prof. Dr. Cristian Braun: PhD from the Institute for Business-to-Business Marketing at the University of Muenster. Now Professor of B2B Marketing and Entrepreneurship at HKA and vice dean of the Faculty of Management Science and Engineering. His current focus areas are customer-centric B2B Management, Digital Market Strategies, Innovative Service Models, B2B Platforms and Entrepreneurial Marketing. He gained his practical experience from management positions in high-tech companies in Germany and South East Asia.

Prof. Dr. Yi-Juen Chen: Prof. Dr. Yi-juen Chen had worked in HIWIN Technologies Corp., USI Ltd. (ASE Group) and ITRI/TSMC; she received her PhD in Technology Management from National Chung Hsing University, Taiwan. Her research interest is intellectual property management/strategy, and digital transformation. She's now an assistant professor at the National Kaohsiung University of Science and Technology (NKUST) and teaches courses for creativity, innovation, and entrepreneurship.

Prof. Jyh-Cheng (Jason) Yu: Ph.D. from the Department of Mechanical Engineering at the Ohio State University, USA. He is now a distinguished professor in the Department of Mechatronics Engineering at the National Kaohsiung University of Science and Technology (NKUST), Taiwan. Dr. Yu has served in NKUST as a department chair, Dean of the Research and Development Office, and Dean of the College of Engineering. His research interests include intelligent service robots, design innovation, concurrent engineering design, quality engineering using evolutionary optimization, light guide design, and piezoelectric microsensors. Dr. Yu has been dedicated to innovative design and teaching. His enthusiasm and devotion to higher education have won him the 2019 IEET Distinguished Teaching Award and the 2021 National Excellent Teacher Award.

Prof. Tsung-Liang (Anthony) Wu: Dr. Wu received his PhD in Mechanical Engineering from University of Washington, WA, USA, after graduation, was immediately recruited by the largest research institute in Taiwan, i.e. Industrial Technology Research Institute (ITRI), as a researcher and manager for 5 years. At that time, he focused on the development of technologies for intelligent factory and gained ample of industrial experience for later foundation of academic career. In the last 10 years of service in university, Dr. Wu continued to deep knowledge including A.I. in diagnosis, non-stationary signal decoupling, and sensor design, with his group of Dynamic System Design and Analysis Laboratory (DSDA). Until 2023, Dr. Wu has incubated more than 20 graduate students who currently serve as engineers in industry.

In late 2021, Prof. Chen attended a virtual networking event at HKA, where Prof. Rust and Prof. Braun pitched a virtual "product development" course in partnership with a German company. This event aimed to connect professors from various Taiwanese universities and HKA to develop joint COIL courses in the future. After meeting, the professors held regular virtual meetings to plan the project's details, including managing the challenge of online-only courses. They implemented a hybrid scenario where German students and professors met face-to-face at HKA and joined a virtual session together. The system allowed for individual broadcasts of presentations, camera, and sound, while one camera captured the classroom. The same approach was applied to the Taiwanese classroom.



Students' experience and course specifics

The students, tasked with designing and developing new prototypes for STIHL's urban garden project, formed groups of 8-10 and appointed project leaders and deputies to improve teamwork. These self-managed groups met regularly outside of class and delivered interim reports to monitor their progress. STIHL set strict requirements with deadlines for their product, mirroring real-world assignments. This independent group work gives future engineers a taste of authentic working life. At the end of the semester, groups presented their final prototypes in their chosen style, ranging from physical to virtual simulations, and even augmented reality models.



Students presenting their final prototype, Photo: Prof. Hendrik Rust

Beyond the exciting group work, the entire class of over 40 students also met weekly for 90-minute lectures. These lectures were given by Taiwanese and German professors, alternating based on their areas of expertise. The lecturers provided theoretical input tailored to the current tasks and challenges of the student groups, covering topics such as product development basics, market research, and specific methods for conceptualizing and creating a new product. Thanks to this COIL course, NKUST and HKA were able to combine their unique expertise and provide students with a holistic, global perspective on product development.

This collaboration was a huge success, marking the beginning of an exclusively virtual, mutually beneficial partnership between the two universities. The course will be optimized and repeated in the upcoming semester, and due to the success of this first run, more COIL courses are already in the works. Two additional courses will be taught during the summer term of 2023.

In an effort to solidify their relationship and expand future collaborations, a German delegation, including Prof. Dr. Hendrik Rust, visited the First Campus of NKUST. The delegation was not only interested in examining the facilities but also to explore new opportunities for cooperation, including the possibility of launching additional COIL courses or other joint educational programs. The visit was a continuation of the universities' commitment to promoting academic exchange and cross-cultural learning, and the delegation was warmly received by the faculty and staff of NKUST.



Prof. Rust visiting NKUST First Campus in Kaohsiung, Photo: Prof. Anthony Wu

During the visit, many other ideas were exchanged, and some are currently being conceptualized as future COIL courses between NKUST and HKA. Among them, Prof. Braun and Prof. Chen are working on a COIL course concept called "Creativity and Innovation," which introduces students to entrepreneurship.

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