Create a New Circle of Science, Engineering and Design

Introduction to Kyoto University Design School

Toru Ishida, Kyoto University
Overview of Design Studies

Introducing interdisciplinary design theory, method, and practice to seamlessly connect domain design theory/methods to general design methodology.
Cultivating people with outstanding ability to get things done who can design social systems and architectures in collaboration with experts from diverse fields.

Six new General Design Courses have been added.

Seven new Basic Theory Courses linked to the General Design Courses have been added.

Of these 13 new courses, 12 are taught by faculty members from participating departments.

Participation by 11 departments of 4 graduate schools

Write doctoral dissertation

Leading Project (PhD research) Approx. 100 weeks

Field Internship Research Internship Several weeks–months

Open Innovation Practice Approx. 10 weeks

Qualifying Examination

Decision on multidisciplinary advisory committee

Domain Design Courses Approx. 5 courses

General Design Courses Approx. 5 courses

Field-based Learning / Problem-based Learning Approx. 1 week

Study in preparatory course, then begin regular course after a certain period

Pass entrance exam of desired graduate school

Participation by 11 departments of 4 graduate schools

Architecture (Graduate School of Engineering) Mechanical Engineering (Graduate School of Engineering) Informatics (Graduate School of Informatics) Management (Graduate School of Management) Psychology (Graduate School of Education)
General Design Courses

Six new courses in interdisciplinary design theory, methods and methodology

Artifact Design

Study of methodologies for functional design, which aims at achieving an intended purpose, and for usability design, which takes into account the users’ situation/perspective, in the context of artificial systems.


Information Design

Study of techniques and methods of information design for not only areas such as graphic design and infographics, but also information structuring/visualizing, linguistic expression, video expression, and interface design.

Example of easy-to-understand presentation of information (source: Wikipedia, “Infographic”)

Methods for Field Analysis

Study of field analysis methods required in the design of products, services, businesses, etc., including survey methods for ethnography, questionnaires, etc., as well as study of statistical analysis and other methods for quantitative data analysis.

Design Composition Theories

Study of the processes that make up human and environmental systems involved in the design processes, based on understanding of cognitive/social attributes of humans: expression, thought, sensory characteristics, communication, and mutual understanding.

Organization and Community Design

Study of design that avoids hypostatizing society as a “thing,” with reference to the state of real-life organizations and communities, and based on understanding of various sociological theories.

Tool for drawing a vision

Design Methodology

Explanation of the new science of design and design methodologies for creating complex systems, grounded in an overview of the history of design studies since the 1960s.

Structure of design
Lineup of Practical Training in Design

Five steps for practical training in design that combines coursework with workshops.

Problem finding/solving across the domain expertise.

**STEP 1** Summer Design School (taking an interest)

Three days of tackling problems based on industry-academia-government collaboration. 2015: 28 themes, 250 participants. Open to all No credit

**STEP 2** Field-based / Problem-based Learning (learning methods)

Cooperation with experts in other domains, industries, etc. Application of design methods learned in the classroom. 1st-year students 1 credit × 2 times

**STEP 3** Design School in Okinawa/Hong Kong (collaborating)

Three-day joint workshops held with other universities:: facilitation in Okinawa, and problem solving in Hong Kong. 1st/2nd-year No credit

**STEP 4** Open Innovation Practice (managing workshops)

Companies provide challenges to be tackled by team of experts and students. The students are requested to manages the team. 3rd–5th-year 4 credits

**STEP 5** Field Internship (applying expertise)

Challenging practicum forces students to contribute to the team based on their expertise in an unfamiliar environment. 3rd–5th-year 2 credits

**Student Participation**

- Okinawa
  - No 24%
  - 1 time 39%
  - 2 times 25%
  - >2 times 12%
- Hong Kong
  - No 24%
  - 1 time 4%
  - 2 times 33%
  - >3 times 4%

- Yes 79%
- No 21%
Summer Design School

Students experience industry-academia-government collaboration for solving real-world problems of society.

A look at the 2015 program (3 days in September)

Participants: **186**
- KU: 72
- Other universities: 72
- Industries: 42

14 Design School students participated and led the overall program.

Theme proposers: **148**
- KU: 50
- Other universities: 16
- Industries: 82

A new form of interactive learning with a faculty/student ratio of almost 1:1

37 themes drawn from industry-academia-government collaboration

A town where Japanese and foreigners live together - Kyoto in 2025 -
If the world looks the same even in different languages
Revitalize Nishi-jin area with arts and crafts
Design disaster culture in Kyoto
How to utilize empty houses in the future

Consortium members proposed 14 themes. DS students also proposed themes.

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**Participation levels**

- Observers
- Theme proposers
- Participants

**Discussion**
**Brainstorming**
**Prototyping**
**Video Ethnography**
Field-based / Problem-based Learning

New program based on experience of Summer Design School
Laboratories select themes. Carried out with experts in other fields, industries, etc.
Ten projects conducted in 2015.

- Virtual Team Design Using Crowdsourcing (Informatics)
- Plan Design for New Business Types (Informatics)
- “ANSHIN” Design Training (Mechanical Engineering)
- Know about Kyoto Prefecture through an Online Survey (Psychology)
- Townscape Design Based on Community Governance (Architecture)
- Design for New Residences in a Rural Community (Architecture)
- Examining, Representing and Communicating Treasurable Artifacts for Designing Inspiring Museum Experience (English: Informatics)
- Let’s Design New Stationery with 3D CAD and 3D Printer (Mechanical Engineering)
- Designing Experience with Benefit of Inconvenience (Informatics)
- Foreign Language Education++ (English: Informatics)

No. of labs experienced

One 26%

Two 53%

Three 13%

No. of disciplines experienced

One 19%

Two 55%

Three 26%

Participants’ feedback

Student: I was inspired by the knowledge and thinking of members from other disciplines.

Instructor: Students and faculty members representing diverse disciplines pooled their experiences to solve problems together, and through both successes and failures we got to see the characteristics of each methodology.
Students experience intercultural collaboration with members of different universities

**Program with Ryukyu University**

Role of students: **Facilitators**

Participants struggle to identify and solve specific issues faced by Okinawa.

Past focuses: Enhancing the local townscape and hospitality (2013), improving health and employment (2014), and revitalizing Okinawa City's commercial district, Koza (2015)

Participation in 2015: 32 students (KU: 9, UR: 23) and 12 faculty members (KU: 5, UR: 4, +3 others)

**Program with Hong Kong Baptist University**

Role of students: **Solving problems through collaboration**

A challenging program since the workshop is conducted in English and a certain level of expertise is required.

Past focuses: Developing and preserving Lantau Island (2014) and tackling Hong Kong's energy problem (2015)

Participation in 2015: 27 students (KU: 13, HKBU: 14) and 13 faculty members/supporters (KU: 6, HKBU: 7)

**Students’ feedback**

**Okinawa:**

I learned how tough it is to facilitate and about ways to bridge different opinions.
(1st-year student)

**Hong Kong:**

I gained the confidence to produce meaningful results in collaboration with people from different cultural backgrounds and areas of expertise by gradually expanding discussion with an open-minded approach.
(2nd-year student)
Field Internship

A challenging practice in which students contribute to the problem field as an expert.

Cooperation with host organizations in Chizu Village, Indonesia, etc.

<table>
<thead>
<tr>
<th>Theme in 2015: Sustainable tourism focused on rice terrace scenery</th>
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<tr>
<td>Host: Indonesia Heritage Trust (an NGO focused on cultural preservation)</td>
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<td>Period: August 3–7, 2015 (3 DS students)</td>
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An action plan proposal to the government for enhancing rural living on Bali while preserving the scenic rice terrace landscape (World Heritage site), based on the perspectives of culture, economy, and environment.

External evaluation

- Compared with field work programs that we have hosted in the past, this one had a more specific theme and produced well-organized results, which is something we appreciated.
- The students were very eager to do their work, and naturally compare our field with other regions without our instructions.

Students’ feedback

- I learned about how to manage an international team by using the approach of carefully checking member’s understanding in English.
- I learned about how to apply my own expertise from other experts’ behavior.
Introduction to Design Studies
(March 2016)

Design Methodology
Design Composition
Artifact Design
Information Design
Organization/Community Design
Field Analysis

Part I: Fundamentals of Design
1. Basic Theory of Design
2. Design and Cognition

Part II: Design Method
3. Artifact Design
4. Information Design
5. Organization/Community Design
6. Field Analysis

Part III: Domains Practice
7. Service Design
8. Urban Design
9. Healthcare Design
10. Disaster Mitigation Design
11. Education Design

Part IV: Design School
12. Designing Design Workshops
13. Physical Prototyping
14. Designing Design Schools

Publication of textbook series as the first step of design education
(Publisher: Kyoritsu Shuppan)

Creativity and ambition shown in efforts toward theoretical design competency education with respect to design literacy education at various universities. Aggressively and vigorously taking on extremely challenging issues strongly linked to society’s needs.
(External Evaluation Committee)
# Bringing Together Exceptional Students

Students of diverse backgrounds study together

<table>
<thead>
<tr>
<th>Year of study (Leading Project year)</th>
<th>No. of students</th>
<th>Female</th>
<th>International</th>
<th>Non-KU graduate</th>
<th>Adult</th>
<th>Notes (JSPS fellowships, etc.)</th>
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<td>3</td>
<td>15</td>
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<td><strong>Total</strong></td>
<td><strong>66</strong></td>
<td><strong>13(20%)</strong></td>
<td><strong>9(14%)</strong></td>
<td><strong>30(45%)</strong></td>
<td><strong>9(14%)</strong></td>
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- **International student origins**
  China: 3; South Korea: 1; France: 1; Russia: 1; Lebanon: 1; Cambodia: 1; Thailand: 1

- **Students with industry experience**
  R&D, planning/consulting, junior/senior high school teaching, local government, etc.
Self-Assessment of Generic Skills

Students at the beginning of their doctoral studies gave higher ratings to their ability to collaborate than did non-design school students at the end of their studies.

“Generic Skill” is defined as (1) the ability to work on the global stage boldly and collaboratively, guided by a firm set of values; (2) the ability to identify challenges that need to be addressed, formulate hypotheses, and creatively tackle those challenges using one’s own knowledge; and (3) the ability to perceive the essence of things by taking a holistic view informed by one’s advanced expertise, internationality, and broad knowledge. (Ministry of Education)
Students go through a multifaceted process of growth

**Student S (3rd year)**
- PhD research: Cultural value of interpersonal services
  - Qualitative analysis + quantitative analysis
- Master’s research: Analysis of Tabelog (restaurant review site) reputations
  - Tried out quantitative analysis
- Took FBL/PBL 6 times
- Interaction with students in Psychology/Informatics
  - Started feeling I could bring together different disciplines
- 3 weeks at Aalto Univ
  - 1.5 months at Palo Alto Research Center
- Started to wander
  - Attended Summer Design School 3 times

**Student I (3rd year)**
- PhD research: Programming language for IoT and Robot
  - I want to incorporate dynamic variables into the programming language
- Master’s research: Context-oriented language type systems
  - Chose “Robots and Society (Mechanical Engineering)” and “Learning Commons (Education)” for FBL/PBL topics
- Started feeling I could bring together different disciplines
  - Ended up playing lead role in a skit presentation that didn’t fit my type
- 1 week at University of Potsdam
  - 2 weeks at Aalto/Delft
- Not bad.

**1st year**
- Lab (Management): Ethnomethodology
- Seemed a relatively closed community
- Qualitative analysis

**2nd year**
- Lab (Informatics): Program Testing/Type Theory
- Planned workshop with Tama Art University
  - Became familiar with arts and culture
- Strategic Communication Seminar (English)
  - Started feeling I could bring together different disciplines
- 1 week at University of Potsdam
  - 2 weeks at Aalto/Delft

**3rd year**
- Design School in Hong Kong/Okinawa
  - Chose “Robots and Society (Mechanical Engineering)” and “Learning Commons (Education)” for FBL/PBL topics
- Taking FBL/PBL 6 times
  - Joined in workshop with Kyoto City University of Arts
- Planned workshop with Tama Art University
  - Students go through a multifaceted process of growth
- Strategic Communication Seminar (English)
  - Started feeling I could bring together different disciplines
- 3 weeks at Aalto Univ
  - 1.5 months at Palo Alto Research Center

**PhD research**
- Cultural value of interpersonal services
  - Qualitative analysis + quantitative analysis
- Programming language for IoT and Robot
  - I want to incorporate dynamic variables into the programming language
In the course of their studies, many design school students broaden their destinations with respect to career paths that interest them.

Students’ feedback

- In my activities at the Design School I have often received strong acclamation for my management skills and ability to propose new projects, so I think that I might be suited for work that involves these competencies.

- At first, I hadn’t thought about any career paths other than doing research as a member of a national university’s faculty, but recently I’ve started thinking that it might also be good to make use of the knowledge I’ve gained in non-research work in the private sector or at a business.

- In addition to the possibility of becoming a researcher, I also want to consider opportunities to put the communication skills I gained at the Design School to good use as an educator or consultant.
Design Innovation Consortium was founded to promote human resource development through industry-academia-government collaboration. 55 members, comprising corporations, public institutions, etc. (as of Nov. 2015)

A-Members (annual dues: ¥300,000)
- Osaka Gas Co. Ltd.
- Omron Corporation
- Kawasaki Heavy Industries, Ltd.
- Kyoto University Unit of Design
- Kyoto Research Park Corp.
- KDDI R&D Laboratories
- Sharp Corporation
- Sony Corporation
- Daikin Industries, Ltd.
- Daiwa House Industry Co., Ltd.
- Takenaka Corporation
- DMG Mori Co., Ltd.
- Toshiba Corporation
- Toray Industries, Inc.
- Nippon Telegraph and Telephone West
- West Japan Railway Company
- Nikken Sekkei Ltd.
- IBM Japan, Ltd.
- The Japan Research Institute, Ltd.
- Nippon Telegraph and Telephone Corporation
- Nomura Research Institute, Ltd.
- Hakuhodo Inc.
- Panasonic Corporation
- Misawa Homes Institute of Research and Development Co., Ltd.
- Mitsubishi Electric Corporation
- Yamaha Motor Co., Ltd.
- Yokogawa Electric Corporation

B-Members (annual dues: ¥50,000)
- Ishimoto Architectural & Engineering Firm, Inc.
- NTT Data Sekisui Systems Corporation
- Okinawa Kyoiaku Shuppansan, Inc.
- Kajima Corporation
- Kyocera Corporation Central Research Laboratory
- Advanced Science, Technology & Management Research Institute of Kyoto
- Sakura Color Products Corporation
- JFE Steel Corporation
- Sumitomo Heavy Industries, Ltd.
- Sumitomo Electric Industries, Ltd.
- Taisei Corporation
- Architects, Regional Planners & Associates, Kyoto Dentsu Inc.
- Tottori Gas Group
- Fujita Corporation
- Horiba, Ltd.
- Sumitomo Mitsui Construction Co., Ltd.
- Murata Machinery, Ltd.
- Mori Building Co., Ltd.
- Wao Corporation
- mtc Inc.
- Rorze Corporation
- Tanseisha Co., Ltd.
- NEC Corporation

Special Members
- Kyoto Prefecture
- Kyoto City
- Kyoto Chamber of Commerce and Industry
- Information-technology Promotion Agency, Japan

Design Innovation Center Fellows

Fellows work together with Design School and help students with diverse career path experiences.
**Design Innovation Center**

**Design Innovation Center at Kyoto Research Park** (350 tenant companies). A center for creating new ideas and discoveries through encounters and dialogue among various members of businesses, universities, and public agencies.

**Center Activities in 2015**

- **Industry-academia-government collaborative research**
  - 5 events, 4%

- **Industry-academia-government collaborative workshops**
  - 10 events, 9%

- **Industry-academia-government collaborative seminars**
  - 11 events, 9%

- **Industry-academia-government meetings**
  - 24 events, 21%

- **Kyoto University workshops**
  - 49 events, 42%

- **Kyoto University meetings**
  - 10 events, 9%

- **Tours by companies**
  - 7 events, 6%

- **Included in the List of Distinctive Facilities of National Universities**

**Usage rate in 2015 (weekdays only)**

- **Flexible space**
- **Seminar space**
- **Total**

Graph showing the usage rate distribution by month for flexible space, seminar space, and total from April to November.

- **Field-based Learning / Problem-based Learning**
- **Collaborative seminars**
Design Fabrication Center

Consisting of various “studios” which support Design School activities.

- fabrication studio
- sealed studio
- creation studio
- deliberation studio
- presentation studio
- performing studio
- testing studio
- exercise studio
- chat studio
- research studio
- residential students studio
- temporal students working studio
- guest studio
- exhibition studio
- storage studio

A place where students and researchers work together with physical representations and bodily expressions.
The Unit of Design is composed of Kyoto University 76 faculty members.

**International Advisory Board: 10 members**
Barry Katz (IDEO/Stanford University), Bernie Roth (Stanford University), AnnaLee Saxenian (UCB), Pekka Korvenmaa (Aalto University), Maosong Sun (Tsinghua University), Dennis Sylvester (University of Michigan), Wolfgang Wahlster (DFKI), David C. Plaut (CMU), Christer Windeløv-Lidzélius (KaosPilots) and Alison Leggett (University of Bristol).

**Unit of Design: 76 members (5 foreign nationals, 4 women)**
Informatics: 34 (Intelligence Science and Technology, 7; Social Informatics, 14; Applied Mathematics and Physics, 4; Systems Science, 3; Communications and Computer Engineering, 5; Medical Informatics, 1); Engineering: 21 (Architecture and Architectural Engineering, 8; Mechanical Engineering and Science, 6; Micro Engineering, 3; Aeronautics and Astronautics, 2; Electrical Engineering, 1; Neutron Material Engineering, 1); Education: 6; Management: 4; Human Coexistence: 2; Disaster Prevention Research Institute: 2; Kyoto University Museum: 1; Unit of Design: 6

**Adjunct Professors: 3**
Tetsuo Tomiyama (Cranfield University), Hideshi Hamaguchi (monogoto Inc.), Ryohsei Nakatsu (Hexagon Japan)

**Corporate Fellows: 10**
NTT, Toshiba, Mitsubishi Electric, Omron, Nomura Research Institute, Japan Research Institute, Takenaka, Osaka Gas, Hakuhodo, Kyoto Research Park

**Art Experts: 6**
Takeshi Sunaga (Tokyo University of the Arts); Akira Tsukuda, Toyota Horiguchi, Akihisa Tatsumi (Kyoto City University of Arts); Dajjirio Mizuno (Keio University); Koichi Shiraishi (FabLab Kitakagaya)

**International researchers who have coached Design School students**
Thomas Malone (MIT); Richard Davidson (University of Wisconsin-Madison); Mitamura, Shibata (Carnegie Mellon University); Munakata, Miyake (University of Colorado); Robert H. Logie (University of Edinburgh); Kari-Hans Kommonen (Aalto University); Oscar Tomico (Eindhoven University of Technology); P. J. Stappers (Delft University of Technology); L.T. Adishakti, Robert Hirschfeld (University of potsdam); Paola Falini (Sapienza University of Rome); Ryo Okui (University of Rouen); Eva Loth (University of London); Dwita Hadi Rahmi (Gadjah Mada University); Ying-Yi Hong (University of Hong Kong); Jiming Liu (Hong Kong Baptist University); and many others
Develop a curriculum that meets international standards through collaboration.

**Harvard University**
- Graduate School of Design
- Ph.D. in Design since 1936
- Architecture
- Collaborative Master in Design Engineering since 2016
- John A. Paulson School of Engineering and Applied Sciences
- Engineering
- Design is found at the nexus of technology, society, and environment
- Ph.D. in Design since 1969

**Delft University of Technology**
- The Graduate School of Industrial Design Engineering
- Ph.D. in Design since 1969
- (1) Discipline-related skills
- (2) Research skills
- (3) Transferable skills
- Staffed with faculty representing diverse disciplines, including Psychology, Mechanical Engineering, and Informatics

**Aalto University**
- Formed in 2010 through integration of three universities with different focuses: engineering, art, and economics.
- Emphasizes ties with industry.
- Tackles challenges in healthcare, aging society, and global warming.
- Engineering, Art, Economics

**Stanford University**
- Hasso Plattner Institute of Design d.School since 2004
- Hosts cross-disciplinary design workshops.
- Non-degree institute without its own students.
- Mechanical Engineering, Informatics

**KU Collaborative Graduate Program in Design**
- Informatics, Mechanical Engineering, Architecture, Management, Psychology

**British Council**
- Transferable Skills Program

**IDEO**
- IDEO.com offers services in product and organization design; IDEO.org supports developing countries

**Mecahnical Engineering, Informatics**
Kyoto University has created the circle of Science and Engineering. Kyoto University Design School will create a circle of Science, Engineering and Design for future human society.