**Global Learning Initiatives Program Course Syllabus**

**Course Information**

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| Course Name | Comput. Design Thinking & Fabric. Studio (CITE490A) |
| Lecturer(s) | Prof. Juhong Park |
| Course Description | The purpose of this studio is to introduce students’ computational design thinking, incrementally iterative and explorative  reflective thinking utilizing computational power in the design process, through scalable making and fabrication projects. W  eekly lectures provide reading materials to teach the theoretical background of thinking, the thinking of thought process (m  eta-thinking), and design thinking. These include schema (mental model) theory, constructivist theory/constructionism, and m  etaphor. At the same time, the course will gradually cover both software and hardware design tools, such as Rhino 3D (3D mod  eling), 3DS Max (visualization), Python and Grasshopper (programming tools), and rapid prototyping technologies (laser cutti  ng, 3D printing, CNC milling, and physical computing). After the successful finish of this studio, students will gain a conf  idence in navigating self-motivated journey to explore the uncertainties of design and the design process. |
| Course Objectives | 1.Students will acquirefundamental knowledge in computational design and digital fabrication.  2.Students will acquireknowledge of algorithmic and systemic thinking.  3.Students will be introducedto a variety of computational thinking such as abstraction, modularization, incremental iterat  ion, and reflection-in-action.  4.Students will acquireevidence-based design and research skills.  5.Students will furtherdevelop their verbal presentation techniques and visual communication skills |
| Suggested Proficiencies | 3D CAD Modeling using Rhino 3D, 3DS Max, Maya, Sketchup, or Inventor.  Programming Skills such as Python, Java, or C/C++/C#  Object Oriented Programming |
| Reading List | Perkins, D. N. (1994). Creativity: Beyond the Darwinian paradigm. In M. A. Boden (Ed.), Dimensions of creativity (pp. 119-142).  Cambridge, MA: MIT Press  Perkins, D. N. (1995). Insight in minds and genes. In R. J. Sternberg & J. E. Davidson (Eds.), The nature of insight (pp. 49 5-534). Cambridge, MA: MIT Press  Perkins, D.N., & Grotzer, T.A. (2005).  Dimensions of causal understanding: The role of complex causal models in students' un  derstanding of science. Studies in Science Education, 41, 117-166.  Parnas, D. L., & Clements, P. C. (1986). A rational design process: How and why to fake it. IEEE Trans. Softw. Eng., 12(2) |
| Grading Criteria | Daily/Weekly Assignments 30%  Attendance 20%  Final Presentation/Exhibition 50%# |

**Course Schedule**

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| Class  (Week) | Date | Course Topic | Lecturer |
| 1 | Week 1 | Computational Thinking | *Prof. Juhong Park* |
| 2 | Week 2 | Data Thinking | *Prof. Juhong Park* |
| 3 | Week 3 | Abstract Thinking | *Prof. Juhong Park* |
| 4 | Week 4 | Structural Thinking | *Prof. Juhong Park* |
| 5 | Week 5 | Module 1 Review  -Procedural Design Thinking  (2D Design) | *Prof. Juhong Park* |
| 6 | Week 6 | Modular Thinking | *Prof. Juhong Park* |
| 7 | Week 7 | Generative Thinking | *Prof. Juhong Park* |
| 8 | Week 8 | Parallel Thinking | *Prof. Juhong Park* |
| 9 | Week 9 | Pattern Thinking | *Prof. Juhong Park* |
| 10 | Week 10 | Module 2 Review  -Object-oriented Design Thinking  (3D Design) | *Prof. Juhong Park* |
| 11 | Week 11 | Visual Representation  - Rendering and Collage | *Prof. Juhong Park* |
| 12 | Week 12 | 2D and 2.5DFabrication  - Laser Cutters | *Prof. Juhong Park* |
| 13 | Week 13 | Additive 3DFabrication  - 3D Printing | *Prof. Juhong Park* |
| 14 | Week 14 | Subtractive 3DFabrication  - CNC Machine | *Prof. Juhong Park* |
| 15 | Week 15 | Final Review  -Computational Design Thinking and Fabrication  (Independent Projects) | *Prof. Juhong Park* |