Built Environment

CODE2110
Computational Design
Theory 3

Dr. Nicole Gardner
Disclaimer
This abbreviated course outline is indicative of the outcomes, delivery and assessment. While Course Learning Outcomes will remain constant, other details may be subject to change. The full and most accurate course outline will be available in Moodle.

1. COURSE STAFF

<table>
<thead>
<tr>
<th>Course Convenor</th>
<th>Dr. Nicole Gardner</th>
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<tbody>
<tr>
<td>Email</td>
<td><a href="mailto:n.gardner@unsw.edu.au">n.gardner@unsw.edu.au</a></td>
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2. COURSE DETAILS

Credit Points: 6 UoC

<table>
<thead>
<tr>
<th>Learning Activity</th>
<th>Hours per week</th>
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<tbody>
<tr>
<td>Lecture</td>
<td>1</td>
</tr>
<tr>
<td>Tutorial</td>
<td>4</td>
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<tr>
<td>Online learning activity</td>
<td>1</td>
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Description
This course is part of the practice orientated teaching trajectory 'Calibrating' in the Path 1: Computational Design Theory. The course is situated in the 'Beginner Level' in the CoDe student specialisation journey and therefore available for enrolment as an elective for all other UNSW undergrad students.

In the early nineties, the concept of the paperless studio and the integration of digital media into design practice; the 'digital turn', were considered to be merely experiments undertaken by the avant-garde. Today, computation is embedded in all aspects of design practice from conception to construction. New digital design techniques have been joined by new methodologies and formal outcomes. The representation of design has greater sophistication and we understand more about the effects of digital imagery. Computation has also infiltrated the construction of our built environment, from materiality to management. Highly complex information systems process, analyse and integrate components in 3D virtual spaces.

Computation is ubiquitous in our built environment, and its integration has had significant effect on the culture of the design and built environment. The interest we have in technology has moved beyond merely the creation of blob architecture into the new possibilities and challenges it offers to parametrics, sustainability and fabrication. This course will explore the elaborate relationship between computer, the designer and the design and construction of our built environment. The semester's lectures will help in better understanding the relationships and effect of the continual change and evolution on the social and cultural aspects of our design practices. A range of bridging theories essential to the 'digital turn' in building information management, information modelling, as well as the agency for simulation and optimization will be introduced. For example, pre-BIM design concepts; agency in architecture; visualization; materiality and material practice; robotics and making, BIM in practice and so on.

Students will have an opportunity to develop their understanding of ideas and issues through their participation in a critical discussion group. Theoretical understanding will be expanded and formalised through online activities and through illustrated writing exercises, which will be presented in class. The teaching strategy of the course positions students to the concept and theoretical formation of the digital design.
Program Learning Outcomes (PLO)

1. Synthesise interdisciplinary knowledge of cultural, natural, and technological systems in local and global contexts.
2. Apply interdisciplinary knowledge using computational design thinking and methods to built environment challenges.
3. Critically analyse complex environmental conditions through digital technologies and computational methods.
4. Apply computational design knowledge and skills for professional work and, or further learning.
5. Practice the ethical application of digital and computational technologies in and for the design of the built environment.

Course Learning Outcomes (CLOs) with Alignment to PLOs and Assessment

<table>
<thead>
<tr>
<th>CLO #</th>
<th>CLO Statement</th>
<th>PLO #</th>
<th>Related Assessment</th>
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<tbody>
<tr>
<td>CLO 1</td>
<td>generate their own critical design positions as well as navigate and expand the digital design media that explores new forms and relationships between the designer, environment, workflow, and information.</td>
<td>1, 3, 5</td>
<td>Assignment 1 / Assignment 2 / Assignment 3 / Assignment 4</td>
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<tr>
<td>CLO 2</td>
<td>construct his or her own ‘theoretical interval’ and formulate theoretical discourse in practice.</td>
<td>1, 4</td>
<td>Assignment 1 / Assignment 2 / Assignment 3 / Assignment 4</td>
</tr>
<tr>
<td>CLO 3</td>
<td>formulate his/her own design paradigm.</td>
<td>2, 3, 5</td>
<td>Assignment 1 / Assignment 2 / Assignment 3 / Assignment 4</td>
</tr>
<tr>
<td>CLO 4</td>
<td>analyse and re-construct significant projects by operating theories in the expanding field of technologies.</td>
<td>1, 3, 5</td>
<td>Assignment 1 / Assignment 4</td>
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3. ASSESSMENT

<table>
<thead>
<tr>
<th>Assessment Task</th>
<th>Weight</th>
<th>CLOs Assessed</th>
<th>Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assignment 1A: Making experiment</td>
<td>25%</td>
<td>CLO 1 / CLO 2 / CLO 3 / CLO 4</td>
<td>Week 3</td>
</tr>
<tr>
<td>1. Assignment 1B: Making experiment</td>
<td>25%</td>
<td>CLO 1 / CLO 2 / CLO 3 / CLO 4</td>
<td>Week 6</td>
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These two experiments explore the relationships between analogue and digital design techniques through making physical/virtual objects, and reflecting on the experiments and their outcomes through graphic diagrams, images, and text. The text must describe and connect the experimental making process in relation to theory(s). by drawing on a minimum of two readings of your choice from the list provided. Format: Three A4 vertical format colour hard copies to be pinned to the wall that include: -Photographs of the finished product(s) -Photographs of the making process with annotations -Images of the digital design process with annotations
At least one graphic diagram that simplifies and abstracts the basic principles involved in your experiment. 500 words detailing and reflecting on the outcomes of the process in relation to the chosen theoretical readings.

2. Assignment 2: Analytical writing & class discussion
This assignment requires reading reviewing and analysing readings as set out in the course outline before each lecture and writing a 250-300 word critical analysis of the reading in comparison with the previous week’s reading. A critical analysis requires a reflection on the key ideas discussed and a questioning of the argument and its findings, and most importantly, how those ideas and arguments differ from or align with those in the previous week’s reading. Though short, this writing tasks should be considered as mini-essays, complete with an introduction, body, and conclusion, and citations where appropriate. Announce in the introduction how you believe this reading relates to the previous week’s, and then use (max 2) paragraphs to provide evidence to support your argument. In the conclusion identify what (if any) new interesting questions arise from the comparison of the two texts. Format: A4, double-spaced, Times New Roman font; identify with student name, number and tutor name. Students must submit their analysis to their tutor in hard copy before the lecture.

3. Assignment 3: Illustrated catalogue essay
This assignment is the compilation of the making experiments including text and diagrams, revised according to feedback, for an exhibition catalogue. The fictional exhibition is notionally called “Computational Design Theory in Practice”. This will comprise of a 1500 word (minimum) essay that reflects on the subject as a whole, including the lectures and weekly readings. The essay should state your position on the relationship between digital and analogue methods of design and making. Format: A5 printed booklet, vertical format. No page number limit.

4. Online Exam: Moodle Quiz
Multiple choice questions based on material presented in lectures and tutorial readings.

4. WEEKLY COURSE SCHEDULE

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Activity</th>
<th>Related CLO</th>
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| Week 1 | Digital craft | • Activity: Exercise – Paper material explorations. Anisotropy and the effects of water cellulose in commercial paper  
• Activity: Introduction to Assignment 1: Making Experiments Select making experiment 1 and generate research question. | CLO 1 CLO 4 |
| Week | Human-machine interaction & collaborative making | Activity: Read and discuss set reading.  
CLO 4 |
|---|---|---|---|
| Week 2 | Emergence | Activity: Discuss set readings.  
Activity: Making experiment  
ONLINE: Read set articles and comment in Moodle forum | CLO 1  
CLO 2  
CLO 3  
CLO 4 |
| Week 3 | Biomimicry | Activity: Discuss set readings.  
Presentation: Assignment 1 Making Assignment 1A  
ONLINE: Read set articles and comment in Moodle forum | CLO 1  
CLO 2  
CLO 3  
CLO 4 |
| Week 4 | Performance | Activity: Discuss set readings.  
Activity: Making experiment  
ONLINE: Read set articles and comment in Moodle forum | CLO 1  
CLO 4 |
| Week 5 | Digital Tectonics | Activity: Discuss set readings.  
Activity: Making experiment  
ONLINE: Read set articles and comment in Moodle forum | CLO 1  
CLO 4 |
| Week 6 | Design-to-production | Activity: Discuss set readings.  
Activity: Making experiment  
ONLINE: Read set articles and comment in Moodle forum | CLO 1  
CLO 4 |
| Week 7 | Open Source & big data | Activity: Discuss set readings.  
Activity: Presentation: Assignment 1 Making Assignment 1B  
ONLINE: Read set articles and comment in Moodle forum | CLO 1  
CLO 2  
CLO 3  
CLO 4 |
| Week 8 | Industry 4.0 | Activity: Discuss set readings.  
Activity: Making experiment  
ONLINE: Read set articles and comment in Moodle forum | CLO 1  
CLO 4 |
| Week 9 | Ways of making and ethics | Activity: Discuss set readings.  
Presentation: Assignment 3 Exhibition & exhibition catalogue  
ONLINE: Quiz | CLO 1  
CLO 2  
CLO 3  
CLO 4 |