



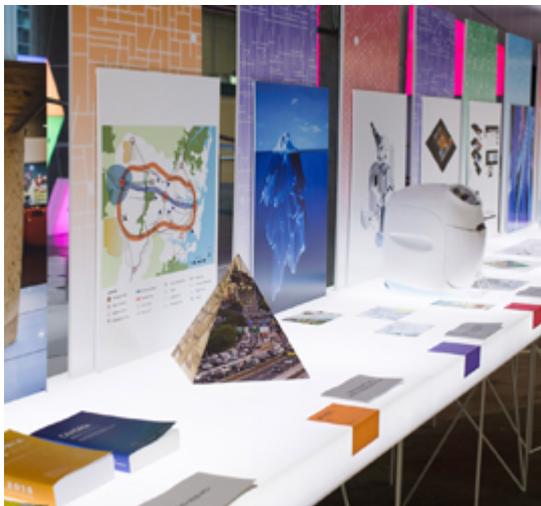
**UNSW**  
SYDNEY

Australia's  
Global  
University

# Built Environment

CODE1110  
Computational Design Theory I

Dr Nicole Gardner



3+ Abbreviated Course Outline – T1

## 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

<b>Course Convenor</b>	Dr Nicole Gardner
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## 2. COURSE DETAILS

**Credit Points:** 6 UoC

<b>Learning Activity</b>	<b>Hours per week</b>
Lecture	1
Tutorial	4
Online learning activity	1

### Description

This course addresses architecture's digital turn and introduces students to historical and contemporary discourses, theoretical concepts and ideas, and architectural projects that have engaged digital technologies and computational design thinking and methods from the late twentieth century onwards. Students will undertake verbal, visual, and written modes of analysis to develop knowledge and critically evaluate discourses and architectural projects relating to digital and computational design technologies. Students will employ a range of verbal and multimedia communication mediums and skills to demonstrate their knowledge and analysis.

### Program Learning Outcomes (PLOs)

The Computational Design Program Learning Outcomes addressed in this course are:

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

<b>CLO #</b>	<b>CLO Statement</b>	<b>PLO #</b>	<b>Related Assessment</b>
CLO 1	Synthesise historical and theoretical knowledge of computational design thinking and methods in an architectural context.	1	Assignment 1 / Assignment 3 / Assignment 4
CLO 2	Critically analyse architectural projects that engage computational thinking and methods.	3	Assignment 1 / Assignment 2 / Assignment 3
CLO 3	Analyse and evaluate the ethical application of digital	4	Assignment 3

	and computational technologies in an architectural context.		
CLO 4	Demonstrate a range of written, verbal and multimedia communication skills.	5	Assignment 1

### 3. ASSESSMENT

Assessment Task	Weight	Course Learning Outcomes assessed	Due Date
<p><b>1. Assignment 1: Reflective Writing (Individual)</b> Based on the lectures and weekly required readings, students will submit x3 pieces of writing, firstly in Week 2 - a synopsis, secondly in Week 5 - an analysis, and thirdly in Week 8 - a critique. Each writing task is required to be approximately 300-500 words supported by independent research (references, images, diagrams, and a range of representations). WEEK 2 Synoptic writing: identify and summarise the key themes and concepts across the different required readings from weeks 1 + 2. WEEK 5 Analytic writing: identify, compare, contrast and evaluate the themes and concepts across the required readings from weeks 1-4. WEEK 8 Critique: select, explain and interpret related arguments and positions from the readings from week 1-7, and then evaluate their merits and formulate your own interpretation. Each writing task requires students to closely read and interpret the weekly required readings. This can be achieved by discussing, comparing, and referencing the key concepts and examples from each article and the inclusion and interpretation of key quotes. The writing must adopt the Harvard style in-text referencing system and correctly attribute concepts, ideas and quotes.</p>	20%	CLO 1 / CLO 2	Week 2 / Week 5 / Week 8
<p><b>2. Assignment 2: Discursive formations – Computational Design timelines (Individual)</b> This assignment employs Michel Foucault’s notion of a “discursive formation” to explore how the computational design paradigm has been constituted and articulated through certain images, concepts, texts, and practices. For Foucault (1972), a discursive formation concerns the way meanings are connected together across multiple texts or sources. In this way, discourse can be understood as “a coherent pattern of statements across a range of archives and sites” (Green quoted in Rose 2012, p.198). Select a project from an architect featured in the key course text <i>The Archaeology of the Digital: Frank Gehry, Chuck Hoberman, Shoji Yoh</i> (Lynn 2013). This project will act as the initial ‘protagonist’ from which to then research an additional 4 other projects (by the same or different architect/inventor/engineer) and construct a discursive formation in the shape of a graphic and textual ‘timeline’. The content of the timeline could address themes such as form, space, concept, goal, organisation (function, space, circulation, material process), typology, materiality, client/user. The timeline should construct a</p>	30%	CLO 2 / CLO 4	Week 4

system of dispersion – i.e. logic of connecting the selected projects/concepts/themes. The timeline should question the ‘true’ meaning of the project, and challenge the preconceived linearity of time, past and future.			
<p><b>3. Assignment 3: Interview with an architect (Group)</b></p> <p>This assignment takes inspiration from the format of the Greg Lynn show where Lynn interviews significant architectural figures who are engaged in computational design thinking and methods to realise their architectural projects. In student pairs, students will choose a significant figure from the computational design paradigm (as discussed in lectures and readings) and script and film a highly polished 5minute (minimum) interview. Student teams will need to thoroughly research their selected figure and become familiar with their design philosophy and key projects to script both sides of the interview. The interview should also demonstrate the computational designer / architect’s situated-ness/position within the wider computational design context. For example, the interviewer may pose questions to interviewee about their view/response to other buildings/projects and other significant figures that are similar or different. The recorded interview should be curated to also include (throw to with voice overs) images and diagrams of the interviewee’s projects, as well as diagrams and 3D digital models created by the students to demonstrate spatial/material/formal concepts, i.e. computational processes or constructability models, visualisations, fly-thru, as well as completed project images. (projects by the interviewee do not need to necessarily be built). The interview script, and the recorded interview, should demonstrate inventiveness, creativity, and critical reflection. It should be compelling as well as intellectual, and find ways to demonstrate the knowledge and interpretation of the computational design paradigm gained through the student’s own research as well as the lecture and course material delivered throughout the semester.</p>	30%	CLO 1 / CLO 2 / CLO 3 / CLO 4	Week 10
<p><b>4. Online Exam: Moodle Quiz (Individual)</b></p> <p>Multiple choice questions based on material presented in lectures and tutorial readings. Maximum of x2 attempts</p>	20%	CLO 1	Week 12 (Exam week)

#### 4. WEEKLY COURSE SCHEDULE

Week	Topic	Activity	Related CLO
Week 1	What is computational design? A discursive exploration	<ul style="list-style-type: none"> <li>Activity 'Words and Buildings' - in groups of x3 students read assigned articles and compile a list of keywords and definitions:</li> </ul> <ol style="list-style-type: none"> <li>Carpo, M. 2013, "Introduction: Twenty years of digital design", in M. Carpo (ed) <i>The digital turn in architecture 1992-2012</i>, John Wiley &amp; Sons Ltd, West Sussex, U.K. pp 8-14.</li> <li>Menges, A. 2011, "Introduction", in A. Menges &amp; S. Ahlquist (ed) <i>Computational Design Thinking</i>, John Wiley &amp; Sons Ltd, West Sussex, U.K. pp 10-21.</li> <li>Leach, N. 2017, "Introduction", in N. Leach and P. Yuan (eds) <i>Computational Design</i>, Tongji University Press, People's Republic of China, pp.11-28.</li> </ol> <ul style="list-style-type: none"> <li>ONLINE read and answer Moodle set questions - What is synoptic writing?</li> </ul>	CLO 1 CLO 4
Week 2	The digital turn in architecture: A history of the recent past	<ul style="list-style-type: none"> <li>Activity 'Computational design aesthetics-image matrix' – Drawing on key words and themes established in week 1 compile a corresponding image matrix</li> <li>Activity: Workshop - Introduction to Adobe Photoshop/InDesign/Illustrator</li> <li>ONLINE read set readings Submit Assignment 1a: Synoptic writing (500w)</li> </ul>	CLO 1 CLO 4
Week 3	Geometric mutability: Computation and complexity	<ul style="list-style-type: none"> <li>Activity: Workshop - Graphic strategies and compositions - Adobe Photoshop/InDesign/Illustrator</li> <li>Activity: Students to present work-in-progress research Assignment 2: Computational Design Timeline</li> <li>ONLINE read and answer Moodle set questions - What is analytic writing?</li> </ul>	CLO 2 CLO 4
Week 4	Geometric mutability: Complex forms and complex surfaces	<ul style="list-style-type: none"> <li>Activity Presentation Assignment 2: Computational Design Timeline</li> <li>ONLINE read set readings</li> </ul>	CLO 2 CLO 4
Week 5	Environmental catalysts: Simulations and responsiveness	<ul style="list-style-type: none"> <li>Activity: Introduction to Assignment 2 Interview with an architect &amp; organization of groups</li> <li>Activity: Watch <i>The Greg Lynn</i> show &amp; student examples from 2018.</li> <li>ONLINE read set readings Submit Assignment 1b: analytic writing (500w)</li> </ul>	CLO 2 CLO 4
Week 6	Dynamic structures and performance	<ul style="list-style-type: none"> <li>Activity: Student groups to compile and present x4 different examples of filmed interview formats and discuss their attributes</li> </ul>	CLO 2 CLO 3

		<ul style="list-style-type: none"> <li>Activity: Student groups to present initial architect interview research themes and questions</li> <li>ONLINE read set readings</li> </ul>	
Week 7	Digital materials	<ul style="list-style-type: none"> <li>Activity: Workshop 1: Introduction to designing and filming interviews, overall organization, scenes, and storyboarding</li> <li>Activity: Reading discussion and group critical writing activity</li> <li>ONLINE read set readings</li> </ul>	CLO 2 CLO 3 CLO 4
Week 8	Data systems: Generative design methods	<ul style="list-style-type: none"> <li>Activity: Workshop 2: Designing and filming interviews, sound and lighting techniques</li> <li>Activity: Group work-in-progress consultations</li> <li>ONLINE read set readings</li> <li>Submit Assignment 1b: Critical writing (500w)</li> </ul>	CLO 1 CLO 4
Week 9	Computational design: Elegance and aesthetics	<ul style="list-style-type: none"> <li>Activity: Group work-in-progress consultations</li> <li>ONLINE read and answer Moodle set questions</li> </ul>	CLO 2 CLO 3 CLO 4
Week 10	Computational design aesthetics: Case study	<ul style="list-style-type: none"> <li>Activity: Interview with an Architect Film screening</li> <li>ONLINE Moodle Quiz complete by Week 12.</li> </ul>	CLO 1 CLO 2 CLO 3 CLO 4