



## UNSW Course Outline

# BENV1012 Parametric Design and Digital Fabrication - 2024

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## General Course Information

**Course Code :** BENV1012

**Year :** 2024

**Term :** Term 2

**Teaching Period :** T2

**Is a multi-term course? :** No

**Faculty :** Faculty of Arts, Design and Architecture

**Academic Unit :** School of Built Environment

**Delivery Mode :** In Person

**Delivery Format :** Standard

**Delivery Location :** Kensington

**Campus :** Sydney

**Study Level :** Undergraduate

**Units of Credit :** 6

### Useful Links

[Handbook Class Timetable](#)

## Course Details & Outcomes

### Course Description

Parametric Design and Digital Fabrication introduces you to computational design methods and digital fabrication. It focuses on the relationship between mathematics and geometry, and how these two fields are foundations of parametric design processes. You will develop skills in the

creation of adaptable models and explore the advantages of a flexible design. You will learn visual programming, and a range of digital fabrication techniques, construction systems, and materials to translate your digital models into physical prototypes.

## Course Learning Outcomes

Course Learning Outcomes
CL01 : Apply fundamental visual programming skills to produce digitally fabricated objects and forms.
CL02 : Connect computational design knowledge and processes to fabrication.
CL03 : Apply digital fabrication skills to design projects and other professional work.
CL04 : Communicate computational design ideas through scripting, digital modelling, and 3D fabricated prototypes.

Course Learning Outcomes	Assessment Item
CL01 : Apply fundamental visual programming skills to produce digitally fabricated objects and forms.	<ul style="list-style-type: none"><li>• Scripting and Fabrication of Flexible Surfaces</li><li>• Scripting and Fabrication of Construction Systems</li></ul>
CL02 : Connect computational design knowledge and processes to fabrication.	<ul style="list-style-type: none"><li>• Scripting and Fabrication of Flexible Surfaces</li><li>• Scripting and Fabrication of Construction Systems</li></ul>
CL03 : Apply digital fabrication skills to design projects and other professional work.	<ul style="list-style-type: none"><li>• Scripting and Fabrication of Flexible Surfaces</li><li>• Scripting and Fabrication of Construction Systems</li></ul>
CL04 : Communicate computational design ideas through scripting, digital modelling, and 3D fabricated prototypes.	<ul style="list-style-type: none"><li>• Scripting and Fabrication of Construction Systems</li></ul>

## Learning and Teaching Technologies

Moodle - Learning Management System

## Learning and Teaching in this course

The course is delivered through lectures and tutorials. Tutorials will build on the knowledge introduced in lectures and involve activities to develop your technical skills

# Assessments

## Assessment Structure

Assessment Item	Weight	Relevant Dates
Scripting and Fabrication of Flexible Surfaces Assessment Format: Individual	40%	Start Date: Week 1 Due Date: Week 5: 24 June - 30 June
Scripting and Fabrication of Construction Systems Assessment Format: Individual	60%	Start Date: Week 5 Due Date: Week 11: 05 August - 11 August

## Assessment Details

### Scripting and Fabrication of Flexible Surfaces

#### Assessment Overview

You will apply scripting techniques for flexible surfaces based on 2D and 3D modular patterns for digital fabrication. Grading will be done against assessment criteria accompanied by written feedback.

#### Course Learning Outcomes

- CL01 : Apply fundamental visual programming skills to produce digitally fabricated objects and forms.
- CL02 : Connect computational design knowledge and processes to fabrication.
- CL03 : Apply digital fabrication skills to design projects and other professional work.

#### Detailed Assessment Description

Refer to the Assessment Brief in Moodle for a detailed description.

#### Assessment information

#### Use of AI: Permission Level: Simple Editing Assistance

For this assessment task, you may use AI-based software to research and prepare prior to completing your assessment. You are permitted to use standard editing and referencing functions in word processing software (limited to spelling and grammar checking) in the creation of your submission. You must not use any functions that generate, paraphrase or translate passages of text, whether based on your own work or not.

Please note that your submission will be passed through an AI-generated text detection tool. If your marker has concerns that your answer contains passages of AI-generated text you may be asked to explain your work. If you are unable to satisfactorily demonstrate your understanding of your submission you may be referred to UNSW Conduct & Integrity Office for investigation for

academic misconduct and possible penalties.

**Assignment submission Turnitin type**

Not Applicable

## **Scripting and Fabrication of Construction Systems**

**Assessment Overview**

You will apply scripting techniques for rationalisation of simple and double curvature surfaces to create construction systems based on discrete elements for digital fabrication. You will learn data management based on lists and trees. Grading will be done against assessment criteria accompanied by written feedback.

**Course Learning Outcomes**

- CL01 : Apply fundamental visual programming skills to produce digitally fabricated objects and forms.
- CL02 : Connect computational design knowledge and processes to fabrication.
- CL03 : Apply digital fabrication skills to design projects and other professional work.
- CL04 : Communicate computational design ideas through scripting, digital modelling, and 3D fabricated prototypes.

**Detailed Assessment Description**

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### Grading Basis

Standard

### Requirements to pass course

Achieve a composite mark of, at least, 50 out of 100 points.

# Course Schedule

Teaching Week/Module	Activity Type	Content
Week 0 : 20 May - 26 May	Module	Digital Fabrication Training and Software Installation
Week 1 : 27 May - 2 June	Online Activity	Rhinoceros: Exploring Rhinoceros
	Lecture	Introduction to the Course
	Tutorial	Grasshopper: Exploring Grasshopper: Origami Pattern
	Studio	Task 1.1: Origami Pattern (original design)
Week 2 : 3 June - 9 June	Online Activity	Rhinoceros: Create a Template
	Lecture	Numbers, Functions and Curves. Creating Basic Elements in Grasshopper
	Tutorial	Grasshopper: Exploring 2D Curves and Patterns: Living Hinges
	Studio	Task 1.2: Living Hinges (original design)
Week 3 : 10 June - 16 June	Assessment	Submission Assessment 1 [Formative] -Including Tasks 1.1 and 1.2- (refer to Moodle for more detailed information)
	Online Activity	Rhinoceros: Creating Surfaces from Curves. Transformations
	Lecture	Data Management 1: Lists, Sets and Domains
	Tutorial	Grasshopper: Exploring 3D Surfaces and Solids: 3D Printed Textile
	Studio	Task 1.3: 3D Printed Textile (original design)
Week 4 : 17 June - 23 June	Online Activity	Rhinoceros: Editing Curves and Surfaces. Intersections
	Lecture	Classification and Rationalization of Surfaces
	Studio	Assessment 1 Consultations
Week 5 : 24 June - 30 June	Assessment	Submission Assessment 1 [Summative] -Including Tasks 1.1, 1.2, 1.3 and 1 Physical Prototype- (refer to Moodle for more detailed information)
	Online Activity	Rhinoceros: Extracting 2D Drawings for Documentation. Organization and Annotation
	Lecture	Analysis and Evaluation of Points, Curves and Surfaces
	Tutorial	Grasshopper: Attractor Points: Panelling with Dynamic Patterns
	Studio	Task 2.1: Panelling with Dynamic Patterns (original design)
Week 6 : 1 July - 7 July	Other	No Lecture/Tutorial/Studio on Flexibility Week
Week 7 : 8 July - 14 July	Online Activity	Rhinoceros: Extracting 3D Views for Documentation. Cameras
	Lecture	Data Management 2: Trees
	Tutorial	Grasshopper: From Continuous Surfaces to Discrete Elements: Waffle Structure
	Studio	Task 2.2: Waffle Structure (original design)
Week 8 : 15 July - 21 July	Assessment	Submission Assessment 2 [Formative] -Including Tasks 2.1 and 2.2- (refer to Moodle for more detailed information)
	Online Activity	Rhinoceros: Basic Rendering
	Lecture	Construction and Edition of Meshes
	Tutorial	Grasshopper: Classification of Parts for Fabrication: Rods & Nodes Structure
	Studio	Task 2.3: Rods & Nodes Structure (original design)
Week 9 : 22 July - 28 July	Lecture	Grasshopper Plugins and Utilities
	Tutorial	Grasshopper: Mesh Relaxation through Physics Simulation: Minimal Surface Structure
	Studio	Task 2.4: Minimal Surface Structure (original design)
Week 10 : 29 July - 4 August	Lecture	Assessment 2 Consultations
	Studio	Assessment 2 Consultations
Week 11 : 5 August - 11 August	Assessment	Submission Assessment 2 [Summative] -Including Tasks 2.1, 2.2, 2.3, 2.4 and 2 Physical Prototypes- (refer to Moodle for more detailed information)
	Presentation	Final Exhibition

## Attendance Requirements

You are expected to be regular and punctual in attendance at all classes for the School of Built Environment courses in which you are enrolled. If and where individual courses have specific attendance requirements, these will be stated in the course outline.

If you do not attend, engage, or participate in scheduled class activities, including lectures, tutorials, studios, labs, etc, you run the risk of failing a course.

If illness or unexpected and beyond your control circumstances prevent you from completing a task on time, or substantially disturb your assessment performance, you should apply for [Special Consideration](#), as soon as practicable, accompanied by appropriate documentation.

No special consideration will be provided if you miss out on essential course information and materials, or if you miss assessment tasks and deadlines due to unexplained absences or an unapproved lack of attendance.

You may be advised by the Course Convenor to withdraw from the course if significant learning activities are missed.

## Course Resources

### Prescribed Resources

Refer to Moodle for prescribed resources.

### Recommended Resources

Refer to Moodle for recommended resources.

## Additional Costs

This course includes the fabrication of physical prototypes which may lead to additional costs.

## Course Evaluation and Development

Refer to the link "myFeedback Matters" on Moodle.

We encourage and support students to maintain regular contact with the course convenor to provide informal feedback throughout the course. For specific issues or detailed feedback, please arrange a meeting with the course convenor via email.

In this course there is an option for students to provide anonymous feedback via the course's Moodle page, which is directly sent to the convenor. As a final step, students are invited to share their insights and experiences by completing the MyExperience survey. The feedback gathered each year is integral to the continuous enhancement and development of the course.

## Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Cristina Ramos Jaime		Anita B. Lawrence Centre (West Wing), Level 4, Room 4007	0451226744	Email to organise a time	No	Yes

## Other Useful Information

### Academic Information

Due to evolving advice by NSW Health, students must check for updated information regarding online learning for all Arts, Design and Architecture courses this term (via Moodle or course information provided).

Please see: <https://www.unsw.edu.au/arts-design-architecture/student-life/resources-support/protocols-guidelines> for essential student information relating to:

- UNSW and Faculty policies and procedures;
- Student Support Services;
- Dean's List;
- review of results;
- credit transfer;
- cross-institutional study and exchange;
- examination information;
- enrolment information;
- Special Consideration in the event of illness or misadventure;
- student equity and disability;

And other essential academic information.

### Academic Honesty and Plagiarism

Plagiarism is using the words or ideas of others and presenting them as your own. It can take many forms, from deliberate cheating to accidentally copying from a source without



acknowledgement.

UNSW groups plagiarism into the following categories:

- Copying: Using the same or very similar words to the original text or idea without acknowledging the source or using quotation marks. This includes copying materials, ideas or concepts from a book, article, report or other written document, presentation, composition, artwork, design, drawing, circuitry, computer program or software, website, internet, other electronic resource, or another person's assignment without appropriate acknowledgement.
- Inappropriate paraphrasing: Changing a few words and phrases while mostly retaining the original information, structure and/or progression of ideas of the original without acknowledgement. This also applies in presentations where someone paraphrases another's ideas or words without credit and to piecing together quotes and paraphrases into a new whole, without appropriate referencing.
- Collusion: Working with others but passing off the work as a person's individual work. Collusion also includes providing your work to another student for the purpose of them plagiarising, paying another person to perform an academic task, stealing or acquiring another person's academic work and copying it, offering to complete another person's work or seeking payment for completing academic work.
- Inappropriate citation: Citing sources which have not been read, without acknowledging the "secondary" source from which knowledge of them has been obtained.
- Duplication ("self-plagiarism"): Submitting your own work, in whole or in part, where it has previously been prepared or submitted for another assessment or course at UNSW or another university.

The UNSW Academic Skills support offers resources and individual consultations. Students are also reminded that careful time management is an important part of study. One of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting and proper referencing of sources in preparing all assessment items. UNSW Library has the ELISE tool available to assist you with your study at UNSW. ELISE is designed to introduce new students to studying at UNSW, but it can also be a great refresher during your study.

Completing the ELISE tutorial and quiz will enable you to:

- analyse topics, plan responses and organise research for academic writing and other assessment tasks
- effectively and efficiently find appropriate information sources and evaluate relevance to your needs
- use and manage information effectively to accomplish a specific purpose
- better manage your time
- understand your rights and responsibilities as a student at UNSW
- be aware of plagiarism, copyright, UNSW Student Code of Conduct and Acceptable Use of

## UNSW ICT Resources Policy

- be aware of the standards of behaviour expected of everyone in the UNSW community
- locate services and information about UNSW and UNSW Library

## Use of AI for assessments

As AI applications continue to develop, and technology rapidly progresses around us, we remain committed to our values around academic integrity at UNSW. Where the use of AI tools, such as ChatGPT, has been permitted by your course convener, they must be properly credited and your submissions must be substantially your own work.

In cases where the use of AI has been prohibited, please respect this and be aware that where unauthorised use is detected, penalties will apply.

[Use of AI for assessments | UNSW Current Students](#)

## Submission of Assessment Tasks

### Turnitin Submission

If you encounter a problem when attempting to submit your assignment through Turnitin, please telephone External Support on 9385 3331 or email them on [externalteltsupport@unsw.edu.au](mailto:externalteltsupport@unsw.edu.au)

Support hours are 8:00am – 10:00pm on weekdays and 9:00am – 5:00pm on weekends (365 days a year). If you are unable to submit your assignment due to a fault with Turnitin, you may apply for an extension, but you must retain your ticket number from External Support (along with any other relevant documents) to include as evidence to support your extension application. If you email External Support, you will automatically receive a ticket number, but if you telephone, you will need to specifically ask for one. Turnitin also provides updates on their system status on Twitter.

Generally, assessment tasks must be submitted electronically via either Turnitin or a Moodle assignment. In instances where this is not possible, alternative submission details will be stated on your course's Moodle site. For information on how to submit assignments online via Moodle: <https://student.unsw.edu.au/how-submit-assignment-moodle>

### Late Submission Penalty

UNSW has a standard late submission penalty of:

- 5% per calendar day,
- for all assessments where a penalty applies,
- capped at five calendar days (120 hours) from the assessment deadline, after which a student cannot submit an assessment, and
- no permitted variation.

Students are expected to manage their time to meet deadlines and to request [Special Consideration](#) as early as possible before the deadline. Support with [Time Management is available here](#).

## School Contact Information

beadmin@unsw.edu.au