

DOCUMENT: SYLLABUS	COURSE CODE: CPTHS21D	COPIES ISSUED TO: College of Engineering Learning Resource Center Faculty
EFFECTIVITY: AY 2023 – 2024	COURSE TITLE: CAPSTONE DESIGN PROJECT 2 – DRAFTING	

<p>VISION We are National University, a dynamic private institution committed to nation-building, recognized internationally in education and research.</p> <p>MISSION Guided by the core values and characterized by our cultural heritage of Dynamic Filipinism, National University is committed to providing relevant, innovative, and accessible quality education and other development programs. We are committed to our: STUDENTS, by molding them into life-long learners, ethical and spiritual citizens, and self-directed agents of change. FACULTY and EMPLOYEES, by enhancing their competencies, stimulating their passions, cultivating their commitment, and providing a just and fulfilling work environment. ALUMNI, by strengthening their sense of pride through engagement, loyalty, and love for their alma mater. INDUSTRY PARTNERS and EMPLOYERS, through active collaborations, providing them Nationalians who will contribute to their growth and development. COMMUNITY, by contributing to the improvement of life's conditions and well-being of its members.</p>	<p>CORE VALUES 1. Integrity 2. Compassion 3. Innovation 4. Resilience 5. Patriotism</p> <table border="1"> <thead> <tr> <th>GRADUATE ATTRIBUTES INTENDED FOR NATIONALIANS (GAINS)</th> <th>INSTITUTIONAL LEARNING OUTCOMES (ILO)</th> </tr> </thead> <tbody> <tr> <td>1. Leadership and Teamwork</td> <td>a. Exhibit moral, ethical, and competent leadership. b. Collaborate effectively in teams of different cultures.</td> </tr> <tr> <td>2. Responsible Citizenship</td> <td>c. Participate actively in community-oriented advocacies that contribute to nation-building.</td> </tr> <tr> <td>3. Innovative, Creative, and Critical Thinking</td> <td>d. Develop an entrepreneurial mindset. e. Provide solutions to challenges in various fields of specialization and society in general.</td> </tr> <tr> <td>4. Academic and Professional Competence</td> <td>f. Demonstrate mastery of foundational skills and specific areas of specialization.</td> </tr> <tr> <td>5. Effective Communication</td> <td>g. Express ideas meaningfully, accurately, and appropriately in multicultural and multidisciplinary contexts.</td> </tr> <tr> <td>6. Whole Person Character</td> <td>h. Practice NU Core Values in personal and professional life. i. Engage in continuing personal and professional development.</td> </tr> <tr> <td>7. Life and Career Skills Orientation</td> <td>j. Exemplify the capacity for self-reflection. k. Demonstrate adaptability, flexibility, productivity, and accountability in diverse settings.</td> </tr> <tr> <td>8. Technological Literacy</td> <td>l. Exhibit mastery in navigating various technological tools and techniques.</td> </tr> </tbody> </table>	GRADUATE ATTRIBUTES INTENDED FOR NATIONALIANS (GAINS)	INSTITUTIONAL LEARNING OUTCOMES (ILO)	1. Leadership and Teamwork	a. Exhibit moral, ethical, and competent leadership. b. Collaborate effectively in teams of different cultures.	2. Responsible Citizenship	c. Participate actively in community-oriented advocacies that contribute to nation-building.	3. Innovative, Creative, and Critical Thinking	d. Develop an entrepreneurial mindset. e. Provide solutions to challenges in various fields of specialization and society in general.	4. Academic and Professional Competence	f. Demonstrate mastery of foundational skills and specific areas of specialization.	5. Effective Communication	g. Express ideas meaningfully, accurately, and appropriately in multicultural and multidisciplinary contexts.	6. Whole Person Character	h. Practice NU Core Values in personal and professional life. i. Engage in continuing personal and professional development.	7. Life and Career Skills Orientation	j. Exemplify the capacity for self-reflection. k. Demonstrate adaptability, flexibility, productivity, and accountability in diverse settings.	8. Technological Literacy	l. Exhibit mastery in navigating various technological tools and techniques.
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Program Educational Objectives (PEO) After 3 to 5 years on the job, graduates of NU College of Engineering are expected to:	ILO											
	a	b	c	d	e	f	g	h	i	j	k	l
1. demonstrate engineering knowledge by providing solutions to technological problems;					✓	✓						✓
2. demonstrate entrepreneurial skills in engineering related ventures;				✓	✓							
3. demonstrate ethical commitment to the community and the profession;	✓		✓					✓		✓	✓	
4. contribute to knowledge and best engineering practice through research and development; and		✓		✓	✓	✓	✓					✓
5. engage in life-long learning as demonstrated through career achievements.	✓								✓	✓		

Program Outcomes (PO) At the time of graduation, the student must be able to:	PEO				
	1	2	3	4	5
a. apply knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems;	✓				
b. design and conduct experiments as well as analyze and interpret data;	✓			✓	
c. design system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability, in accordance with standards;	✓			✓	

d. function on multidisciplinary teams;		✓	✓		
e. identify, formulate, and solve complex engineering problems;	✓	✓		✓	
f. understand professional and ethical responsibility;			✓		
g.1.communicate effectively (written);		✓			✓
g.2.communicate effectively (oral);		✓			✓
h. have a broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.;	✓			✓	
i. recognize the need for, and an ability to engage in life-long learning.;					✓
j. have knowledge of contemporary issues;				✓	✓
k. create, select and apply appropriate techniques, resources, skills, and modern engineering and IT tools, including prediction and modelling, to complex engineering problems, with an understanding of the limitation;	✓			✓	
l. have knowledge and understanding of engineering and management principles as a member and leader in a team, to manage projects and in multidisciplinary environments; and	✓		✓		
m. understand and apply one specialized field in engineering	✓				

COURSE DESCRIPTION

This course is the continuation of Capstone Design Project 1, where students will be prepared to come up with their full-blown design proposal in solving the identified complex engineering problem. It will help the students refine the needs of their chosen community and convert them into design requirements and identify design constraints. The course will also guide the students on coming up with different solution alternatives and apply necessary techniques to choose the best possible solution. Students will be exposed in the use of tools and techniques to properly develop their design solution and have it tested and evaluated with the intended users. Project management skills will also be enhanced through this course as they plan and organize their design proposal.

PRE-REQUISITE(S)

CPTHS120 – Methods of Research

COURSE OUTCOMES (CO)

At the end of the course, the student must be able to:	Program Outcomes (PO)												
	a	b	c	d	e	f	g	h	i	j	k	l	m
1. Identify the design requirements and constraints based on the needs of the community, partner, or intended user.								✓					
2. Formulate at least three (3) different alternative design solution based on the requirements and constraints..	✓				✓								
3. Conduct a trade-offs analysis among the alternative design solutions.								✓					
4. Recommend the best design option based on available information.			✓										
5. Describe a design development technique and testing and evaluation methods to use.		✓									✓		
6. Create a project management plan to ensure effective and efficient delivery of the design project; and												✓	
7. Present the design proposal both in written and oral form.							✓						

CREDIT

1-unit drafting

TIME ALLOTMENT

4-hour drafting every week

COURSE REQUIREMENTS

Students are required to do the following:

1. Drop the course if there are any pre-requisite violations. Secure special approval from program chair if allowed.
2. Strictly retain original grouping from CDP1. Secure approval from program chair if there is a need to change grouping.
3. Attend structured webinars required by the course.
4. Review prior knowledge on design process, design thinking process, iterative decision-making, and project management principles.
5. Make use of official class hours for group discussion, consultation, and preliminary coaching with lecturer.
6. Submit assessment tasks and other requirements on time.
7. Read from different sources on identifying design constraints, conducting tradeoffs analysis, design development techniques, design testing, and evaluation methods, and managing design projects.
8. Be in constant communication and consultation with assigned adviser.
9. If possible, officialize your partnership/engagement with community or intended user through a MOA/MOU or Letter of Collaboration to serve as basis of design requirements and the expected activities and commitments of both parties.

CLASS POLICIES

1. Students must observe and practice the National University core values.
2. During synchronous classes, students are expected to observe proper etiquette and decorum.
3. Attendance is a must. Students must inform the instructor of absence and tardiness. Giving of equivalent assessment is under the discretion of the instructor.
4. Students are expected to practice academic honesty and avoid committing plagiarism by submitting original contents in all written and oral assessments. Any student who violates the policy on academic honesty will automatically receive a grade of 0.0. These include cheating, excessive absences and others as agreed in the course.
5. Students must always come prepared to class and are required to bring all necessary materials.
6. Students are expected to be aware of the assessment schedule as specified in the latter part of this document.
7. Students are encouraged to do advanced reading and submission of assessments.

GRADING SYSTEM

[Breakdown the grade components for the final grade computation]

A. Midterm Period

Group Report 1-3 100%

B. Final Period

Group Report 4-6 40%

Final Written Report 20%

Final Oral Report 40%

Final Grade = 50%MP + 50%FP

Grade Equivalent

Grade Range (%)	Grade Point
96 – 100	4.0
90 – 95	3.5
84 – 89	3.0
78 – 83	2.5
72 – 77	2.0
66 – 71	1.5
60 – 65	1.0
59 and below	R

Note: *Passing grade is 60% on a base-0 Grading System*

COURSE CONTENTS / COURSE OUTLINE

WEEK	COURSE OUTCOMES	TOPIC OUTCOMES	TOPICS	METHODOLOGY	RESOURCES	ASSESSMENT
1		At the end of the topic, students are expected to: <ul style="list-style-type: none"> Familiarize with the requirements and expected outcome of the course. 	<ul style="list-style-type: none"> Re-orientation about OBE/OBTL Discussion of Syllabus Official Approval of CDP1 Concept Proposal Concerns and Issues related to CDP Official Appointment of Adviser 	<ul style="list-style-type: none"> Lecture Open Forum 	Student Manual Syllabus	
2	CLO 1	At the end of the topic, students are expected to: <ul style="list-style-type: none"> Scrutinize the needs of the chosen community / intended user. 	<ul style="list-style-type: none"> Community Needs Analysis Requirements for community programs and project Community partnership/collaboration Webinar 1: Competency Building for Community Development Programs and Projects	<ul style="list-style-type: none"> Group Discussion Class Consultation Structured Webinar Literature Reading 	Presentations Literature Mendeley Needs Assessment Report Template	<ul style="list-style-type: none"> Group Report 1: Needs Assessment Report
3	CLO 1	At the end of the topic, students are expected to: <ul style="list-style-type: none"> Familiarize with different kinds of design requirements and constraints. Identify the design requirements and constraints involves in addressing the needs of the chosen community / intended user. 	<ul style="list-style-type: none"> Definition and examples of design requirements and constraints. Identification of design requirements based on the needs of the chosen community / intended user. Identification of design constraints in providing the best possible solution to the needs of the chosen community / intended user Webinar 2: Needs-based Design Requirements and Constraints	<ul style="list-style-type: none"> Group Discussion Class Consultation Structured Webinar Literature Reading 	Presentations Literature Mendeley Needs Assessment Report Template	<ul style="list-style-type: none"> Group Report 2: Design Requirements and Constraints Matrix
4	CLO 2, 3, 4	At the end of the topic, students are expected to:	<ul style="list-style-type: none"> Importance of identifying alternative solutions. Definition of trade-off 	<ul style="list-style-type: none"> Group Discussion Class Consultation Structured Webinar Literature Reading 	Presentations Literature Mendeley	<ul style="list-style-type: none"> Group Report 3: Tradeoffs Analysis Matrix

WEEK	COURSE OUTCOMES	TOPIC OUTCOMES	TOPICS	METHODOLOGY	RESOURCES	ASSESSMENT
		<ul style="list-style-type: none"> Explain the importance of coming-up with alternative solutions. Conduct tradeoffs analysis based on design requirements and constraints for each of the alternative solution. Choose the best solution. 	<ul style="list-style-type: none"> Process and technique in tradeoff analysis. Conducting tradeoff analysis among the alternative solutions <p>Webinar 3: Optimizing Design Alternatives through Trade-offs Analysis</p>		Needs Assessment Report Template	
5	CLO 5	<p>At the end of the topic, students are expected to:</p> <ul style="list-style-type: none"> Choose the applicable development technique to implement the design solution. 	<ul style="list-style-type: none"> Definition and example of design development technique. Process and example of design projects that used prototyping. Process and example of design projects that used modeling and simulation. How to choose between prototyping, modeling, and simulation. <p>Webinar 4: Development of Design Solution: Prototyping v. Modeling v. Simulation</p>	<ul style="list-style-type: none"> Group Discussion Class Consultation Structured Webinar Literature Reading 	<p>Presentations</p> <p>Literature</p> <p>Mendeley</p> <p>Needs Assessment Report Template</p>	<ul style="list-style-type: none"> Group Report 4: Accomplished Design Development Checklist
6	CLO 5	<p>At the end of the topic, students are expected to:</p> <ul style="list-style-type: none"> Describe how the design project is going to be tested and evaluated with the chosen community, intended users, and other stakeholders. 	<ul style="list-style-type: none"> Process and example of testing methods for design projects. Process and example of evaluation methods for design projects. <p>Webinar 5: Design Testing and Evaluation Methods.</p>	<ul style="list-style-type: none"> Group Discussion Class Consultation Structured Webinar Literature Reading 	<p>Presentations</p> <p>Literature</p> <p>Mendeley</p> <p>Needs Assessment Report Template</p>	<ul style="list-style-type: none"> Group Report 5: Proposed Plan for Testing and Evaluation
7	CLO 6	<p>At the end of the topic, students are expected to:</p> <ul style="list-style-type: none"> Identify the components of effective 	<ul style="list-style-type: none"> Components of design project management Process and examples of effective and efficient 	<ul style="list-style-type: none"> Group Discussion Class Consultation Structured Webinar Literature Reading 	<p>Presentations</p> <p>Literature</p> <p>Mendeley</p>	<ul style="list-style-type: none"> Group Report 6: Proposed Project Management Plan

WEEK	COURSE OUTCOMES	TOPIC OUTCOMES	TOPICS	METHODOLOGY	RESOURCES	ASSESSMENT
		and efficient design project management.	management of design projects. <ul style="list-style-type: none"> Design Project Management Tools Webinar 6: Design Project Management		Needs Assessment Report Template	
8-13.5	CLO 7	At the end of the topic, students are expected to: <ul style="list-style-type: none"> Write a full-blown design proposal in solving the identified complex engineering problem. Present the design proposal	<ul style="list-style-type: none"> Design proposal writing Design proposal presentation 	<ul style="list-style-type: none"> Group Discussion Class Consultation 		<ul style="list-style-type: none"> Full-blown Design Proposal Presentation deck

RESOURCES

Open Access References:

- [Cross, N. \(2020\). Engineering Design Methods: Strategies for Product Design \(5th Ed.\). Wiley.](#)
- [Ambrose, G. \(2019\). Design Thinking for Visual Communication \(Basics Design\). Bloombury Visual Arts](#)

Print References:

- [NU Library Holdings](#)
- Karsnitz, J. R., O'Brien, S., & Hutchinson, J. P. (2013). Engineering Design: An Introduction (2nd ed.). Cengage Learning.
- Dieter, G. (1991). Engineering Design: A Materials and Processing Approach (3rd ed.). McGraw-Hill Science/Engineering/Math.
- Ertas, A., & Jones, J. C. (1996). The Engineering Design Process (2nd ed.). Wiley.
- Piotrowski, C. M. (2011). Problem Solving and Critical Thinking for Designers (1st ed.). Wiley.
- Proctor, T. (2005). Creative Problem Solving for Managers: Developing Skills for Decision Making and Innovation (5th ed.). Routledge.
- Bessant, J. R., & Tidd, J. (2011). Innovation and Entrepreneurship (3rd ed.). Wiley.

Online Journal References:

- IEEE Embedded Systems Letters
- IEEE Transactions on Systems, Man and Cybernetics: Systems
- Information Systems Management

Online Databases:

- [Theses and Dissertations \(ProQuest\)](#)

2. Purdue University [Theses](#) and [Dissertations](#)
3. [Elsevier OpenAccess](#)
4. [ScienceDirect](#)
5. [Springer](#)
6. [Espacenet](#)
7. [PatentScope](#)
8. [USPTO](#)

Online References:

1. [The International Engineering Alliance](#)
2. [The Washington Accord](#)
3. [Accreditation Board for Engineering and Technology](#)
4. [Philippine Technological Council](#)
5. [UN Sustainable Development Goals](#)DE
6. [DOST Harmonized National Research and Development Agenda 2022-2028](#)
7. [DENR Priority Programs](#)
8. [Design v. Research; ABET Requirements for Design and why Research cannot be a substitute for Design.](#)
9. [Engineering Design Process](#)

<p>PREPARED:</p> <p style="text-align: center;">MARWIN ALEJO, MEng Department Faculty</p>	<p>CHECKED:</p> <p style="text-align: center;">JEOJILYN NABOR, RL., MLIS University Librarian</p>	<p>RECOMMENDED FOR APPROVAL:</p> <p style="text-align: center;">MARLON BAGARA, MEng Chair, Computer Engineering</p>	<p>APPROVED:</p> <p style="text-align: center;">ROGELIO ANIEZ, PhD, PEE Dean</p>
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