



**EEEB403 CAPSTONE DESIGN COURSE (CAPSTONE)
EPDB4013 INTEGRATED DESIGN PROJECT (IDP)
SEMESTER 2, 2024/25**

COURSE BRIEFING

by

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YOUR COORDINATOR

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EE CAPSTONE / IDP COMMITTEE



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Cheah Cheng Lai



Assoc Prof. Dr. Yap
Boon Kar



Dr. Chau
Chien Fat



Ts. Nagaletchumi
Balasubramaniam

IMPORTANT NOTES

- Friday, 10:00 – 12:00 am @ Theater BM-0-002
 - Briefings and Invited Talks
- Attendance using QR with UNITENLife App
- Self-formation of group by Week 2 – Group Sign-up Form
- Project Presentation will be F2F / Physical during Week 14

COURSE INFO

- Pre-requisites:
 - Engineers in Society (COEB3012 / COEB422)
AND one of the following:
 - Data Communication and Network (EECB3053 / EECB424) for BEEE
 - Electrical Power System II (EPPB3042 / EEPB383) for BEPE
- [Brighten](#) for Course materials and submissions
- [MS Teams](#) for virtual lectures (when needed only)
- [Telegram Channel](#) for broadcast of announcement

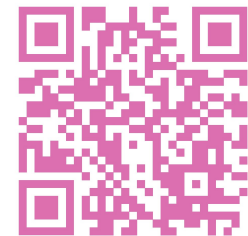
Brighten



MS Teams



Telegram



COURSE INFO

- Course materials and submissions @ BRIGHTEN
 - Course outline, course planner
 - Project Topic
 - Project Groupings – Team members and Advisor (after all students have signed-up or assigned)
 - Slides of Briefing and Invited Talks
 - Formats, Evaluation forms and Rubrics

SELF-FORMATION OF GROUPS

- Currently there are 35 students (10 from BEEE, 25 from BEPE)
 - 7 Groups of 5 students
- You may choose your own group members based on the following criteria:
 1. A group should have 1 or 2 BEEE students.
 2. If possible, group should have a mixture of female and male members
 3. If possible, group should consider to have a mixture of members from different ethnicity, culture and background.

SELF-FORMATION OF GROUPS

- Once the group is complete, apply for group formation using the Group Sign-up Form at BRIGHTEN : [Group Sign-up Form](#)

Deadline for group sign-up is by Thursday, 20th February 2025, 11:59pm

- Incomplete groups and groups that do not fulfil the criteria will be randomly re-assigned.
- Students without group will be randomly assigned to groups.

COURSE OBJECTIVES

- In principle, this IDP/capstone course plans to connect senior electrical power, electrical and electronic engineering students with organizations and businesses in the community that are looking for practical solutions to design and maintenance problems.
- **Working in teams of four or five**, students gain real-world design experience by applying the extensive knowledge learned from their undergraduate studies toward a project which may include diverse fields in control, power, communications, electronics or energy related fields.

COURSE OBJECTIVES

- Potential project topics are suggested by a panel of committee which consists of industrial partners and faculty members.
- Student design teams communicate regularly with their industrial partners and faculty members, whom are responsible for defining the design problem, technical specifications and project schedule.
- This design course is an essential element to prepare senior students for their first job as an engineer in training.

COURSE OBJECTIVES

- It is first and foremost design, planning and teamwork course that provides students with an opportunity to use their training and knowledge of fundamental engineering principles to create a "problem solution" that satisfies the real-world needs.
- Besides this, students will be required to include sustainability and entrepreneurship principles in their final product design.

CO-PO MATRIX

CO	Course Outcomes	PO3	PO8	PO9	PO10
		MQF2	MQF3b, 3f	MQF3b, 3c	MQF4b
1	Design creative solutions for complex engineering problem to meet identified needs with appropriate consideration for public health and safety, culture, society, environment, whole-life cost, net zero carbon as well as resource.	√			
2	Work effectively in a team to meet engineering objectives.		√		
3	Present and justify the proposed solutions effectively by means of oral presentation and/or report writing.			√	
4	Demonstrate knowledge of project management, finance and entrepreneurship whilst designing solutions to engineering problem.				√

ASSESSMENTS-CO MATRIX

NO	Assessments	%	PO3	PO8	PO9	PO10
			CO1	CO2	CO3	CO4
1	Concept Generation Report	15	10			5
2	Project Presentation	25	10	10	5	
3	Team Dynamics	10		10		
4	Individual Report	25	20		5	
5	Project Report	25	20			5
Total Distribution (%)		100	60	20	10	10

ASSESSMENTS DETAILS

No	Assessment	Group (%)	Individual (%)
1	Concept Generation Report	15%	
2	Project Presentation	10%	15%
3	Team Dynamics		10%
4	Individual Report		25%
5	Project Report	25%	
	Total	50%	50%

Group mark is awarded ONLY upon:

1. Submission of Individual Report, and
2. Participation in Project Presentation

ASSESSMENT BREAKDOWN

	Assessments ^[1]	Group Marks ^[2]	Individual Marks
1	Concept Generation Report – 15% (PO3, PO10) [MQF2 & MQF4b] <ul style="list-style-type: none"> • Conceptual design (PO3) • Project implementation and resource plan (PO10) • Financial implication (PO10) 	10% 3% 2%	
2	Project Presentation – 25% (PO3, PO8, PO9) [MQF2 & MQF3b, 3c, 3f] <ul style="list-style-type: none"> • Technical content (PO3) • Presentation skills (PO9) • Team dynamics (PO8) <div> <u>Weighted by Attendance Percentage Example:</u> Peer Evaluation = 5 Advisor Evaluation = 4 Attendance = 70% Team Dynamics = $(5+4)*0.7$ = 6.3 </div>	10%	10% 5%
3	Team Dynamics – 10% (PO8) [MQF3b, 3f] <ul style="list-style-type: none"> • Peer Evaluation • Advisor Evaluation <p>Weighted by Attendance Percentage</p>		5% 5%

ASSESSMENT BREAKDOWN

	Assessments ^[1]	Group Marks ^[2]	Individual Marks
4	<p>Individual Report – 25% (PO3, PO9) [MQF2 & MQF3b, 3c] An individual report describing scope and roles within the group, concept generation of technical scope^[3], and design solution with validation using engineering principles and/or modern tools.</p> <ul style="list-style-type: none"> • Design specifications, concept generation and design solution with validation (PO3) • Impact on public health and safety, culture, societal, environmental, whole-life cost, net zero carbon and resources (PO3) • Writing skills (PO9) 		15% 5% 5%

ASSESSMENT BREAKDOWN

	Assessments ^[1]	Group Marks ^[2]	Individual Marks
5	Project Report – 25% (PO3, PO10) [MQF2 & MQF4b] Consists of the following sections: <ol style="list-style-type: none"> 1. Introduction (PO3) 2. Design requirements (PO3) 3. Product design & engineering analysis (PO3) 4. Project Implementation plan & resource plan (PO10) 5. Conclusion (PO3) 	1% 5% 13% 5% 1%	
	Percentage distribution:	50%	50%

ASSESSMENT BREAKDOWN

[1] Assessment evaluation is conducted accordingly:

- *Advisor – Concept Generation Report and Team Dynamics (Advisor Evaluation), Individual Report and Project Report*
- *Peer - Team Dynamics (Peer Evaluation)*
- *IDP / Capstone Evaluation Committee - Project Presentation, Individual Report and Project Report*

[2] Group mark is awarded ONLY upon:

- *Submission of Individual Report, and*
- *Participation in Project Presentation*

[3] Concept generation must be done *by Week 6*

[3] Document and record the concept generation process and decisions via minutes of meetings.

LECTURE SERIES

No	Lecture Topic	Lecturer / Speaker	Time	Date	Location
1	Course Introduction	Dr. Sharifah Azwa Shaaya	10 am – 12 pm (Friday)	14-Feb	Theatre BM-0-002 if not online
2	Project Topic	Dr. Sharifah Azwa Shaaya		21-Feb	
3	<i>Invited Talk 1</i>	TBC		28-Feb	
4	<i>Invited Talk 2</i>	TBC		7-Mar	
5	<i>Invited Talk 3</i>	TBC		14-Mar	
6	<i>Invited Talk 4</i>	TBC		11-Apr	
7	<i>Invited Talk 5</i>	TBC		18-Apr	
8	Project Presentation and Final Report Requirement	Dr. Sharifah Azwa Shaaya		25-Apr	

PLANNER SEM 2, 2024/25

- Refer to PDF version of Course Planner.
- Weekly plan is shown next.

PLANNER FOR SEM 2, 2024/25

WEEK	DATE & TIME	ACTIVITIES	VENUE	COMMENTS
1	14th Feb 2025 (Friday) 10:00 am - 12:00 pm	Briefing: Course Introduction	BM-0-002	Attendance is MANDATORY
2	20th Feb 2025 (Thursday) by 11:59 pm	Submission of Group Members	BRIGHTEN	Only one submission per group.
	21st Feb 2025 (Friday) 10:00 am - 12:00 pm	Briefing: Project Topic	BM-0-002	Attendance is MANDATORY
3	27th Feb 2025 (Thursday) by 11:59 pm	Submission of Technical Scope Selection	BRIGHTEN	Group Submission - Submit to BRIGHTEN.
	28th Feb 2025 (Friday) 10:00 am - 12:00 pm	Invited Talk 1	TBC	Attendance is MANDATORY

4	7th Mar 2025 (Friday) 10:00 am - 12:00 pm	Invited Talk 2 Ts. Dr. Nur Azzammudin Bin Rahmat	BM-0-002	Attendance is MANDATORY
5	14th Mar 2025 (Friday) 10:00 am - 12:00 pm	Invited Talk 3	BM-0-002	Attendance is MANDATORY
6	20th Mar 2025 (Thursday)	Draft Concept Generation due		Group Submission - Submit directly to your Advisor.
7				
8	<i>Midterm break/ Hari Raya Aidilfitri</i>			
9	11th Apr 2025 (Friday) 10:00 am - 12:00 pm	Invited Talk 4	BM-0-002	Attendance is MANDATORY
10	17th Apr 2025 (Thursday) by 11:59 pm	Submission of Concept Generation Report	BRIGHTEN	Group Submission - Submit to BRIGHTEN.
	18th Apr 2025 (Friday) 10:00 am - 12:00 pm	Invited Talk 5	BM-0-002	Attendance is MANDATORY

11	25th Apr 2025 (Friday) 10:00 am - 12:00 pm	Briefing on Project Presentation and Final Report Requirements	BM-0-002	Attendance is MANDATORY
12				
13				
14	13th May 2025 - 16th May 2025 (Monday - Friday)	Project Presentation	TBC	Exact date, time and venue for group to be confirmed
15				
16	26th May 2025 (Monday) by 5:00 pm	Submission of Project Report, Individual Report & Team Dynamic	BRIGHTEN	<u>Project Report</u> - Group <u>Individual Report</u> - Individual <u>Team Dynamic (Peer)</u> - Individual ALL submission is at BRIGHTEN.

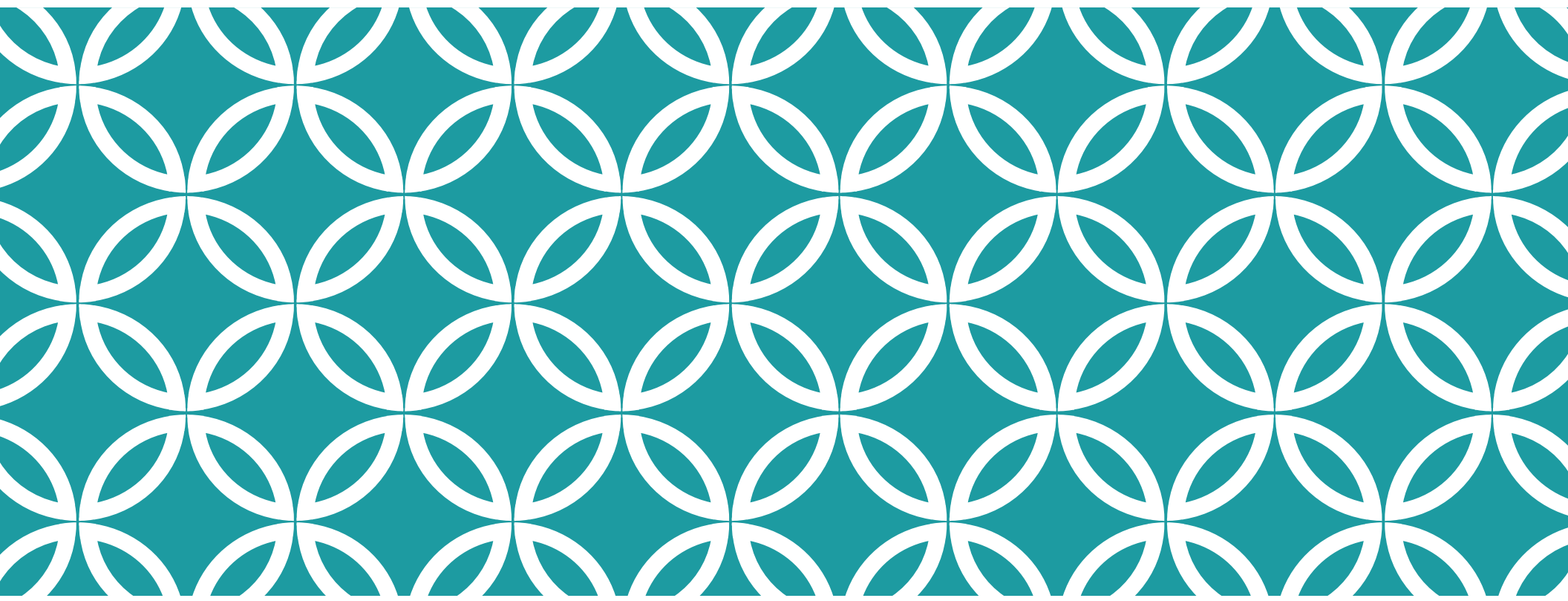
SUMMARY OF SUBMISSIONS

Group

1. Group Sign-up Form by 20-02-2025 (submit at BRIGHTEN)
2. Technical Scope Selection Form by 27-02-2025 (submit at BRIGHTEN)
3. Draft CG to Advisor by 20-03-2025
4. Concept Generation Report by 17-04-2025 (submit at BRIGHTEN) **[15%]**
5. Project Report by 26-05-2025 (submit at BRIGHTEN) **[25%]**
6. Slide of Project Presentation 26-05-2025 (submit at BRIGHTEN)
7. At least 8 Minutes of Meeting by 26-05-2025 (submit at BRIGHTEN)

Individual

1. Peer Review Form by 26-05-2025 (submit at BRIGHTEN) **[5%]**
2. Individual Report by 26-05-2025 (submit at BRIGHTEN) **[25%]**



PROJECT TOPIC & TECHNICAL SCOPE



Affordable Smart, Sustainable and Green Housing Township Incorporating Renewable Energy, Rainwater Harvesting and Zero Waste – A Conceptual Design in Malaysian Environment

EPDB4013 Integrated Design Project

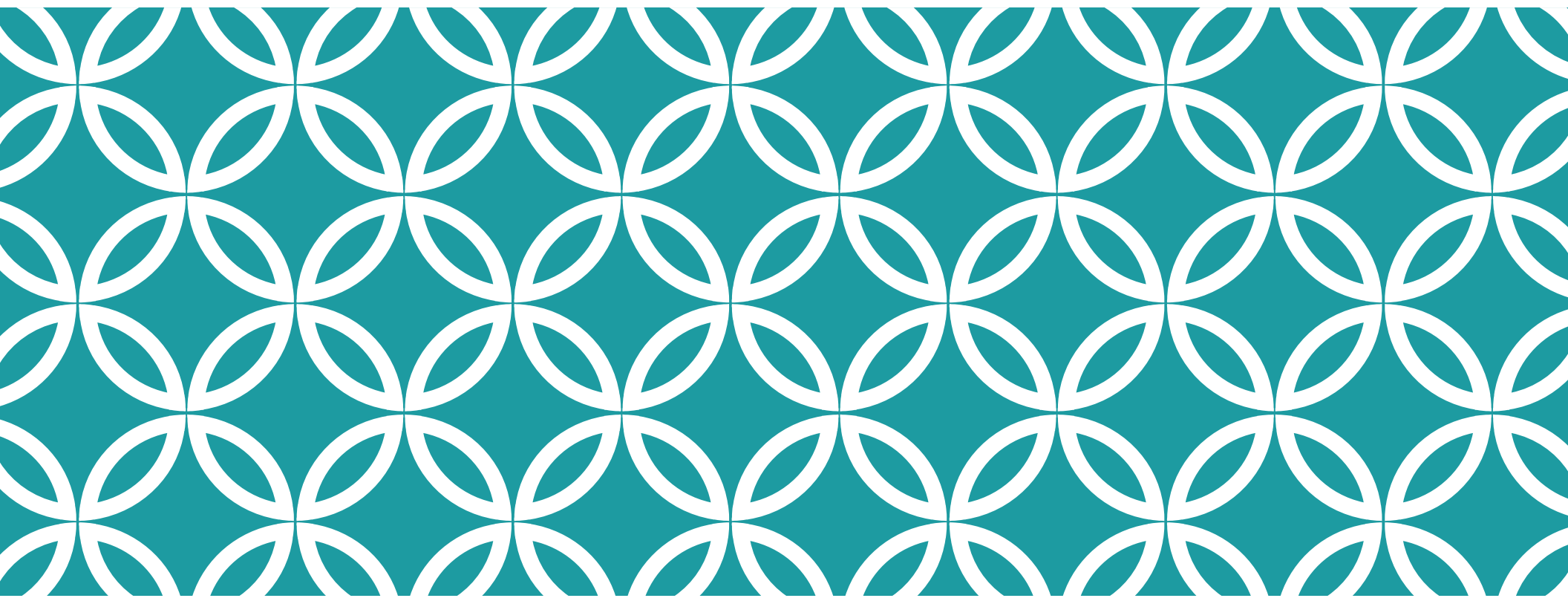
Semester 2, 2024/2025



Prepared by: IDP Committee, Department of Electrical & Electronics Engineering

TECHNICAL SCOPE SELECTION

- Each team must discuss and agree on the technical scope for each team member that cater for:
 - i. Location, Layout, and Resource Assessment
 - ii. Electrical and Power Services + Electrical Layout
 - iii. Renewable Energy Harvesting System + Electrical Layout
 - iv. Rain Harvesting System and Zero-Waste Initiative Implementation + related Layout
 - v. Monitoring, Communication & Control, and Safety & Security System + System Layout
- Some technical scopes are to be shared among a few or all team members – business model, project planning, etc.
- All teams must submit the Technical Scope Selection Form by **27th February 2025**



MORE ON ASSESSMENTS



WHAT IS CONCEPT GENERATION (CG)?

- A draft of the Concept Generation (CG) must be submitted to your Advisor by the end of week 6
- In the draft CG, the team should aim to explore multiple (ideally 3) alternative design solutions so that comparative analysis could be established between each alternative designs for final concept selection.
- Incremental improvement of design is allowed but not recommended – this is only applicable where clear technological advancement has already been established for certain technical scope(s)

WHAT IS CONCEPT GENERATION (CG)?

- For example, on technical scope of renewable energy:
 - First design – design solution based on solar PV technology
 - Second design – design solution centred on wind energy
 - Third design – design solution combining concepts from first and second designs with solar-wind hybrid renewable energy
 - Final concept selection – first design using solar PV due to technological readiness, better performance, cost benefit or better return-of-investment, etc.

WHAT IS CONCEPT GENERATION (CG)?

- For example, on technical scope of renewable energy where only solar PV is suitable:
 - First design – design solution based on silicon solar PV technology with energy storage for stand alone system
 - Second design – design solution based on grid-connected thin film solar PV technology
 - Third design – design solution based on grid-connected silicon solar PV but with energy storage (incremental from first and second designs)
 - Final concept selection – third design due to efficiency, energy security, total cost of ownership or better return-of-investment, etc.

WHAT IS CONCEPT GENERATION REPORT?

- Concept Generation Report is a technical report submitted to the **IDP / Capstone Advisor** on the findings of initial concept generation (CG) with a proposal to a complete, selected design solution and detailed plan how the **Team** will implement and manage the **Project** in terms of tasks, resources and timelines.
- The report should highlight the team's initial findings / CG and a high-level design in order to solve the assigned problem / project topic.
- The Concept Generation Report will be evaluated by the IDP / Capstone Advisor according to the rubrics provided.
- Refer to ***Concept Generation Report Format*** as guideline.

OUTLINE OF CONCEPT GENERATION REPORT

- 6 Sections
- 1.0 INTRODUCTION
 - 1.1 Background
 - 1.2 Problem Statement
 - 1.3 Objectives of Project
 - 1.4 Scope of Project

Meet Expectation	Exceed Expectation	Significantly Exceed Expectation
3	4	5
<p>Description of background appears to simply be a rephrasing of original project statement. Added insight appears to be largely unsupported student opinion.</p> <p>Able to relate problem statements, objectives and scope of work with some justifications.</p> <p>Delegated technical scope of work to each member.</p> <p>Minimal descriptions of task for each technical scope of work are given.</p>	<p>Description of background is sufficient. Added insight provided but some evidence of unsupported claims.</p> <p>Able to relate problem statements, objectives and scope of work with some justifications on public health, safety, environment or culture.</p> <p>Delegated technical scope of work which is relevant to objectives to each member.</p> <p>Some details of task for each technical scope of work are given but some are not.</p>	<p>Description of background is complete and comprehensive. Added insight shows clear evidence with claims supported by references.</p> <p>Able to relate problem statements, objectives and scope of work with wide-ranging (public health, safety, environment and culture) and tangible justifications.</p> <p>Delegated technical scope of work which is relevant to objectives to each member.</p> <p>Justified technical scope of work with details of task.</p>

OUTLINE OF CONCEPT GENERATION REPORT

■ 2.0 CONCEPT GENERATION

Meet Expectation	Exceed Expectation	Significantly Exceed Expectation
3	4	5
<p>Good exploration of design ideas with some feasible options that may or may not satisfy project requirements.</p> <p>Some discussions of advantages / disadvantages are presented, but lack sound comparison.</p>	<p>Good exploration of design ideas with some feasible options that satisfy project requirements.</p> <p>Discussion of advantages / disadvantages is presented, but not as strong as it could be.</p>	<p>Extensive exploration of design ideas spanning a wide range of feasible options that satisfy project requirements.</p> <p>Discussion of advantages / disadvantages is well-presented with sound comparison.</p>

OUTLINE OF CONCEPT GENERATION REPORT

- 3.0 CONCEPTUAL DESIGN
 - 3.1 Design Concept
 - 3.2 Impact of Design

Complete conceptual designs provided for **all five** sub- systems / technical scopes.

Proposed conceptual design **is relevant but lacking in some areas** in realization of the project.

Some validation of conceptual designs for **three** sub- systems / technical scopes.

Complete conceptual designs provided for **all five** sub- systems / technical scopes.

The proposed conceptual design is **relevant** and **contributes** towards the realization of the project.

Some validation of conceptual designs for **four** sub- systems / technical scopes.

Justified and complete conceptual designs provided for **all five** sub- systems / technical scopes.

The proposed conceptual designs **contribute significantly** towards the realization of the project with **clear** and **coherent** illustration to demonstrate how each design contributes to realization of the project.

Comprehensive validation of conceptual designs for **all five** sub- systems / technical scopes.

OUTLINE OF CONCEPT GENERATION REPORT

■ 3.0 CONCEPTUAL DESIGN

- 3.1 Design Concept
- 3.2 Impact of Design

Meet Expectation	Exceed Expectation	Significantly Exceed Expectation
3	4	5
Some descriptions of public health and safety, cultural, societal, environmental, whole-life cost, net zero carbon or resources considerations, in the proposed solution of some but not all of the technical scopes.	Some descriptions of all aspects public health and safety, cultural, societal, environmental, whole-life cost, net zero carbon and resources considerations in the proposed solution of some but not all of the technical scopes.	Comprehensive descriptions of all aspects of public health and safety, cultural, societal, environmental, whole-life cost, net zero carbon and resources considerations in the proposed solution of all the technical scopes.

OUTLINE OF CONCEPT GENERATION REPORT

■ 4.0 PROJECT MANAGEMENT AND FINANCIAL IMPLICATION

- 4.1 Flowchart
- 4.2 Gantt Chart
- 4.3 Financial Implication

Average definition and justification of methodology used with flow chart demonstrating the realization of the project	Good definition and justification of methodology used with flow chart demonstrating the realization of the project	Sound definition and justification of methodology used with effective utilization of flow chart demonstrating the realization of the project
Average discussion on the difficult implementation issues and challenges	Good discussion on the difficult implementation issues and challenges	Sound discussion on the difficult implementation issues and challenges with justification
Series of comprehensive activities for the implementation of the project is defined but shows some loophole . Timeline and milestones are given.	Series of comprehensive activities for the implementation of the project is defined. Timeline and milestones are given.	Clearly defined series of comprehensive activities for the implementation of the project with rational timeline and milestones.

OUTLINE OF CONCEPT GENERATION REPORT

- 4.0 PROJECT MANAGEMENT AND FINANCIAL IMPLICATION
 - 4.1 Flowchart
 - 4.2 Gantt Chart
 - 4.3 Financial Implication
- 5.0 CONCLUSION
- 6.0 REFERENCES

Meet Expectation	Exceed Expectation	Significantly Exceed Expectation
3	4	5
Provide anticipated costing list of project equipment, materials, etc. for some but not all the project scopes , which may relate to achieving the initial project concept design.	Provide anticipated costing list of project equipment, materials, etc. for some but not all the project scopes , which relates to achieving the initial project concept design .	Provide comprehensive anticipated costing list of project equipment, materials, etc. for all the project scopes , which relates to achieving the initial project concept design .
Able to identify potential customer value and potential market attractiveness without any analysis.	Able to identify potential customer value and potential market attractiveness with some analysis.	Able to identify potential customer value and potential market attractiveness with comprehensive and thorough analysis with consideration to project budget.

WHAT IS PROJECT PRESENTATION?

- Twenty-five (25) minutes oral presentation – all team members must present at least one part (technical scope).
- Present the complete final design solution:
 - Each student must present their technical scope of work with regards to the finalized design with validation.
 - Integration of each technical scope of work is also presented.
 - Financial implication, business model, impact to public health & safety, culture, society and environment, etc.
- More info during briefing in Week 11

WHAT IS PROJECT REPORT ?

- The Project Report provides a detailed description of the proposed finalized design solution.
- The aim of the report is to convince the panel that the team:
 - Clearly understands the problem assigned, the technical specifications and constraints
 - Has conducted thorough research of available technologies, components and design methods
 - Has evaluated alternative design/solutions and is justified in the chosen design
 - Has a final design solution that is viable and validated / supported by sound engineering analysis and/or modern tools

WHAT IS PROJECT REPORT ?

- Has evaluated the impacts of the finalized design solution towards public health and safety, environment, social and cultural aspects
- Is able to effectively organize the project execution considering the resources (timelines, personnel/resources and budget) available
- Refer to Project Report Format as guideline
- More info during briefing in Week 11

WHAT IS INDIVIDUAL REPORT?

- An individual report describing your scope and roles within the group, your concept generation of design solution, finalized design with validation using engineering principles and/or modern tools:
 - Design specifications, concept generation and design solution with validation
 - Public health and safety issue
 - Impact on culture, society and environment
 - Writing skills
- More info during briefing in Week 11

THE END

THANK YOU!
