



## COURSE CONTENT

<b>Academic Year</b>	2023/2024	<b>Semester</b>	1
<b>Course Coordinator</b>	Ravish Maqsood		
<b>Course Code</b>	CH4102		
<b>Course Title</b>	Project Management for Engineers		
<b>Pre-requisites</b>	Nil		
<b>No of AUs</b>	3		
<b>Contact Hours</b>	Lectures: 36 hrs; Final Presentations & Quiz: 3 hrs		
<b>Proposal Date</b>	02 Sep 2021		

### Course Aims

This course aims to introduce basic concepts in project management to the engineering students. This equips the engineers to improve their employability in the industry and helps in their career growth. Some of the key concepts such as project integration, scope management, project planning, project budget & cost management, project risks and opportunities, communication and conflict management shall be covered.

This module will enable students to define and plan a project with proper understanding of engineers' role.

### Intended Learning Outcomes (ILO)

By the end of this course, you (as a student) would be able to:

1. Understand project management concepts and project life-cycle.
2. Implement value-engineering concepts with better understanding of management expectations.
3. Communicate with stakeholders; internal or external.
4. Plan and schedule project activities.
5. Apply tools and knowledge in their day-to-day life to improve productivity and efficiency.

### Course Content

S/N	Topic	Lecture Hours
1	Introduction and Overview	3
2	Project Integration & Scope Management	3
3	Role of Engineers in Client organization & Engineering Companies	3
4	Project Planning and Scheduling	3
5	Project Cost estimation and Budgeting	3
6	Project Set-up & Project Execution Strategies	3
7	Project Resource Management & Project Risk Management	3
8	Project Procurement Management	3
9	Project Engineering and Value Engineering	3
10	Construction, Site engineering & Commissioning	3
11	Project Quality Management	3
12	Project Communications, Leadership skills, Motivation	3
13	Final Quiz and presentations	3
<b>Total:</b>		<b>39</b>

**Assessment (includes both continuous and summative assessment)**

Component	Course LO Tested	Related Programme LO or Graduate Attributes	Weightage	Team/Individual	Assessment Rubrics
1. Continuous Assessment (CA1): Online Quiz	1,2,3,4, 5	EAB SLOs* (a), (b), (c), (d), (f), (g), (h), (i), (j), (k), (l)	25%	Individual	Please refer to Appendix 1
2. Continuous Assessment (CA2) Group Project & Presentation	1,2,3,4, 5	EAB SLOs (a), (b), (c), (d), (f), (g), (h), (i), (j), (k), (l)	50%	Team and Individual	Please refer to Appendix 1, 2 & 3
3. Continuous Assessment (CA3) Online Quiz	1,2,3,4, 5	EAB SLOs* (a), (b), (c), (d), (f), (g), (h), (i), (j), (k), (l)	25%	Individual	Please refer to Appendix 1
Total			100%		

\*EAB Student Learning Outcomes

- (a) **Engineering knowledge:** Apply the knowledge of mathematics, natural science, engineering fundamentals, and an engineering specialisation to the solution of complex engineering problems: LOs 1, 2, 3, 4, 5 are fully mapped. Module covers project life cycle, planning and scheduling activity for a project, communication as role play through project and presentation, group assignment, usage of Gantt chart & excel to execute the project tasks and cost calculations, construction hand over and commissioning is covered in the lecture. All above is not possible without applying the basic Engineering knowledge.
- (b) **Problem Analysis:** Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences: LOs 1, 2, 3, 4, 5 are fully mapped. Class activities are planned such as usage of Gantt chart with a simple individual exercise, Interactive Planning Session is conducted during the class as hands on activity, later Group assignment and followed by quiz. The whole process uses the problem analysis at various stages as basis to move on in the class.
- (c) **Design/development of Solutions:** Design solutions for complex engineering problems and design systems, components or processes that meet the specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations: LOs 1, 2, 3, 4, 5 are fully mapped. A class activity of simple kitchen example and then followed by a group assignment ensures that design / development of solutions approach is applied.

- (d) **Investigation:** Conduct investigations of complex problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions: LOs 2, 4 are weakly mapped. We do not conduct any investigation of complex problems in this Module as learning through class activities, presentations, homework, and group assignments.
- (e) **The Engineer and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice: LOs 2, 3, 6 are fully mapped. Covers safety as top most priority with other ethical approach for Engineers. Importance of accountability, honesty, and cultural diversity is discussed through the lectures and many reminders throughout the module.
- (f) **Environment and Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for the sustainable development: LOs 2, 5, 6 are fully mapped. Planning and scheduling activities are in accordance to the requirements, usage of the tools and commissioning steps are covered from Environmental & Sustainability point of view.
- (g) **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice: LOs 3, 4, 5 are fully mapped, MLO 2 is partly mapped. The module emphasis on planning and execution of a project with professional ethics, many examples are discussed during the class on this topic and its consequences.
- (h) **Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams and in multidisciplinary settings: LOs 1, 2, 3, 4, 5 are fully mapped. The module involves a team project and the entire module is about project management.
- (i) **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions: LOs 1, 2, 3, 4, 5 are fully mapped. Students learn how to communicate with clients and they also write a detailed report for their team project. They also role play for a distinct role through their group assignment and every student presents a portion as final assessment.
- (j) **Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and economic decision – making, and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. LOs 1, 2, 3, 4, 5 are fully mapped. Students learn a short overview about the project management as well as project funding, budget, cost management, value engineering in order to improve capital efficiency and productivity of the project.
- (k) **Life-long Learning:** Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change: LOs 1, 2, 3, 4, 5 are fully mapped. Students start this module as to understand

the linkage of all the other subjects being taught during their course in the University. Every topic discussed during the class are used in real life scenario and encourages the students to improve their life long learning interest.

**Formative feedback**

Upon finishing your presentation with Q&A, you will receive feedback on whether you have covered sufficiently with facts/contents, challenges faced/caused/overcome, and going forward with takeaways.

**Learning and Teaching approach**

Class meets once per week over 3 hours in lecture format and once for the final presentation for classroom presentation. Students for each project group shall meet at their own convenience to complete the project assigned.

Approach	How does this approach support students in achieving the learning outcomes?
Lecture	Formal lectures on the topics with in-class discussions with hands-on exercises.
Group Project	<p>A group project with elements of project management will be executed as part of this module. You are expected to put the sequence of activities of the given information together, prepare organization, timeline, identify challenges, risks and solutions, and prepare a report for submission.</p> <p>This helps you to achieve one or more of the outcomes, as you need to do self-study, research and prepare the report submission.</p> <p>(The class is split into presentation teams to be grouped into 3-5 students per team.)</p>
Team presentation	<p>This helps you to achieve one or more of the outcomes, as you need to make classroom presentation on your group project proposal.</p> <p>(The class is split into presentation teams to be grouped into 3-5 students per team.)</p>

**Reading and References**

1. A guide to the Project Management body of Knowledge “PMBOK guide sixth edition”, by Project Management Institute (PMI).
2. Project Management for Engineering and Construction, third edition, by Garold D. Oberlender.
3. Project Management Toolkit: The Basics for Project Success, by Trish Melton, 2nd Edition, Elsevier (Butterworth Heinemann), 2007.
4. Construction Purchasing & Supply Chain Management, by W.C. Benton, Linda McHenry
5. Value Management in Construction and Real Estate: Methodology and Applications, by Geoffrey Q. P. Shen, Ann T. W. Yu

6. Construction Planning & Scheduling, by Jimmie W. Hinze, fourth edition
7. Construction Management Jumpstart: The Best First Step Towards a Career in Construction Management, by Barbara J. Jackson

### **Course Policies and Student Responsibilities**

#### (1) General

- a. Students are expected to make presentations and attend all classes punctually. Students are expected to participate in the Q&A sessions of all the presentations.
- b. Students are expected to complete all assigned pre-class readings and activities, attend all seminar classes punctually and take all scheduled assignments and tests by due dates.
- c. Students are expected to take responsibility to follow up with course notes, assignments and course related announcements for seminar sessions they have missed.
- d. Students are expected to participate in all seminar discussions and activities.

#### (2) Absenteeism

This course requires you to be in class to contribute to teamwork and participate in presentation as well as Q&A sessions. In-class activities make up a significant portion of your course grade. Absence from class without a valid reason will affect your overall course grade. Valid reasons include falling sick supported by a medical certificate and participation in NTU's approved activities supported by an excuse letter from the relevant bodies. There will be no make-up opportunities for in-class activities.

#### (3) Compulsory Assignments

You are required to submit compulsory assignments on due dates.

### **Academic Integrity**

Good academic work depends on honesty and ethical behaviour. The quality of your work as a student relies on adhering to the principles of academic integrity and to the NTU Honour Code, a set of values shared by the whole university community. Truth, Trust and Justice are at the core of NTU's shared values.

As a student, it is important that you recognize your responsibilities in understanding and applying the principles of academic integrity in all the work you do at NTU. Not knowing what is involved in maintaining academic integrity does not excuse academic dishonesty. You need to actively equip yourself with strategies to avoid all forms of academic dishonesty, including plagiarism, academic fraud, collusion and cheating. If you are uncertain of the definitions of any of these terms, you should go to the [academic integrity website](#) for more information. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.

**Course Instructors**

Instructor	Office Location	Phone	Email
Ravish Maqsood	NA		ravishmaqsood@ntu.edu.sg
Invited speaker(s) from the industry based on their availability.			

**Planned Weekly Schedule**

Week	Topic	Course LO
1	Introduction and Overview	1
2	Project Integration & Scope Management	1, 4
3	Role of Engineers in Client organization & Engineering Companies	3, 4
4	Project Planning and Scheduling	1, 4, 5
5	Project Cost estimation and Budgeting	1, 3, 4
6	Project Set-up & Project Execution Strategies	1, 3, 5
7	Project Resource Management & Project Risk Management	1, 2, 3, 4, 5
8	Project Procurement Management	1, 4, 5
9	Project Engineering and Value Engineering	2, 5
10	Construction, Site engineering & Commissioning	1, 3, 4, 5
11	Project Quality Management	5
12	Project Communications, Leadership skills, Motivation	3, 5
13	Final Quiz and presentations	1, 2, 3, 4, 5

## Appendix 1: Assessment Rubric

Performance Indicators / Course LO Tested	Performance Level / Criteria			
	Below Expectations: 1	Average, meet expectations: 2	Good: 3	Outstanding: 4
<b>Identify the project activities to plan and manage the project/ LOs 1,2,3,4,5</b>	Unable to identify the project activities and monitor the project.	Able to identify only or two project activities and monitor the project.	Able to identify some project activities and monitor the project.	Able to identify all critical project activities and monitor the project.
<b>Recognize the needs and the importance of life-long learning/ LOs 1, 2, 3, 4, 5</b>	Unable to recognize the needs and importance of life-long learning	Able to recognize the needs and importance of life-long learning one or two situations	Able to recognize the needs and importance of life-long learning for some situations	Able to recognize the needs and importance of life-long learning for most situations
<b>Comprehend codes of ethics/</b>	Unable to comprehend codes of ethics	Able to comprehend one or two aspects of code of ethics	Able to comprehend some aspects of code of ethics	Able to comprehend complete spectrum of code of ethics
<b>Understand project management and finance aspects of a project / LOs 1,2,3,4,5</b>	Unable to understand project management and finance aspects of a project.	Able to understand one or two project management and finance aspects of a project.	Able to understand some project management and finance aspects of a project.	Able to understand large spectrum of project management and finance aspects of a project.
<b>Adopt systems thinking for sustainable development, ethics and safety/ LOs 1,2,3,4,5</b>	Unable to adopt systems thinking for sustainable development, ethics and safety	Able to adopt little systems thinking for sustainable development, ethics and safety	Able to adopt some systems thinking for sustainable development, ethics and safety	Able to adopt proper systems thinking for sustainable development, ethics and safety

## Appendix 2: Group Project & Presentation

The class is split into 3-5 students per group to perform the group project.

A group project with elements of project management will be executed as part of this module. This helps you to achieve one or more of the outcomes, as you need to do self-study, research, and prepare the report submission.

**Group Project Report : 60% weightage**  
**Individual Presentation : 40% weightage**

Criteria	Below Expectations (0-2.5)	Average (3-5)	Good (5.5- 7.5)	Outstanding (8-10)	Remarks
<b>*Group Project Report 60%</b>					
Content (50%)	Unable to address the content in line with the proposed project outline	Able to identify only or two content items in line with the proposed project outline.	Able to identify some content items in line with the proposed project outline.	Able to identify all content items in line with the proposed project outline.	
Teamwork (10%)	<b>Unable to demonstrate teamwork,</b> coordination, presentation transition.	Able to demonstrate <b>little broken teamwork,</b> coordination, presentation transition.	Able to demonstrate <b>teamwork,</b> coordination, presentation transition.	Able to demonstrate <b>outstanding teamwork,</b> coordination, presentation transition.	Good coordination between the team members; Good transitions and connections between slides; Well pace and finish on time.
<b>Individual Presentation 40%</b>					
Presentation skill (30%)	Unable to present as <b>smooth delivery, engaging,</b> and in sync with other team members	Able to present as <b>little smooth delivery, less engaging,</b> and less in sync with other team members	Able to present as <b>good delivery, somewhat engaging,</b> and little in sync with other team members	Able to present as <b>smooth delivery, very engaging,</b> and in sync with other team members	Captivating, lively and engaging; smooth delivery and in sync with other team members.
	Unable to	Able to	Able to	Able to	Able to



Question & Answer / Participation (10%)	understand the question and did not answer or ask any question during others presentation.	understand the question and but <b>did not answer</b> or ask any question during others presentation.	understand the question and <b>answer</b> or <b>ask</b> questions during others presentation.	understand the question and <b>answer</b> well or <b>ask</b> sharp questions during others presentation.	understand and answer all questions; Handling of questions convey confidence and full knowledge of work presented.
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\*Please note that your individual score may vary based on feedback or observation of your contribution to the team via peer review.

### Appendix 3: Assessment Criteria for Peer Evaluation

Each student in the group is required to rate the contribution of other group members. All evaluations are held in confidence so no student will know how other group members' rate his/her contribution. You are to evaluate other group members fairly and objectively, bearing in mind the implications for the other members' grades (explained below). It is essential for you to submit your peer evaluation form to get marks.

To factor peer evaluations into the marks for your group assignment, the following computation will be used:

- If, on average, a student receives a rating of 9 or more, that student receives 100% of the group's grade.
- If, on average, a student receives a rating of less than 9, that student receives a specific percentage of the group's grade to be determined by the formulae below:

An average rating of 8 to < 9 =  $90\% + (\text{average rating obtained} - 8) * 10$

An average rating of 7 to < 8 =  $80\% + (\text{average rating obtained} - 7) * 10$

An average rating of 6 to < 7 =  $70\% + (\text{average rating obtained} - 6) * 10$

An average rating of 5 to < 6 =  $60\% + (\text{average rating obtained} - 5) * 10$

An average rating of 4 to < 5 =  $50\% + (\text{average rating obtained} - 4) * 10$

An average rating of 3 to < 4 =  $40\% + (\text{average rating obtained} - 3) * 10$

An average rating of < 3 will be investigated by your instructor and the student may receive 0-40% of group grades.

#### Example 1:

Assume the overall group assignment is 50 marks, and out of 50 your group got 50 marks. A student with an average rating of 9.10 gets 100% of 50 marks, i.e., 50 marks. An average rating of 6.29 means that a student gets 72.9% (or  $70\% + (6.29 - 6) * 10$ ) of 50 marks, i.e., 36.45 marks.

#### Example 2:

Assume the overall group assignment is 50 marks, and out of 50 your group got 30 marks. A student with an average rating of 9.10 gets 100% of 30 marks, i.e., 30 marks. An average rating of 6.29 means that a student gets 72.9% (or  $70\% + (6.29 - 6) * 10$ ) of 30 marks, i.e., 21.87 marks.