



**Master of Science in
CONSTRUCTION ENGINEERING AND MANAGEMENT**

Courses of Study (Syllabus)
(First Revision)

(Approved by the Subject Committee of Buddhist Architecture and Engineering on December 13, 2021, and consequently endorsed by the Faculty Board on December 23, 2021, and Academic Council on December 25, 2021)

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THE CONTEXTS

Lumbini Buddhist University (LBU) was established in Lumbini through LBU Ordinance in 2004 in response to the 1st World Buddhist Summit in Lumbini in 1998, and later endorsed by its own Act in 2006.

As outlined in its 2030 Vision Seven Initiatives, LBU expanded its programs by creating the School of Development Studies & Applied Sciences (SDSAS) in accordance to the Article 9D of its Act and by the decision of its 11th Senate Meeting held on August 14, 2019 in Lumbini.

The three master level engineering management programs that were approved by the LBU's 7th Senate held in Kathmandu on June 16, 2016 are as follows:

- i. Master's in Construction Engineering & Management,
- ii. Master's in Disasters Risk Engineering & Management, and
- iii. Master's in Rural Infrastructure Engineering.

Upon receiving LBU's letter of affiliation dated December 13, 2015, the Lumbini International Academy of Science and Technology (LIASST) had started two programs such as

- i. Master's in Construction Engineering & Management, and
- ii. Master's in Disasters Risk Engineering & Management.

In accordance to the decision number 6 of the 11th Senate held in Kathmandu on August 14, 2019, and as per the instruction of Executive Council on clustering of academic programs, a decision was made by a meeting of Deans chaired by Vice Chancellor on October 3, 2019 to include the ongoing two programs such as MSc in Construction Engineering & Management (CEM) and MSc in Disasters Risk Engineering & Management (DRM) within the domain of SDSAS.

With a purpose of mainstreaming the ongoing programs, LBU's 135th Executive Committee Meeting held on June 15, 2020 formed a team to explore on the scope and feasibility of master level engineering programs to address the Buddhist architecture, monuments, heritage and landscapes. Upon completion of over three and half months of consultative study, the team submitted its report with recommendations including the followings:

Maintain Unique Characteristics of the Lumbini Buddhist University: While developing academic programs in the architecture and engineering, it is essential for LBU to maintain its unique characteristics of Buddhist philosophy as envisaged in the declaration of the 1st World Buddhist Summit held in Lumbini in 1998, and the LBU Act 2006 with amendments in 2020 as specifically reflected in the **Preamble** and the **Article 3 (sub-article 1)**.

Continue Existing Programs: The two ongoing programs namely 1) MSc in Construction Engineering Management, and 2) MSc in Disaster Risk Engineering Management should be continued, since these programs have been implemented successfully since the affiliation was granted on December 13, 2015 with endorsement by the Senate on June 16, 2016. However, the syllabus of both the programs should be reviewed from the perspectives of LBU's Act and vision as mentioned above in Unique Characteristics and the UGC's 2016 Higher Education Qualification Framework Nepal.

THE PROGRAM

Program Course Title

M. Sc. in Construction Engineering and Management (MSc. CEM)

Course Duration

The course duration is two academic years (four semesters) in regular basis. However, due to genuine reasons, maximum duration for the completion of the course is 6 years after completion of regular two academic years.

Objective of the Program

The main objective of this program is to produce highly competent professionals in the field of construction engineering and management. Graduates from this course will be familiar with the project planning, contract management, construction technology, research methodology, project investment and other aspects of construction engineering and management.

To achieve the objective, MSc in Construction Engineering and Management Program of LBU, offers Main Core Courses and diversified Elective Courses with many case studies, project works and their research works on this particular field.

It is envisioned that the graduates of this program will be capable to manage the complex infrastructure projects and carry research project in the areas of construction engineering and management.

Entry Requirements for Admission

The candidate pursuing the admission in MSc. CEM must hold the Bachelor's Degree with 16 year academic study in Civil Engineering, Agricultural Engineering, Architecture, Electrical engineering, Mechanical Engineering, and Industrial engineering or holding an equivalent to above degree from recognized institutions or universities.

The candidate shall appear in and pass the admission test.

Total Credits

The MSc-CEM program offers 60 credits in accordance to the qualification framework for master level programs as recommended by the University Grants Commission (UGC) (HEQFDT, 2016:8), and also to be in compatible with the norms followed at the IoE-TU.

Pedagogy

LBU follows the 2016 Higher Education Qualification Framework as approved by the University Grants Commission. It includes definitions of credit, lecture hour, practical, minimum qualification and other relevant criteria.

For the purposes of this program also, pedagogical approaches will be based on the UGC's framework as elaborated in the **Table 1**.

Table 1. Definitions of Credit Hour

Types of Study (One credit hour equivalent)	Engaged Learning Hours (minimum)	Independent Learning Hours (minimum)	Total Hours
Lecture hour	15	30	45
Hours of lab studies	45	30	75
Hours of field studies	45	30	75
Hours of clinical studies	45	30	75
Hours of industrial training	90	30	120
Hours of self-study or online study or distance study	-	45	45

Source: HEQFDT, 2016

REVISION OF COURSE

Background

Upon the successful completion of two cycles of the courses of MSc in Construction Engineering and Management (MSc CEM), revision process was initiated in February 2021 in response to the recommendations made by LBU's study team in October 2020.

The purpose of revision was to further enrich the course contents and make them compatible with the developing technology in the construction industries.

The course encompasses the efficient skills in project planning, implementation and control along with cross cutting issues of technology, quality, contract, safety, financial investment, and environment, policy/legal provisions and other many contemporary issues.

Criteria of Revision

For the purposes of course and syllabus revision, LBU follows two main bases and standards such as its own Act and decisions, and the framework approved by University Grants Commission (UGC).

LBU Act and Decisions

The Preamble of its Act mentions that LBU should "... *operate high standard educational institutions on Buddhist Philosophy, Literature, Education, Culture and other subjects; to conduct study, teaching and research programs by promoting peace, fellowship, friendship or goodwill upon accepting the teachings of Lord Buddha as guiding principles of world peace...*" (GON, 2077:31).

Similarly, a decision made in the 11th Senate held on August 14, 2019 stated that LBU should "... *compulsorily incorporate Buddhist philosophy, literature, education and culture in every subject without compromising on the standards of pedagogy and evaluation system of the programs approved by the academic councils ...*" (LBU, 2019:20).

For expediting LBU's ongoing programs of engineering and also to promote engineering education on Buddhist architecture, LBU signed a Memorandum of Understanding with the Institute of Engineering of Tribhuvan University on November 13, 2020. Accordingly, a subject committee was formed within its domain. In its first meeting held on November 22, 2020, the committee also made the following decision:

"Considering that the syllabuses of both the MSc programs (such as CEM and DREM) were developed in 2015, it would be appropriate to review them from the following perspectives:

- accommodate in the course contents the contemporary topics like Sustainable Development Goals, and disaster resilience etc.;*
- reorganize course structure and credits to be compatible with the guidelines of University Grants Commission; and*
- incorporate Buddhist philosophy in all the courses as appropriate rather than inserting a separate course in isolation."*

(Source: LBU, 2020:5-6)

Method

A revision committee was formed within the scope and objective of the course contents.

Feedback from the construction project engineers/managers, graduates and faculties was collected. Individual teachers provided their inputs based on their teaching experiences and students feedbacks. All those inputs were incorporated in the revised courses.

Meetings with individual course teacher have been conducted virtually due to potential risk of COVID-19 pandemic. A workshop with minimum faculties and experts was organized at the LIAST college premises following the health protocols for COVID-19 precaution.

The revision of the course on MSc CEM has been accomplished after thorough review of present course and recommendations of faculties.

SYLLABUS AND CURRICULUM

Credits

The Master of Science in Construction Engineering Management (MSc-CEM) degree program includes 11 regular courses (each of 100 marks) and a thesis of 400 marks. In the first semester, all four courses are of foundation level. In the second semester, there are 2 core courses, and one course each to be selected from the two elective groups. In the third semester, there are two core courses, and one elective course to be selected. Thus, the total number of courses will be 11 totaling 44 credits. In the fourth semester, a thesis course of 16 credits will be offered.

Codes

For the purposes of this program, an alpha-numerical Course Code has been adopted. It includes three alphabets representing the program title and three digits reflecting on the semester.

Structure

In line with the semester system of the university, the course structure of the MSc-CEAM is as follows (**Table 2**):

Table 2. Course Structure of MSc in Construction Engineering and Management					
Course Code	Title of Course	Total Credits			Full Marks
		Theoretical	Tutorial	Total	
Year I	Semester I				
CEAM 511	Legal and Ethical Issues in Engineering Management	3	1	4	100
CEAM 512	Safety Engineering and Management	3	1	4	100
CEAM 513	Advanced Project Management	3	1	4	100
CEAM 514	Advanced Construction Technology & Equipment	3	1	4	100
Year I	Semester II				

Table 2. Course Structure of MSc in Construction Engineering and Management					
Course Code	Title of Course	Total Credits			Full Marks
		Theoretical	Tutorial	Total	
CEAM 551	Research Methodology & Quantitative Techniques	3	1	4	100
CEAM 552	Quality Management in Construction	3	1	4	100
	Electives (Any Two)				
CEAM 553	Construction Environment in Developing Countries	3	1	4	100
CEAM 554	Human Resource Management	3	1	4	100
CEAM 555	Bio Engineering	3	1	4	100
Year II	Semester III				
CEAM 611	Project Work on Construction Management	1	3	4	100
	Electives (Any Two)				
CEAM 612	System Engineering for Construction Management	3	1	4	100
CEAM 613	Construction Project Engineering and Administration	3	1	4	100
CEAM 614	Project Finance	3	1	4	100
Year II	Semester IV				
CEAM 651	Thesis work			16	400
	Total			60	1500

EVALUATION CRITERIA

The end-semester (final) examinations will be based on the following Sections of LBU's 2017 Academic Administration Rules:

- Section 19 Office of the Examinations Controller,
- Section 20 Evaluation of Answer Sheets and Archives,
- Section 21 Arrangement of Committees on Examinations,
- Section 22 Arrangement of Revealing Answer Sheets and Providing Copies,
- Section 23 Students' Code of Conducts on Examinations, and
- Section 24 Arrangements of Publishing and Suspending Results of Examinations.

The internal evaluation of students will be based on the Section 4 Examinations and Evaluation of LBU's 2018 Sub-Rules of Semester System.

COURSE WITH SYLLABUS

Year: I Semester: I

CEAM 511 Legal and Ethical Issues in Engineering Management

Year I, Semester I	
Course Title : Legal and Ethical Issues in Engineering Management	Course Code : CEAM 511
Nature of the Course : Theory + Case Study	Per week Hours: (3+1)
Credit : 4	Total Hours : 60

Course objectives: The course aims to develop the general understanding of legal issues related to the engineering projects and make the students familiar with the professional ethics in reference to Nepal.

Course Content

Unit 1: Introduction and Concept of Ethics

6 Hrs.

- Concept of ethics, ethics of Buddhism, Overview of ethical and moral theories, and introduction to ethical decision making approaches
- Meaning and scope of law in engineering activities, crime, tort, law of contract, etc., professional and ethical issues in engineering profession, Dilemma in making managerial decisions for an engineer etc.

Unit 2: Profession

3 Hrs.

- Introduction to engineering profession, professional duty and liability of an engineer, Limitation of liability, Duties and Liability of the Engineers for the professional conduct and negligence etc.

Unit 3: Contract

6 Hrs.

- Introduction and meaning of a contract, kinds of contracts, void and voidable agreements, and essential elements of contracts: offer, acceptance, consideration etc.
- Performance of contracts, discharge of contract, breach and remedies for breach of contract etc.

Unit 4: Tort and Negligence

6 Hrs.

- Meaning and kinds of tort, negligence and element of negligence, vicarious liability etc.

Unit 6: Insurance, Contract of Indemnity and Guarantee

9 Hrs.

- Basic concept: nature and principles of contract of insurance: - fundamental principles of insurance contract (policy). Reinsurance, contractor's all risk policy (CAR - Insurance), guarantee and surety, extent of surety's liability, continuing guarantee, discharge of surety from liability, etc.

Unit 7: Public Procurement law

6 Hrs.

- Organization for Public Procurement Management, objective and principle of public procurement law, public procurement and good governance, procurement of work, goods and service.

Unit 8: Dispute Resolution Mechanism

6 Hrs.

- In the engineering/business activities court litigation, arbitration, differentiating between litigation and arbitration: the law of arbitration, adjudication, dispute adjudication

Unit 9: Intellectual Property

3 Hrs.

- Introduction to intellectual property, the law of patent, design and trade mark, protection of techno-commercial information. Basic concept of property and ownership, distinction between property and ownership etc.

Unit 10: Case Study and Tutorial/Practical

15 Hrs.

The case study is focused on contemporary and Nepalese context and the above course contents. Students are assigned topics of case study, and the students prepare, present and submit assignments to the teacher.

References:

Relevant books, documents, archives and journals etc.

Carves, D.L., Design Liability in the caustrotias Industry. London: Collins

Fledderman, C.B., Engineering ethics. New York: Prentice Hall

Frankena, W.K., ethics, London: Prentice Hall

Goyaria, G.T., Law relating to building and engineering contracts in India, New Delhi: PHL Uaring

Hosmer, L.T., The ethics of management, Landon: McGraw Hill

Mishra, M.N. Ignorance principles and practices. New Delhi: Chand and company.

Tondon, M.P. Jurisprudence and legal ethics, New Delhi: Prentice Hall

CEAM 512 Safety Engineering and Management

Year I, Semester I	
: Safety Engineering and Management	Course Code : CEAM 512
Nature of the Course : Theory + Case Study	Per week Hours: (3+1)
Credit : 4	Total Hours : 60

Course Objectives

After completing this course students will be able to identify problem and issues related to safety at construction site. Students will be able to independently manage safety at construction site.

Course Content

Unit 1: Introduction

3 Hrs.

Construction industry and safety, Meaning and scope of construction safety, construction safety in the aspect of Buddhism, Scope for improvement.

Unit 2: Modern Safety Concept:

3 Hrs.

Introduction; The British Safety Legislation; Growth of safety laws and legislation; Legislation, penalties or standards; concern over health and safety of workers; Concern for general people and property; Educating the mass.

Unit 3: Accidents and Their Causes:

3 Hrs.

Software causes; Hardware causes; Accidents at construction sites; Losses due to accidents, Calculation of lost hour and lost resources. Theory of Accident in brief

Unit 4: Attending the Emergency:

3 Hrs.

Introduction; Fire emergency; Drowning, Electric shock; burn with acids and chemicals; Attending a person fallen from height; First aid at construction site; the first aid center.

Unit 5: Prevention of Accidents:

6 Hrs.

Introduction; Role of legislation; Implementation of safety plan at construction site; Awareness and self-discipline – discipline at work; Design provisions for reducing accidents; Eliminating the accidents at construction sites.

Unit 6: Documentation for Safety Management:

6 Hrs.

Preparation of an EHS plan; Organization safety policy- its content; Review of contractor's safety policy; Approval of contractor's EHS plan; Fire safety plan; Emergency dealing plan; Site security plan; Machine inspection records; Daily observation records; Meeting minutes; Test certificates, Manufacturer's instruction manual for storage and handling of hazardous substances; Site activity records.

Unit 7: Work Place Safety Management:

9 Hrs.

Safety signal and signage; Awareness generating slogans; Equipment safety- third party inspection, licensed operator, training of operator; Ensuring electrical safety; Housekeeping; Training of workers – Induction, tool box talk, skill training, periodical safety briefing; safety walk down at site; Safety meetings; Safety reporting; Method statement and job Safety analysis (JSA); Near miss reporting; Accidents reporting; Report of property loss; Safety performance chart. Safety supervision – qualification and competence of safety personnel, role of safety engineers and safety stewards.

Unit 8: Motivation for Safety

3 Hrs.

Introduction; motivating the workers; Motivating the supervisors and managers; Motivating the planners and designers; motivating the contractors; the safety committee.

Unit 9: Safety Cost

3 Hrs.

Introduction; Cost to the contractor; Cost to the employer; cost of managing safety at construction site; Calculating the cost of safety; Provision in the tender document.

Unit 10: Safety Practices in Buddhist Heritage

6 Hrs.

Safety practices in ancient and modern Buddhist Heritage sites in construction and maintenance

Unit 10: Case Study and Tutorial/Practical

15 Hrs.

The case study is focused on contemporary and Nepalese context and the above course contents. Students are assigned topics of case study, and the students prepare, present and submit assignments to the teacher.

References:

Relevant books, documents, archives and journals etc.

Atev, S. S. Construction Technology. Moscow: Mir Publishers, 1997.

Grimaldi, J.V. Simonds, R. H. & Richard, D. Safety Management. Homewood, IL Irwin, 1989.

NICMAR, Safety Management in the Construction Industry. Bombay: NICMAR publication

Tarafdar, N. K. & Tarafdar, K. J. Industrial Safety Management, Delhi: Dhanpat Rai & Co.

CEAM 513 Advanced Project Management

Year I, Semester I	
Course Title : Advanced Project Management	Course Code : CEAM 513
Nature of the Course : Theory + Tutorial/Case Study	Per week Hours: (3+1)
Credit : 4	Total Hours : 60

Course objectives:

The Objective of this course is to enable the students to state and explain the concepts of project management in a simple and effective manner with concept of modern trends and techniques of project management.

Course Content

Unit 1: Project Management Concept

6 Hrs.

Project and Project Management, Project Characteristics and classification Project, Project Life Cycle, Stage of Construction Project, Basic Principles of Construction Management, Project Environment Concept, Elements of Project Management and Functions, Project Identification, Techniques for Project Management, and Roles of Project Manager; Buddhist approaches of project planning.

Unit 2: Project Appraisal and Techniques of Project Formulation

6 Hrs.

Concept of project appraisal, tools of project appraisal, project proposal (technical and financial), procedure for developing project proposal, techniques of project formulation (feasibility analysis, network analysis, cost benefit analysis, input analysis, environmental analysis), concept of logical frame work.

Unit 3: Project Planning and Scheduling

9 Hrs.

Concept of project planning and its importance, project planning process, work breakdown structure, project scheduling and tools used in scheduling (Bar chart, Network analysis: CPM, PERT).

Unit 4: Introduction of Contract Management

6 Hrs.

Concept of contract, sub contract, types of contract, contract planning, Introduction to national and international bidding, contract document and factors to be considered in preparing a contract, EPC Contract, FIDIC Conditions of Contracts.

Unit 5: Project Risk Management

6 Hrs.

Introduction to project risk, types of project risk, analysis of major source of risk, effective management of project risks.

Unit 6: Project Implementation, Controlling and Evaluation

9 Hrs.

Introduction to monitoring, evaluation and controlling, Project Control System, Project Control Cycle, Elements of Project Control (Time, Cost and Quality), Variations in Contract, Concept of Earned Value Analysis and S-curve, Decision Support System, Introduction to Project Management Information System (PMIS), Monitoring and Evaluation Framework.

Unit 7: Introduction to Project Finance

3 Hrs.

Concept of project finance, features of project finance, project development and management, project finance and privatization, Form of Project Finance (BOOT, BOT, BTO, BOO BOOT, BOT, BTO, BOO), public private partnership.

Unit 7: Case Study and Tutorials/Practical

15 Hrs.

The case study is focused on contemporary and Nepalese context and the above course contents. Students are assigned topics of case study, and the students prepare, present and submit assignments to the teacher.

References:

Relevant books, documents, archives and journals etc.

A Guide to the Project Management Body of Knowledge, Second Edition.

Agrawal, G. R. 2013. Project Management in Nepal, MK Publishers and Distributors, Kathmandu.

BIS, 2009. *Construction Project Management-Guidelines.Part I: General*. New Delhi 110002: Bureau of Indian Standard.

BIS, 2013. *IS 15883-2: Construction Project Management-Guidelines, Part-2: Time Management Including Safety in Construction*, New delhi 110002: Bureau of Indian Standards.

DhurbaP.Rizal, Project Management 2001, Ratnapustakbhandar, First Edition.

E.R. Yescombe, Principles of Project Finance 2002, Yescombe-Consulting Limited.

Frederick E. Gould, PE, CPC, 2002. *Managing the construction Process*. Prentice Hall Upper Saddle River, New Jersey 2002. Second Edition.

IshwarAdhikari and Santosh Kr. Shrestha, A text of Project Engineering 2011, Chandeshwori Publication, First Edition

Kuzher, H. Project management, New Delhi: CBS publishers and distributors

CEAM 514 Advanced Construction Technology & Equipment

Year I, Semester I	
Course Title: Advanced Construction Technology & Equipment	Course Code : CEAM 514
Nature of the Course : Theory + Tutorial/Case Study	Per week Hours: (3+1)
Credit : 4	Total Hours : 60

Course Objective:

The objective of this course is to strengthening students' understanding of construction technology & equipment knowledge to acquire relevant skill for applying them into real practice in managing construction projects.

Course Content

Unit 1: Overview of History of Construction technology and equipment	3 Hrs.
Unit 2: Ground Engineering: Excavation and Compaction, Pile driving, Shoring	3 Hrs.
Unit 3: Masonry: Stone masonry and Brick masonry	3 Hrs.
Unit 4: Concrete Construction: Brief history of cement and concrete, Sand and aggregate production, Batching, Mixing, Placing, Compaction, Curing	3 Hrs.
Unit 5: Woodworks, Steel and Aluminum works for openings. Steel structures.	3 Hrs.
Unit 6: Pipe Laying, Concrete, Steel, GI, CI, Polythene Pipes	3 Hrs.
Unit 7: Highway and Pavement construction: Excavation, Filling, Flexible and Rigid Pavement	6 Hrs.
Unit 8: Hydraulic Structures: Dam, Barrage, Weirs, Power house, Canals, Gates, Cofferdam & Sedimentation tanks	6 Hrs.
Unit 9: Tunnel Construction: Drilling, Blasting & Boring method	3 Hrs.
Unit 10: Bridge Construction: RCC Bridge & Suspension Bridge	3 Hrs.
Unit 11: New Technologies: Prefabrication & erection of units, mechatronics, SMART construction, use of Drone etc.	3 Hrs.
Unit 12: Appropriate Selection of Construction Plants and Equipment Background and introduction, planning for equipment selection, considerations to be done while selecting equipment	3 Hrs.
Unit 13. Application of Modern Technology in Buddhist Architecture	15 Hrs.
Unit 14: Case Study and Tutorials/ Practical	

The case study is focused on contemporary and Nepalese context and the above course contents. Students are assigned topics of case study and the students should prepare, present, and submit the assignments to the teacher.

References:

Relevant books, documents, archives and journals etc.

- Harris, Frank, Construction Plant Excavating and Materials handling equipment and Methods, Granada Publishing, London
- Harris, Frank, Construction Plant Ground Engineering Equipment and Methods, Granada Publishing, London
- Neville, A. M. "Properties of Concrete" Pitman publishing Limited, London's 4th Edition 2000, PP. (674-760).

Year: I Semester: II

CEAM 551 Research Methodology & Quantitative Techniques

Year I, Semester II	
Course Title: Research Methodology & Quantitative Techniques	Course Code : CEAM 551
Nature of the Course : Theory + Tutorial/Case Study	Per week Hours: (3+1)
Credit : 4	Total Hours : 60

Course Objective: The objective of the course is to make students able to comprehend the fundamentals of research; facilitates student to carry out their research activities independently; and to familiarize the students with the participatory approaches and methodology.

Course Content

Unit 1: Introduction to Research Methodology

6 Hrs.

- Approach to application of Buddhist knowledge in modern research
- Scientific research and methods
- Research design
- Research question

Unit 2: Methods of research

3 Hrs.

- Conventional research method
- Historical research method
- Experimental research method
- Survey research method
- Case study research

Unit 3: Task of writing research papers

9 Hrs.

- Research proposal: meaning and purpose of research proposal, academic/project/case study proposals, steps for the preparing proposal, framework and arrangement of sub heading in research proposal; writing research proposal for academic program; common mistakes in proposal writings
- Review of literature and note taking; methods selecting relevant literature, ways of note taking and recording; from different sources.
- Research report: introduction, purpose and different forms of report; qualities research reports; presentation of preliminary, general and technical reports; format of research report, necessary elements of research report, precautions for report preparation.
- Thesis/dissertation; introduction, features of thesis, structure of thesis, steps in thesis writings, documentation of a thesis/dissertation.
- Citation and referencing: different ways of work citation, arranging reference material; bibliography quoting from different sources; different system of citation and referencing: APA, MLA and iso690 (numerical reference).
- Publication in research journals: introduction and its importance, arrangements of the article; difference between general and research article
- Preparation of research/project proposal
- Questionnaire designing
- Preparation of observation schedule for field/lab work
- Case analysis/situation analysis
- Survey report preparation/field or lab work report preparation
- Presentation on related topic (class seminar)
- Analysis of references and citation (books, journal, reports, theses etc.)

Unit 4: Sampling and sampling distribution

6 Hrs.

- Introduction and review of sampling: definition, needs, steps; definition of population, sample, sampling unit, sampling unit, sampling frame, sampling error and non-sampling error; steps in sampling; fundamentals, characteristics, advantage and disadvantage of sampling.
- types of sampling ; probability (simple, stratified, systematic, cluster and multistage- in brief), process of selecting random sample; non probability sampling (convenience, purpose, quota, snowball, self-selecting); advantages and disadvantages (brief discuss only)
- Size of sample ; factor affecting size of sample, testing the reliability of sample, methods of estimating sample size, process of selecting random sample

Unit 5: Data and techniques of data collection

6 Hrs.

- Need and nature of data in construction and disaster risk engineering and management, different form of information, primary and secondary data, cross section and categorical data, time, series, spatial and ordered data. Different pandemic and disaster related data in world history
- Types of data according to measurement scale, qualitative and quantitative data ,nominal, ordinal ,interval ,ratio scale data
- Data collection in engineering, Schedule, questionnaire, interview, focus group discussion, survey and census, observation methods.
- Ethical consideration
- Participatory approach of learning

Unit 6: Descriptive statistics

3 Hrs.

- Central tendency
- Location measurement (median, quartile, decile, percentile)
- Variability, skewness, kurtosis

Unit 7: Probability and probability distribution

3 Hrs.

- Terminology and definition of probability,
- Addition, multiplication theory of probability
- Bayes theorem
- Random variable
- Mathematical expectation
- Binomial Poisson and normal distribution

Unit 8: Hypothesis Testing

6 Hrs.

- Basic concepts to the hypothesis testing;
- Hypotheses testing of Large Sample(Z-test);
- Test for equality of population means;
- The t-test;
- Testing equality of variances of two normal populations;
- Confidence interval;
- Chi-square as a test of goodness of fit;
- Test of independence of attributes and test of population variance;
- Analysis of Variance: One-way classification and two-way classification

Unit 9: Application of Qualitative Tools

3 Hrs.

- Application of Qualitative Tools in Construction Engineering and Disaster Risk Management Research

Unit 10: Case Study and Tutorials/Practical:

15 Hrs.

The case study is focused on contemporary and Nepalese context and the above course contents. Students are assigned topics of case study and the students should prepare, present, and submit the assignments to the teacher.

References

Relevant books, documents, archives and journals etc.

Alan Bryman & Emma Bell (2007). Business Research Methods, Oxford University Press.

Cooper & Schindler (2004). Business Research Methods. New Delhi: Tata McGraw-Hill Publishing Co.

Donald Cooper & Pamela Schindler (2006). Business Research Methods (9th edition), TMGH.

Kothari, C.R. (2008). Research Methodology-Methods and Techniques, New Age International Publishers, New Delhi.

CEAM 552 Quality Management in Construction

Year I, Semester II	
Course Title : Quality Management in Construction	Course Code : CEAM 552
Nature of the Course : Theory + Case Study	Per week Hours: (3+1)
Credit : 4	Total Hours : 60

Course objectives:

The objective of this course is to strengthen student's understanding to acquire knowledge and skill of quality management in managing construction projects.

Course Content

- Unit 1: Introduction** **6 Hrs.**
- Concept of Quality, Evolution and History of Quality, Dimensions of Quality, Importance of Quality, Quality Issues in Nepalese Construction Industry, Buddha's teachings in quality management
- Unit 2: Quality Assurance in Construction Project** **6 Hrs.**
- Quality requirements and Standards in Construction Works, Specifications, Testing and Recording, Limit Fit & Tolerance, Acceptance and Rejection of test results, Quality Assurance Plan, Role of Design and Supervision
- Unit 3: Quality Control, Tools and Techniques** **9 Hrs.**
- Concept of Quality Control, Area of Quality Control, Concept of Process Variation, Sampling Technique, Measurement & Metrology, Precision & Accuracy, Basic Quality Control Tools: Flow Chart, Check List, Histogram, Pareto Analysis, Cause and Effect Diagram, Control Charts, Scatter Diagram; Quality Control Technique: Just in Time, Quality at the Source, Statistical Process Control and Implementation, Capability Index, Quality Circle, Brainstorming
- Unit 4: Total Quality Management** **9 Hrs.**
- Concept of Quality Management System and TQM, Main Elements of TQM, Pioneers of TQM, Principles of Quality Management system, TQM Systems, Approach of TQM and Implementation, Continuous Improvement.
- Unit 5: Quality Management Philosophies and Approaches** **6 Hrs.**
- Management Philosophy, Deming Principle and 14 Points of Quality Management, Juran Philosophy, Crosby Philosophy
 - Quality Management Approaches: Taguchi Principle, Six Sigma Principle, Quality Function Deployment, Keizen Principle
- Unit 6: ISO Quality Management Standards** **9 Hrs.**
- Concept of ISO Standards, History of ISO 9000, Series of ISO-standards, Principle of Standard Development, Process/Steps of QMS Implementation for ISO 9001-2015 Standard: Quality Policy/ Manual, Planning, Team Formation, Training, Planning for Audits, Auditing Techniques, Internal Audits, Check List For Audits, Certification/Registration Process, Continual Improvement
 - Current Practices /Implementation Status of ISO 9001-2015 standard in Nepalese Construction Industries
- Unit 7: Case Study and Tutorial/Practical** **15 Hrs.**

The case study is focused on contemporary and Nepalese context and the above course contents. Students are assigned topics of case study, and the students prepare, present and submit assignments to the teacher.

References:

Relevant books, documents, archives and journals etc.

Besterfield, et al. Total Quality Management. PHI

Ehresman, Terry (1996). Small Business Success through TQM. Tata McGraw-Hill Publishing Company Limited, Delhi, India.

Hansen and Ghare (latest ed.). Quality control and application. PHI

Jankiraman&Gopal) new). Total Quality Management. PHI.

Mitra, Amitava (2005). Fundamentals of quality control and improvement (2nded.). PHI.

Montgomery, Douglas C. (1996). Introduction to Statistical Quality Control. John Wiley and Sons, Inc.

Raju, S. M. Sundara (1997). Total Quality Management. Tata McGraw-Hill Publishing Company Limited, Delhi, India

Ron Collard (latest). Total Quality Success through people. Jaico publishing house.

Smith (latest ed.). Quality problem solving. PHI

Suganthi& Samuel. Total Quality Management. PHI

Summers (new). Quality Management: Creating and sustaining organizational effectiveness, PHI.

Zairi, Mohamed (1992 /or latest one). Total Quality Management for Engineers. Aditya Books Private Limited, Delhi, India.

CEAM 553 Construction Environment in Developing Countries (Elective)

Year I, Semester II	
Course Title : Construction Environment in Developing Countries (Elective)	Course Code : CEAM 553
Nature of the Course : Theory + Case Study	Per week Hours: (3+1)
Credit : 4	Total Hours : 60

Course objectives

The course aims to cater students the cultural differences of the developed and developing countries, and its impact in construction industry, similarities and differences, etc.

Course Content

Unit 1: Concept of Development, Linkages between Developed and Developing Countries 15 Hrs.

- Definitions of development, Core value of development, Objectives of development, meaning of underdevelopment, meaning and measurement of development, classification of countries based on levels of development, similarities and differences in developed developing countries.
- Concept of global village, Environment, population, migration, debt, job, education, trade/transit, tourism, terrorism, politics, peace, multinational institutions, international business, multinational corporations, outsourcing, foreign direct investment etc.
- Interdependence of developed and developing countries: socio-economic interdependence, environmental interdependence, political interdependence and cultural interdependence, etc.
- Needs and priorities of developed countries: human resources, natural resources, investment opportunities, climate change, dumping site for obsolete technology, wastes, medicine testing, etc.
- Needs and priorities of developing countries: education and training, infrastructure project, financial recourses, technology, humanitarian assistance, loan, management system, health needs, water needs, information needs, self-actualization needs, etc.
- Buddhist perspectives of development and construction.

Unit 2 Construction technology and stages of economic development: 3 Hrs.

- Labor intensive technology, capital intensive technology and labor based technology,
- merit and demerits and comparisons of labor intensive and capital intensive technology,
- factors determining choice of technology,
- transfer of technology and
- stages of economic development.

Unit 3 Culture, Attitudes and Beliefs 6 Hrs.

- **Culture:** meaning of culture, elements of culture, safety culture, and impact of culture in construction management.
- **Attitude:** positive, negative and neutral attitude, functions of attitude, impact of attitude in construction management,
- **Beliefs:** religious belief, predestination, accident, social belief, impact of belief system on construction management.

Unit 4: Project Environment in Developing Countries, Choice of Technology and Concept, methodology and strategy 6 Hrs

- **Project Participants:** Client, consultant, contractors, construction materials and allied industries, funding agencies, Journalists, Environmental activities, end users. Management aspect of project environment in developing countries: top level, middle level and operational level management and their characteristics, legal socio-cultural, economic, political and demographic factors, external factors affecting construction project.

- **Objectives and Prospective of Transfer of Technology:** issues related to transfer of technology, channels of transfer of technology, methods of transfer of technology, provisions of the foreign investment and Technology Transfer, impact of technology transfer in construction industry.

Unit 5 Construction Business Environment and Contract Strategy 3 Hrs.

- Construction business strategy, stay in the market, profit maximization, gain reputation, concept of construction business development and growth, goal for growth, continuous improvement, research and development, corporate resources and personnel, financial management, project slicing and packaging: preparing contract packages, setting-up contracts etc.
- Economic factor, the government factor, technological factor, socioeconomic and demographic factor, competition factor, supplier factor, etc.
- The company environment, social environment, political environment, economic environment, fiscal environment, trade union and its relations with management, governance and impact to construction business, government policy and its effect, etc.

Unit 6: Eco-system and Environment 3 Hrs.

- Elements of environment and ecology, environmental pollution, environmental degradation, consequences of development activities, etc.
- Greenhouse effect and some aspects and example of climate change in the country and global perspectives, etc.

Unit 7: Law and Policies governing Environment, Solid waste, Forests, water resources, industrial, urban development and others directly or indirectly related to construction industry and Codes and Bylaws. 6 Hrs.

- Local Governance operation Act BS 2074
- Solid Waste Management Act BS 2068
- Water Resources Act- BS2049
- Forest Act- BS 2049
- Environment Act-BS 2077
- Industrial Act- BS2076
- Urban development Act, along with its Regulations and amendments.

Unit 8: Ownership and Transfer of Ownership Rights 3 Hrs.

- Introduction, ownership issues in developing countries,
- Transfer of ownership, legal provisions related to ownership and transfer of ownership.

Unit 9 : Case Study and Tutorial/Practical 15 Hrs.

The case study is focused on contemporary and Nepalese context and the above course contents. Students are assigned topics of case study, and the students prepare, present and submit assignments to the teacher. This focuses to have **Seminar and Class-room.**

References:

Relevant books, documents, archives and journals etc.
FIDIC, WB, ADB, GoN, Model Conditions of Contract
GoN Related Acts, Regulations, Guidelines, Nepal Law commission websites and publications
Lekhi, R, K. Economics of developing planning, New Delhi: Tata Mac Graw – Hill.
Loraine, R.K. Construction Management in Developing Countries, New York: Telford.
Procurement Guidelines of GoN, Bilateral and Multilateral donors (GoI, UK, FG, WB, ADB/Manila etc.)
Publication of National Planning Commission and CBS.
Publications, Journals, Papers and Reports.
Teacher's Handouts and Presentations

CEAM 554 Human Resource Management (Elective)

Year I, Semester II	
Course Title : Human Resource Management (Elective)	Course Code : CEAM 554
Nature of the Course : Theory + Case Study	Per week Hours: (3+1)
Credit : 4	Total Hours : 60

Course Objectives

To introduce the basic concept of human resources management

To enable the students to apply the principles and practices of organization behavior and human resource management in the work situation.

To develop skills to handle tactfully emerging human resources challenges and issues.

Course Content

Unit 1: Evolution of Management Thought

3 Hrs.

- Scientific management theory, administrative management theory, Bureaucratic theory, Behavioral Management, management science theory, organizational environment theory; Buddhist perspectives of Human Resources Management.

Unit 2: Principles and Types of Organization

3 Hrs.

- Need of an organization, formal and informal organizational structures,
- Principles (objectives, specialization, coordination, authority, responsibility, delegation, efficiency, control, balance, simplicity, flexibility),
- Types (line and staff, functional, matrix, networking, virtual, organic, and boundary less)

Unit 3: Introduction of Human Resources Management

6 Hrs.

- Meaning and functions of human resource management,
- Human resource planning,
- Meaning, process and methods recruitment and selection of employees,
- Selection process, selection test, interview and socialization
- Training and development of employees
- Determination of training Need
- Methods of training
- Management development

Unit 4: Job design and Job Analysis

3 Hrs.

- Meaning of job, task position and occupation.
- Concept, benefits and methods of job design.
- Concept and purpose of job analysis, collecting job analysis information, job analysis techniques- job- focused and person/ behavior focused, job description, job specification and job evaluation.

Unit 5: Motivation and Leadership:

6 Hrs.

Motivation:

- Meaning and process of motivation,
- Major theories of motivation; need based (Maslow's Hierarchy of Needs, Aldermen's ERG Theory, - Herzberg's Two Factor Theory, McClelland's Learned Needs Theory), Cognitive theory (Expectancy Theory, - Equity Theory/ Social Comparison, Goal Setting Theory), reinforcement theory,

Leadership:

- Meaning and need of leadership,
- Qualities of leadership

- Leadership theories (traits theory, behavioral theory, contingency theory, transformation leadership, servant leadership, emotional intelligence, complexity and chaos)

Unit 6: Communication: **3 Hrs.**

- Meaning of communication, communication process,
- Types (formal and informal)
- Barriers to communication, organizational communication and the grapevine, rumors,
- Communication with style (noble, Socratic, reflective) effective communication, improving the communication process, communication breakdown.

Unit 7: Group dynamics, team building and conflict management: **6 Hrs.**

- Types of groups in an organization, Group behavior,
- Group influences, Organization's influence on group behavior,
- Teams in an organization: the trouble with teams, high performing teams and effective teams.
- The team building approach: when it is needed, aspects of team building efforts. Improving ongoing work teams.
- Building new teams, Conflict within the teams.
- Conflict in an organization, managing conflict.
- Methods for resolving conflict.
- Stress management.

Unit 8: Decision Making **3 hrs.**

- Management and decision making,
- The process of decision making,
- Organizational framework for decision making,
- Factors influencing decision making,
- Decision making styles of managers and implementation of decisions.

Unit 9: Employee Performance Evaluation and Reward Management **3 Hrs.**

- Meaning of employee performance,
- Methods performance evaluation,
- Linking performance with reward system,
- Types of reward (financial; direct and indirect, and non-financial: job related and environment related)

Unit 10: Industrial Relations Management **3 Hrs.**

- Meaning and importance of industrial relation,
- Parties involved in industrial relation, trade unions, composition and functions, grievance handling practices and
- Provisions, review of labor laws of Nepal.

Unit 11: Productivity Management **6 Hrs.**

- Introduction, methods of measuring productivity,
- Methods of improving productivity, (managing technology, business process reengineering, training and development, benchmarking,)

Unit 12: Case Study and Tutorial/Practical **15 Hrs.**

The case study is focused on contemporary and Nepalese context and the above course contents. Students are assigned topics of case study, and the students prepare, present and submit assignments to the teacher.

References:

Relevant books, documents, archives and journals etc.

DeCenzo, D. A. & Robbins, S.P. *Human Resource Management*, 10th edition 2010
Dressler, G., *Human Resource Management*. 13th edition, New Delhi: Pearson, 2009
Labor Act and laws of Nepal
Luthans, F. *Organizational Behavior* 12th edition. Boston: McGraw-Hill. 2011
Related Legislations and ILO Convention Papers.
Robbins, S.P., & Judge, T.A., *Organizational Behavior*, 15th. Ed. Delhi: Prentice Hall of India, 2012.
S. K Kharel, Foundation of Human Resource Management Seventh Edition, 2012.
Schermerhorn, J.R. *Management*, 12th ed, John Wiley & Sons. 2013
Trade Union Acts and laws of Nepal.

CEAM 555 Bioengineering (Elective)

Year I, Semester II	
Course Title: Bioengineering (Elective)	Course Code : CEAM 555
Nature of the Course : Theory + Tutorial	Per week Hours: (3+1)
Credit : 4	Total Hours : 60

Course Objective:

The course aims to make students familiar with bioengineering techniques with reference to Nepal.

Course Content

Unit 1: Introduction

6 Hrs.

Definition, problems on a slope, engineering and hydrological functions, scope and benefits of bioengineering, limitations of bioengineering

Unit 2: Site Investigation

9 Hrs.

- Analysis of slope stability on the basis of rock fractures, rock types, grade of rocks
- Mass movements and its classification
- Causes and mechanism of slope failure
- Landslide and gulley mapping

Unit 3. Basic Aspects of Vegetation

6 Hrs.

- Vegetation and plant types
- The basic requirement of plants
- Plant propagation
- Ecology of Nepal and plant selection
- Selection of plant types based on drought factors

Unit 4. Roles of Vegetation in slope stabilization

3 Hrs.

- Engineering, hydrological and mechanical roles
- Soil strength and stability analysis (numerical)

Unit 5: Vegetative Structures

6 Hrs.

- Seed, Seedling, Grass Plantation and Types
- Brush Layering, palisades, fascines, turfing installation process, functions, applications, and limitations
- Selection, design, and application of small scale civil engineering structures
- Interaction between vegetative and civil structures

Unit 6: Nursery and its management: Establishment of a nursery, nursery techniques **6 Hrs.**

Unit 7: Buddhism discourse in bioengineering and slope protection

9 Hrs.

Unit 8: Case Study and Practical/Tutorial

15Hrs.

Case Study:

- Bamboo plantation, life cycle, cost, and benefits analysis for slope protection

- Amliso plantation, life cycle, cost, and benefits analysis for slope protection

Text and Reference Books:

Bikash Adhikari, 2021, "A manual on stabilization of shallow seated instability"

Dahal R. K., 2006, "Geology for Technical Students - A textbook for Bachelor Level Students", Bhrikuti Academic Publication, Exhibition Road, Kathmandu, Nepal.

John Howell, 2002, "A handbook on roadside bioengineering", department of Road, Government of Nepal.

Year: II Semester: III

CEAM 611 Project Work on Construction Management

Year II, Semester III	
Course Title : Project Work on Construction Management	Course Code : CEAM 611
Nature of the Course : Theory + Case Study/Seminar	Per week Hours: (1+3)
Credit : 4	Total Hours : 60

Course Objective:

The course is to build the practical knowledge and skills of the students on independent study of specimen projects and presentation of the research in an academic approach.

The Project work

Project research area broadly covers the ongoing and completed projects in civil engineering and industrial engineering construction planning and management in Cultural and Buddhist heritage sites and other linkages and buildings, Transportation, Hydropower, Irrigation, Water Supply, Waste Management, Industries and other infrastructure projects.

The project work is to help students in studying Procurement/Contract management, Quality management, Construction equipment and technology.

A group(s) of students shall be formed by the college, assigned project work should be carried out by each group. This can also be carried out individually. The report should be prepared following the standard guidelines of academic writing provided by the MScCEM Program. Finally, the work should be presented by the students and evaluation will be made by the project supervisor (70%) and by the research committee formed including course coordinator (30%).

Students shall follow the project work guideline and prepare a report of high standard and the report synopsis should be acceptable to the college.

Reference:

Relevant books, documents, archives and journals etc.

Remarks: The evaluation of this course will be only internal.

CEAM 612 System Engineering for Construction Management (Elective)

Year II, Semester III	
System Engineering for Construction Management (Elective)	Course Code : CEAM 612
Nature of the Course : Theory + Tutorial/Case Study	Per week Hours: (3+1)
Credit : 4	Total Hours : 60

Course objectives:

The objective of this course is to strengthening students' understanding of system engineering / operation research knowledge to acquire relevant skill for applying them into real practice in managing construction projects.

Course Content

Unit 1: Introduction **6 Hrs.**

- Historical Background of Operation Research and Uses
- Linear Programming: Graphical Method, Solution by Graphical Method,
- Simplex Method: Basic Requirements of LP, General LP Problem, Use of Artificial Variables, Problems
- Buddhism and system Theory

Unit 2: Duality in Linear Programming **3 Hrs.**

Duality Theorem, Economic Interpretation of Dual Variables, Problems

Unit 3: Integer Programming **6 Hrs.**

Nature of the Problem, Methods: Branch and Bound, Cut Algorithm
Examples

Unit 4: Transportation Model **3 Hrs.**

Structure of the Problem, Methods for Initial solution, Vogel's Approximation method, North West Corner Method, Other Methods, Example

Unit 5: Assignment Model **3 Hrs.**

Formulation, Hungarian Method, Examples

Unit 6: Queuing Model **3 Hrs.**

Introduction, Queuing Theory, Formulae, Problems

Unit 7: Dynamic Programming **6 Hrs.**

6 Hrs.

Unit 8: Statistics, Probability and Uses

9 Hrs.

Unit 9: Applications in Projects

15 Hrs.

Unit 10: Case Study and Tutorial/Practical

The case study is focused on contemporary and Nepalese context and the above course contents. Students are assigned topics of case study, and the students prepare, present and submit assignments to the teacher.

References:

Relevant books, documents, archives and journals etc.

Bronson, Richard, Theory and Problems of Operations Research, Schaum's Outline Series, McGraw Hill Book Company, Singapore.

Shenoy, G V., Linear Programming: Methods and Applications, Wiley Eastern Ltd., New Delhi

Taha, Hamdy, Operation Research, Tata McGraw Hill Publishing Company, New Delhi, India.

Vohra, N D, Quantitative Techniques in Management, Tata McGraw Hill Publishing Company, New Delhi, India.

CEAM 613 Construction Project Engineering and Administration (Elective)

Year II, Semester III	
Course Title : Construction Project Engineering and Administration (Elective)	Course Code : CEAM 613
Nature of the Course : Theory + Case Study	Per week Hours: (3+1)
Credit : 4	Total Hours : 60

Course objectives: The objective of this course is to make the students familiar to decide on setting-up of contract documents and selecting the contractors in any construction projects.

Course Content

Unit 1: Introduction

6 Hrs.

- Overview of various fields of civil engineering contract works
- Functions of construction management
- Features of successful construction entrepreneur
- Some pros and cons of construction industries, etc.
- Buddhist administration in engineering projects

Unit 2: Working with Consultants

6 Hrs.

- The Scope of a Consultant
- Consultant and Experts, Sub-Consultants, Consultant's personnel
- Accepting and replacement of Consultant
- Consultant's responsibility and obligation in Contract Administration, Kick-off meeting etc.
- Communication with the Consultant
- Relationship among the Consultant, Employer and the Contractor
- Handling change in the scope of the work
- Rating of Consultant's Performance
- Reporting obligation of the Consultant – content, frequency and distribution, etc.

Unit 3: Contract Agreement and Commencement of the Project/Contract Work

3 Hrs.

- Contractor's definition, Terminologies in the Contract (Employer, Consultant/Engineer , Contractor, Contract, Letter of Acceptance, Letter of Tender , FIDIC, Sub-Contractor, Base date, Commencement date, Contract Data etc.,)
- Obligations and Responsibilities of Employer, Consultant/Engineer and Contractor in the Contract
- Commencement of work and Contractor's mobilization,
- Issues of site possession by the Employer
- Consultant moves in the Employer's role to get Project started
- The Kick-off meeting with the Contractor
- Contractor's submission such as schedules and plans reviews, submission and approval of plans for health, safety and security plan, safety management system installed, quality management system designed and installed, submission and approval of quality assurance plan, material testing facilities agreed and installed, copy of contract documents made available at site, etc.

Unit 4: Managing Risk and Uncertainties in Construction Projects

3 Hrs.

- Definitions and Concept of Risks and Uncertainties
- Sources of risk
- Risk identification
- Various techniques of identification of risk
- Risk assessment- likelihood, impact and consequence, risk response planning-risk transferring, risk reducing and contingency planning, risk management principle, risk analysis, etc

Unit 5: Construction Contract Administration **9 Hrs.**

- Definition of construction contract administration
- Supply of drawings and instructions
- Review and approve Contractor's Work Program
- Approval of materials and quality certificates
- Monitoring of Work Progress
- Replacement of Contractor's personnel
- Determining Extension of Time for completion of the work
- Certifying interim payments, variation order: valuation, fixing new rates, getting approval, issuance, control and expenditure of provisional sums
- Control and expenditure of provisional sums
- Measurement and valuation of work completed, Determination on Contractor's claims
- Force Majeure – Definition, Notice of force majeure, Consequences of Force majeure
- Suspension of Work and Contract termination
- Termination by Employer: Notice to Correct, Termination by Employer (Forfeit of Guarantees and other assets of Contractor), Valuation at Termination
- Suspension and Termination by Contractor: Contractor's Entitlement to suspend Work, Termination by Contractor, Cessation of Work and Removal of Contractor's Equipment, Payment on Termination
- Management/Procurement of new Contract for Outstanding works by Employer.

Unit 6: Claims, Disputes and Dispute Settlement **6 Hrs.**

- Introduction to Claims
- Reasons for Claims, Source of Claims
- Meaning of Dispute, Common Causes of Construction Disputes,
- Methods of Dispute Settlement, Appointment of Dispute Board, Obtaining Dispute Board's Decision, Amicable Settlement, Alternative Dispute Resolution (ADR) Mechanisms
- Principles and practices of arbitration, Nepal Council of Arbitration, Nepal Arbitration Act, International Arbitration, (UNICITRAL Rules, ICC Rules, SIAC etc.).

Unit 7: Procurement of Works, Services and Equipment **9 Hrs.**

- Introduction, Considerations that guide procurement policies
- Prequalification of Contractors
- Standard Prequalification Document, prequalification Procedure
- Post Qualification, purpose of standard bidding document. Bidding documents for procurement of works, format of bidding document, single stage, single envelope bidding, two stage bidding, receiving the bids and bid evaluation. Bid examination and deviations, Bid evaluation report, selection of lowest evaluated bidder and award of contract, multilateral agency's guideline on procurement of works, etc.
- Introduction to Procurement of Services, Methods of selection of Consultants, selection procedure, criteria of short listing, request for proposal and the proposal scoring criteria, award of contract, national, bilateral and multilateral agency's guideline on procurement of services, etc.
- Introduction of procurement of Goods, Methods of selection of Suppliers
- PPMO; background of its formation, its roles and responsibilities, Nepal Procurement Act-2063 and its recent amendment and Nepal Procurement Regulation-2064 and its recent amendment, procurement methods recommended and reasons and causes, etc.
- Procedures for procurement of Works, Goods and Services requiring International Competition Bidding

Unit 8: Closure of the Project: **3 Hrs.**

- Tests on Completion, Issuance of Taking over Certificate, Defect Liability Period)

- Definition of Project Closure
- Formalization of Variation Orders
- Formalization of Claim Amount
- Revised Contract Amount
- Total Cost of the Project
- Return of Performance Securities
- Tax Clearance
- Project Completion Report

Unit 9: Case Study and Tutorial/Practical

15 Hrs.

The case study is focused on contemporary and Nepalese context and the above course contents. Students are assigned topics of case study, and the students prepare, present and submit assignments to the teacher.

References:

Relevant books, documents, archives and journals etc.

Various Contract document prepared by DoR, PPMO, WB, ADB/Manila and bilateral donor
ISO-Guidelines

Gould, F.E., & Joyce, N.E. Construction Project Management, New York: Prentice Hall.

Nicholas, J.M., & Steyn, H. Project Management for Business, Engineering and Technology,
Heinemann: Butterworth.

Fryer, B. The Practice of Construction Management, London: Collins.

Joyce, N.E., & Gould, F.E. Construction Project Management, New Jersey: Prentice Hall

Bhattarai, D., An Introduction to Construction Management Practice in Nepal, Lalitpur: *NEC
FIDIC Guidelines*

CEAM 614 Project Finance (Elective)

Year II, Semester III	
Course Title : Project Finance (Elective)	Course Code : CEAM 614
Nature of the Course : Theory + Tutorial/Case Study/Practical	Per week Hours: (3+1)
Credit : 4	Total Hours : 60

Course Objective:

This course is aimed to provide the students with an understanding of the major principles of engineering economics and financial management and enable them to effectively contribute in the financial decision making.

Course Content

Unit 1: Project Finance

6 Hrs.

- Concept
- Definition and basic characteristics
- Development of project finance
- Elements of a project-finance structure
- Why use project finance
- Examples of project-finance structures

Unit 2: Project Development and Management

6 Hrs.

- Introduction
- Sponsors and other investors
- Project development
- The role of advisors
- Joint-ventures issues
- The project company
- Public procurement

Unit 3: Interest and Time Value of Money Of Public Private Partnership

9 Hrs.

- The Time Value of Money
- Simple Interest and Compound Interest (Nominal and Effective Interest Rate)
- Introduction to PPP
- Global experience of PPP in infrastructure projects

Unit 4: Common Aspects of Project Agreement

3 hrs

- Introduction
- Term
- Payment Mechanism
- Contract Monitoring by the Off taker/Contracting Authority
- Performance Bonding and other Guarantees
- Compensation Events
- Excusing Causes
- Relief Events
- Step-in by the Off taker/Contracting Authority
- Termination of the Project Agreement
- Change of Ownership
- Dispute Resolution

Unit 5: Economic Analysis of Public sector Project

3 Hrs.

- Introduction to Public Sector Project

- Difference between Public and Private Sector Project
- Public Sector Project Analysis View Point
- Benefit Cost Analysis (Conventional and Modified)
- Alternative Selection using Incremental Benefit Cost Analysis

Unit 6: Alternatives Evaluation Procedures of Engineering Projects.

9 Hrs.

- Comparing Mutual Exclusive Alternatives having same useful life
- Comparing Mutual Exclusive alternatives having different useful life
- Comparing Mutual Exclusive contingent and independent Project
- Project cash flow (Even and Uneven)
- Balance Sheet and Income statement of Project

Unit 7: Economic Decision Under Risk and Uncertainty

6 Hrs.

- Introduction to Risk & Uncertainty
- Origin of Project Risk
- Methods of Describing Project Risks:
- Sensitivity (What-if) Analysis
- Break even analysis (single project and mutually exclusive project)

Unit 8: Project Financing of Buddhist Period

3 Hrs.

- Introduction of Project Financing of Buddhist period
- History of Buddhist period financing
- Difference between Traditional and Modern finance

Case Study and Tutorial/Practical

15 Hrs.

The case study is focused on contemporary and Nepalese context and the above course contents. Students are assigned topics of case study, and the students prepare, present and submit assignments to the teacher.

References:

Relevant books, documents, archives and journals etc.

Chan S. Park (1997), Contemporary Engineering Economics, Contemporary Engineering Economics, 2nd edition, Addison-Wesley Publishing Company, Inc.

William G Sullivan, James A Bontadelli and Elin M. Wicks (2001), Engineering Economy, 11th Edition, Pearson Education, Inc.

Blank, L. and Tarquin, A. (2005), "Engineering Economy", Sixth Edition, McGraw Hill, Singapore.

Newman, Donald G., Eschenbach, Ted G., and Lavelle, Jerome P. (2012). Engineering Economic Analysis, New York: Oxford University Press.

Brigham, E. F., Gapenski, L. C. and Ehrhardt M. C. *Financial Management: Theory and Practice*. New Delhi: Harcourt Asia Pte. Ltd.

Brealey, Richard A. and Stewart C. M. *Principles of Corporate Finance*. New Delhi: Tata McGraw-Hill Publishing Company Ltd.

Gitman L. J. *Principles of Managerial Finance*. New Delhi: Addison Wesley Longman (Singapore) Pte. Ltd.

Van Horne James C. *Financial Management and Policy*. New Delhi: Prentice Hall of India.

Pradhan, R.S. *Research in Nepalese Finance*. Kathmandu: Buddha Academic Publishers and Distributors.

Paudel R.B., Baral K.J., Gautam R.R. and Rana S.B. *Managerial Finance*. Kathmandu: Asmita Publication.

Year: II Semester: IV

CEAM 651 Thesis Work

Year II	Semester IV	Thesis	
Course Code	Title of Course	Credits	Full Marks
CEM 650	Thesis Work (on relevant topic relevant to Construction management in close coordination with the department/supervisor)	16	4000

Evaluation	Score
Thesis Supervisor	240
Coordinator/Research Committee (Average of member(s), such members can be maximum of three)	40
External	120

A thesis guideline shall be provided by the Program of MSc Construction Engineering Management as per the guidelines of Lumbini Buddhist University that include the followings:

- Framework of research plan
- Manuscripts standards
- Proposals
- Requirements of publications
- Research works
- Presentations and defense
- Acceptance

References

Relevant books, documents, archives and journals etc.

Annex-I Syllabus Revision Process

1. Selecting Experts

Reviewers were selected based on their experiences and contributions in their respective professional fields as well as the academic sector. Upon the recommendations of the senior experts associated with the establishment and management of the ongoing programs, a panel of reviewers was finalized.

2. Collecting Experts View:

All the experts were requested to provide their individual suggestions and feedback in their respective subjects.

3. Incorporating the Experts feedback

Various views, suggestions, and feedbacks were collected, compiled, and incorporated into the contents of the syllabus.

4. Methods of Collecting Feedback

- Direct face to face meeting on a given subject
- Online Meeting (via zoom and telephone)
- Group meeting on common agenda

5. Finalizing the draft report of course revision

The first draft was prepared upon inclusion of individual suggestions and feedback and circulated among the panel of reviewers for their second opinion. Thus, the second draft was prepared.

6. Presentation of the Subjects by the experts

The second draft was presented to a committee of experts as well as university representatives to assure that the draft was in accordance with the requirements of the University Grant Commission, Institute of Engineering, and the Lumbini Buddhist University.

7. Preparation of final draft report

Upon receiving feedback from the respective experts and representatives, the final draft was prepared and submitted to the Office of the Dean of the School of Development Studies & Applied Sciences at Lumbini Buddhist University.

8. Duration

Start Date: 15th February 2021

End Date: 21st November 2021

Acknowledgment

We would like to acknowledge all the experts, especially the individuals mentioned below in the table their contribution during the revision of this course. Substantial feedback and suggestions were also received from the School of Development Studies and Applied Sciences during the entire process of revision.

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