

Sustainable Construction

| | |
|------------------------|----------------------------|
| Code CEM-812 | Credit Hours 3-0 |
|------------------------|----------------------------|

Course Description

This course discusses concepts and techniques of sustainable construction, in depth review of sustainable materials and construction techniques. Specifically, it develops basic knowledge about life cycle concepts for green building planning, basic design, construction and operations. Students will also learn about green building assessment systems, green building economics, and advance building technologies for sustainability. The objectives of this course are to help students develop a good understanding of sustainable construction from a life cycle perspective, and master basic skills to plan, construct and operate green facilities. It will cover LEEDS and EDGE Building certification contents and enable student to appear in the LEEDS and EDGE certification exam.

Reference Books

- 1 Kibert, C. J. (2022). *Sustainable construction: green building design and delivery*. John Wiley & Sons.
- 2 Syed, A. (2012). *Advanced building technologies for sustainability* (Vol. 3). John Wiley & Sons.
- 3 LEED Green Associate, Study Guide
- 4 The U.S. Green Building Council, Inc. (USGBC), (2013) *LEED Reference Guide for Building Design and Construction*, 2013 Edition.
- 5 Friedman, A (2023) *Fundamentals of Innovative Sustainable Homes Design and Construction*. Springer
- 6 Kotaji, S., Schuurmans, A., and Edwards, S. (Eds.). (2003). *Life-Cycle Assessment in Building and Construction: A state-of-the-art report*, 2003. SETAC.
- 7 Douay, N. and Minja, M. (2021). *Urban Planning for Transitions*. John Wiley & Sons.

Prerequisites

Nil

ASSESSMENT SYSTEM FOR THEORY

| | |
|--------------|-----|
| Quizzes | 10% |
| Assignments | 10% |
| Mid Terms | 25% |
| Term Project | 10% |
| ESE | 45% |

Teaching Plan

| Week No. | Topics | Learning Outcomes |
|-----------------|--|---|
| 1 | Introduction | Course outline; objectives; teaching plan; assessment method; and concepts review. |
| 2-4 | Introduction to sustainability, Sustainable construction & Sustainable sites | Three pillars of sustainability; green building; benefits of green building; economic of green building; introduction to LEEDS and EDGE building; rating system. Integrative process; system thinking; comparison of conventional and green buildings; life cycle approach. LEEDs sustainable sites credits, land and landscape approaches for green building, land use issues; sustainable landscapes. |
| 5-8 | Location and transportation, Energy and Material efficiency | LEED for neighbourhood development location; sensitive land protection, high priority site; surrounding density and diverse uses; access to quality transit; bicycle facilities; parking footprint; and green vehicles. Building energy issues; high performance building energy design strategy; passive design strategy; building envelope; and renewable energy systems. LEED energy and atmosphere; and energy efficiency on EDGE Building software. Green building materials; LEED material and resources; building life-cycle impact reduction; environmental product declarations; and material efficiency on EDGE building software. Use of some simulation software to assess energy...BIM or any other |
| 9 | MID TERM EXAM | |
| 10-12 | Water efficiency, IEQ | Global water resource depletion; water distribution and shortage; hydrologic cycle; LEED water efficiency; outdoor water use reduction; indoor water use reduction; and water and material efficiency on EDGE building software. Indoor environmental quality (IEQ) issues; IEQ design; air quality in construction; LEED IEQ; indoor air quality improvement strategies; low emitting materials; indoor air quality assessment; thermal comfort; daylight; acoustic performance; and construction operations and commissioning. |
| 13-15 | Innovation and regional priority | Innovation in sustainable construction; LEEDs category in innovation and regional priority. |
| 16-17 | Life cycle assessment | Life cycle assessment of building and construction; framework LCA; goal and scope definition in LCA; inventory analysis; impact assessment; and interpretation. |
| 18 | END SEMESTER EXAM | |