

Special topic ENGEN585 – Sustainable design and construction

Trimester B

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Brief Description:

This course offers an interdisciplinary approach to the design and sustainable construction, affordable, healthy and sustainable homes in New Zealand, addressing contemporary industry demands and global sustainable development objectives. Furthermore, students will learn low-carbon resilient solution, energy resilient design and climate resilient building strategies integrating principles of architectural engineering, structural design, and sustainability science. This initiative aligns with New Zealand's Ministry of Business, Innovation, and Employment's (MBIE) target of achieving Net Zero by 2050, the goals of the Paris Agreement, and the Climate Change Response Act, while adhering to building codes and design standards.

Emphasizing the integration of building energy, structural integrity, and design principles, students will explore key topics such as:

- Application of locally available construction materials and different design methodologies for enhancing sustainability, structural integrity and energy efficiency.
- Analysis of the social, environmental, and cultural factors influencing sustainability within the construction sector, including compliance with New Zealand building acts, codes and regulations.
- Exploration of fundamental and advanced principles of building physics, assessment and projects on LCA, carbon emission, sustainability in buildings, industry needs and ongoing research endeavors.

Learning outcomes:

- Explain and implement advanced sustainable building principles, integrate sustainable concepts, and design energy-efficient structures.
- Evaluate the critical sustainability issues that should be addressed in planning a building or new development to reduce waste and optimize construction
- Apply building codes and design standards, both national and international, within the real-time context of New Zealand
- Calculate building energy consumption, analyze factors affecting structural robustness, and perform life cycle analysis (LCA) to assess embodied and operational carbon emissions of structures.
- Demonstrate mastery of sustainability concept and principles to design and execute resilient and robust structures

Agreed Components for Assessment and values:

Component	Value (%)
Theory and practices Assessment – Multiple choice questions	20
One of the themes: Energy efficiency, LCA, carbon footprint, Building envelope, building construction Assessment – Assignment	20
Following the selection of assignment theme Assessment - Project	30
Final submission of completed project Assessment – Presentation	30

For more information regarding the paper, Please contact: puviyarasan.velayudham@waikato.ac.nz