



اَوْنُوْرُ سِيْتِي بِاْتِي كُوْلُو كِي مَارَا  
UNIVERSITI  
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MARA

**ECS 358**

**CIVIL ENGINEERING DESIGN PROJECT**

**REINFORCED CONCRETE BUILDING  
DESIGN PROJECT**

**&**

**PROJECT BASED LEARNING  
(CASE STUDY)**

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## **PROJECT 1**

### **REINFORCED CONCRETE BUILDING DESIGN PROJECT**

#### **1.1 INTRODUCTION**

Reinforced concrete is a construction material that combines two or more materials with varying physical qualities to provide a structure greater tensile strength and ductility. Concrete that has not been reinforced has a poor tensile strength and ductility. Therefore, reinforcement is used to minimize the tensile stresses that a building structure is subjected to on a regular basis as a result of natural weather conditions. Steel reinforcement bars, often known as rebars, are commonly used to strengthen concrete, but it can also be done passively by adding more concrete. Steel, composites, and polymers are commonly used as reinforcing materials in concrete structures, providing strength, ductility, and reinforcement.

##### **1.1.1 Requirements of building-by-law, fire safety regulations**

The Uniform Building by Law of 1984 (UBBL 1984) is Malaysia's standard building code of practice, which was officially designated to unify construction planning, building approvals, and building occupants, as well as to improve fire safety requirements. It outlines the minimum criteria for roadway, drainage, and building control and construction in the authority of municipal governments. The building code is divided into nine sections that address the preparatory stage, the submission of plans and drawings for approval, space lighting and ventilation, structural requirements, temporary work processes, and fire safety regulations (fire alarms, fire detection, fire extinguishment and firefighting access).

Each construction project especially those involving building services or megastructures must adhere to any standard regulations widely deployed and standardized by the country. In Malaysia, the role of the local authority as the primary planning authority in the building regulatory system has been specified. Uniform Building by Law 1984 (UBBL 1984) and Street, Drainage, and Building 1974 (Act 133) have been imposed for the purposes of safety and technical inspection to ensure that all buildings or structures to be constructed follow the recommendations and standard requirements as stated.

According to UBBL 1984, the fire safety standards will be specified at the start of each computation throughout this project. In any instance of fire, the structural resistance must be enough for the specified time, according to MS EN 1990. Fire safety

### **3. CONCLUSION**

#### **3.1 Summary of design works**

Civil engineering design project (ECS358) contains TWO (2) numbers of project. The first one is the reinforced concrete building design project while the other one is the project-based learning or known as case study. For the first project, student is required to search for a set of architectural drawing which fulfils some requirements including the layout of the buildings must adopt to the specifications listed in Uniform Building by Law (1984) and the building must fulfil the fire safety and building regulations. Based on the architectural drawing, students are required to generate a structural key plan and produce structural analysis and design calculations of structural elements such as slab, beam, column, staircase and pad footing for the building according to the requirements of EC2 by using software (PROKON) and also manual calculations. This is because comparison between both approaches will be made at the end of the project to identify errors that occurs so that the design for all structural elements are adequate to transfer the load safely. As the information about main reinforcement, shear, cracking, and deflection has passed the design phase, the proposed dimension used for the calculation can be finalised for selection of construction materials based on the manual calculation and software output. As the information about main reinforcement, shear, cracking, and deflection has passed the design phase, the proposed dimension used for the calculation can be finalised for construction material selection based on the manual calculation and software output that has been calculated. At the end, students need to compile all the tasks in a technical design report. On the other hand, students also required to generate bill of quantities (BQ) for the structural elements by manual calculation. After the course lecturer explains all the assessments and course requirements throughout the semester, students are required to prepare a project schedule using Microsoft Project by including a list of activities and the time required for an activity to be completed. This also will be included in the technical report during the compilation. For Project 2, students are given with a case study of geotechnical condition of a proposed site. For example, in case study 1, students need to find the bearing capacity of the soil based on the information retrieved from the Mackintosh Probe report. For the second case study, students are needed to proposed a complete design for flexible pavement based on our site location.