SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

Course Title: HEAVY CONSTRUCTION

Code No.: ARC 232

Program: CIVIL/CONSTRUCTION

Semester: FOURTH

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New: _____ Revision: X

APPROVED: L.P. Arezitto
Chairperson

87.04.21
Date

HEAVY CONSTRUCTION
Course Name

ARC 232
Course Number

PHILOSOPHY/GOALS:

To further the student's understanding of the wide variety of techniques that go to form a heavy civil engineering project with particular emphasis on formwork piling and earth moving.

METHOD OF ASSESSMENT (GRADING METHOD):

Formwork Design	25%
Seminar/Laboratory Work	25%
Final Examination	50%
	100%

TEXTBOOK(S):

Construction Methods and Management - Nunally

REFERENCES:

Concrete Engineering Handbook - Lalonde & James

Formworks of Concrete Structure - Peurifuy (McGraw-Hill)

ACI Formwork Handbook

TOPIC	PERIODS	TOPIC DESCRIPTION
1	5	Cement & Concrete Technology Review Physical properties of cement & concrete
2	8	Formwork Properties of concrete in the Plastic state Properties of formwork material Design tables for timber forms Shoring and scaffold Causes of failure
3	8	Reinforced Concrete Simple and doubly reinforced beams Columns Floors Lift slab and tilt slab construction
4	8	Prestressed Concrete Pretensioned units Post tensioned beams and slabs Stage prestressing
5	8	Structural Steelwork Post and beam Trusses Rigid Frames Fasteners Welding
6	8	Piling Timber steel and concrete Bearing piler Sheet Piling Piling Records
7	6	Additional Miscellaneous Heavy Construction Methods Dewatering Trenching Tunneling Quarrying Marine
8	6	Construction Safety The Construction Safety Act 1973 Trenching Access Structures

HEAVY CONSTRUCTION

ARC 232-4

GENERAL OBJECTIVES

To further the student's understanding of the wide variety of technical, financial and managerial techniques that go to form a heavy civil engineering project.

SPECIFIC OBJECTIVES

Unit 1 - Cement & Concrete Technology

1/1 Experimentally determine the soundness of a portland cement using an autoclave.

1/2 Experimentally determine the performance of a variety of concrete mixes subjected to a protracted series of freeze-thaw cycles.

1/3 Experimentally determine the setting time of a normal portland cement.

1/4 Experimentally determine the value of the modulus of elasticity of a portland cement concrete.

1/5 Experimentally evaluate the effect of an air entrainment agency on normal concrete mixes.

1/6 Experimentally verify the factor affecting the wear properties of a concrete surface.

Unit 2 - Formwork Design

2/1 The student must calculate the hydrostatic pressure exerted by plastic concrete for any given condition of form, temperature and pouring rate.

2/2 For a calculated concrete pressure the student must calculate the safe sheeting thickness and span to safely accommodate beinding stresses, shear stresses and deflection criteria.

2/3 For a given concrete wall the student must calculate the sizes of all formwork members supporting the sheeting i.e. joists, wales and struts.

2/4 In support of the above design the student must prepare a detailed formwork design drawing of the formwork showing all material sizes and fastenings.

2/5 From the above drawing the student must prepare detailed material schedule for a nominal length of the wall.

Unit 3 - Reinforced Concrete Project

N.B. As part of this course a number of full size reinforced concrete structures will be built. Working in groups the students will actively engage in every aspect of the procedures that normally make up a structural concrete project.

Specifically, his objectives are as follows:

3/1 Prepare a general arrangement drawing of the structure

3/2 Prepare calculation sheets and reinforcing details of the structure.

3/3 Draw a bar chart and "S" curves of all work on the project including the design, detailing procurement construction and testing phases of the work.

3/4 Initiate a progress control with weekly reporting on all aspects of the programme.

3/5 Calculate for design and detail all necessary formwork and supports.

3/6 Prepare a detailed construction sequence indicating the allocation of equipment, men and materials.

3/7 Actively participate in the construction period of the job.

3/8 Evaluate the structure by the preparation, implementation and analysis of a full scale test and strain survey.

3/9 Prepare a written project report including all designs, details, calculations, programmes and progress records together with a thousand word evaluation of the job.

Unit 4 - Prestressed Concrete Project

The students working in groups will actively engage themselves in the detailing and construction of an engineered structure.

4/1 Draw a crtical path schedule for the detailing construction and testing of a full size prestressed concrete structure.

4/2 Initiate a progress control and network up-dating procedure for the work.

4/3 Actively participate in the construction work.

4/4 Prepare a cable stressing schedule for the post tensioning operation.

4/5 Evaluate the structure by the preparation, implementation and analysis of a full scale test and strain survey.

4/6 Prepare a written project report including all details, schedules, charts and progress records together with a thousand word evaluation of the job.

Unit 5 - Piling

5/1 Illustrate three types of preformed bearing pile.

5/2 Sketch the construction procedure for constructing a caisson pile.

5/3 List the duties of a piling inspector.

Unit 5 - Construction Safety

6/1 Define the role of the constructor, employer, inspector.

6/2 Outline the requirements of the act with respect to housekeeping and storage.

6/3 List the requirements of the act respecting access and hoisting.

6/4 Fully describe the act's demands for safe trenching.

N.B. Pending laboratory re-construction Units 3 and 4 will be carried out using a seminar format.