

## Construction & Building Engineering Courses (CB)

Construction Engineering Courses Group

### CB 524 – Methods and Equipment for Construction 2

#### COURSE INFORMATION

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Course Title: Methods and Equipment for Construction 2

Code: CB 524

Hours: Lecture – 2 Hrs.                      Tutorial – 2 Hrs.                      Credit –3.

Prerequisite: CB 523

#### GRADING

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Class Performance/Attendance: 10%

Midterm # 1/Assignments – (7<sup>th</sup> Week): 30%

Midterm # 2/Assignments – (12<sup>th</sup> Week): 20%

Final Exam: 40%

#### COURSE DESCRIPTION

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Engineering fundamentals of moving earth. Tractors and related equipment; tractors, bulldozers, clearing land, and ripping rock. Scrapers. Excavating equipment; draglines, clamshells, hydraulic excavators, loaders, and trenching machines. Trucks and wagons. Belt conveyor systems. Piles and pile-driving equipment. The production of crushed stone aggregate. Health and safety precautions.

#### TEXT BOOK

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Managing Construction Equipment by S.W. Nunnally Publisher: Prentice Hall, ISBN, 2005.

#### REFERENCE BOOKS

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Construction Equipment Management by Schaufelberger.J, Publisher: Prentice Hall, ISBN, 2005.

Construction Equipment Guide by Day D.A., Benjamin N.B.H. Publisher: Wiley-Interscience, ISBN, 2005.

## APPENDIX A-147

### COURSE AIM

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The course aims at introducing the student to the knowledge of construction engineering in the area of heavy construction.

### SPECIFIC OUTCOMES OF INSTRUCTION

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The student should be aware with:

- a- The engineering fundamentals of moving earth.
- b- Equipment used in the heavy construction such as: tractors, bulldozers, scrapers, draglines, clamshells, hydraulic excavators, loaders, trenching machines trucks and wagons.
- c- Belt-conveyor systems.
- d- Piling systems.
- e- The production of crushed stone aggregate.
- f- Equipment maintenance tires and safety.
- g- Health and safety.

### COURSE OUTLINE

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*Week Number 1:* Earth moving basis:

- Selection of equipment.
- Equipment production.
- Earth moving materials.
- Soil identification and classification.
- Soil volume change.
- Spoil banks and spoil piles.

*Week Number 2-3:* Hydraulic excavators:

- Front shovels.
- Size of a front shovel.
- Basic parts and operation of a front shovel.
- Selecting a front shovel.
- Shovel production.
- The effect of cut height and swing angle on the shovel production.
- Hoes, the basic parts and operation of a hoe.

*Week Number 4-5:* Draglines and clamshells:

- Types of draglines.
- The size of a dragline.
- Output of draglines.
- Optimum depth of cut.
- Effect of depth of cut and swing angle on dragline output.

- Effect of bucket size and boom length on dragline production.
- Clamshell buckets.
- Production rates for clamshells.

*Week Number 6:* Estimating equipment performance:  

- Rolling resistance, grade resistance, effective grade, altitude, traction, using performance and retarder curves.

*Week Number 7:* Dozer:  

- Blades and attachments.
- Estimating dozer production.
- Techniques to increase production.
- Traction.
- Job efficiency.

*Week Number 8:* Loaders, buckets:  

- Operating load.
- Wheel loaders, truck loaders, and tool carriers.
- Skid-steer loaders and material handlers.
- Production estimation.

*Week Number 9-10:* Trucks and Wagons:  

- Rear dump truck.
- Bottom dump wagons.
- Capacities of trucks and wagons.
- Performance capabilities of trucks and wagons.
- Balancing the capacities of hauling units with excavator size.
- The effect of truck size on the cost of hauling.
- The effect of excavator size on the cost of excavation and hauling.
- The effect of grade on the cost of hauling with trucks.
- The effect of rolling resistance on the cost of hauling.
- The effect of altitude on the performance of the hauling equipment.

*Week Number 11:* Piles and pile-driving equipment:  

- Types of piles.
- Precast concrete piles, cast in place concrete piles, steel piles, composite piles, and sheet piles.
- Pile hammers.
- Methods of supporting and positioning piles during driving, Jetting piles, Driving piles below water, Pile-driving equipment.

*Week Number 12:* Scrapers:

- General information.
- Scraper types.
- Scraper operation.
- Scraper performance charts.
- Cycle time for a scraper.
- Operating efficiency and production.
- Push tractors required.
- Increasing scraper production.
- Scraper load-growth curve.
- Rolling resistance and scraper production.
- Scraper performance calculation.

*Week Number 13:* Belt-Conveyor systems:

- The economy of transporting materials with a belt-conveyor.
- Conveyor belts.
- Idlers.

*Week Number 14:* The production of crushed stone aggregate:

- Types of crushers; Jaw crushers, gyratory crushers, roll crushers, and impact crushers.

*Week Number 15:* Health and safety.

- Movements of people & equipment – hazards & control.
- Work equipment – hazards & control.

*Week Number 16:* Final Exam.

COURSE COORDINATOR AND DEMAND

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*Course Coordinator:* Dr. Mohamed Emam.

*Course Demand:* *Required*