

## Construction & Building Engineering Courses (CB)

Geotechnical Engineering Courses Group

### **CB 463 – Design and Construction of Earth Structures and Foundations**

#### COURSE INFORMATION

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Course Title: Design and Construction of Earth Structures and Foundations

Code: CB 463

Hours: Lecture – 4 Hrs.                      Tutorial – 2 Hrs.                      Credit –3.

Prerequisite: CB 462

#### 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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Types of foundation and selection criteria. Design of shallow and deep foundations. Construction and practical considerations. Pile-load test. Retaining structures. Sheet-pile walls. Diaphragm walls.

#### TEXT BOOK

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Principles of Foundation Engineering sixth edition by DAS, Braja M., Publisher: Brooks-Cole, London, 2007.

#### REFERENCE BOOKS

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Foundation Analysis and Design by BOWLES, J. E. Publisher: McGraw-Hill, New York, 5th Ed., 1996.

Soil Mechanics: Principles and Practice by BARNES, G. E., Publisher: McMillan, London, 1995.

Geotechnical Engineering: Foundation Design by CERNICA, John N., Publisher: Wiley, 1995.

Soil Mechanics by CRAIG, R. F., Publisher: Chapman and Hall, 5th Edition 1992.

Piling Engineering by FLEMING, Weltman, Randolph and Elson, Publisher: Blackie, London, 1992.

Earth Reinforcement and Soil Structures by JONES, Colin, Publisher: Thomas Telford, London, 1996.

Foundation Design and Construction by TOMLINSON, M. J. and Boorman R. Publisher: Longman, London, 6th Ed., 1995

Slope Stability and Stabilization Methods by ABRAMSON, Lee, Sharma and Boyce, Publisher: Wiley, New York, 1996.

Design and Construction of Foundations, Egyptian Code for Soil Mechanics, Design and Construction of Foundations, 1st Edition, 10 Volumes, Al-Ahram Press, 2001.

#### C O U R S E   A I M

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The course aims at introducing the student to the basic aspects of design, analysis and construction of retaining structures and foundations.

#### S P E C I F I C   O U T C O M E S   O F   I N S T R U C T I O N

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The student should be aware with the fundamentals for:

- (1) Selecting the foundation scheme based on existing site conditions and structural constraints,
- (2) Sizing, reinforcing and detailing of the structural elements, and
- (3) Construction of these elements.

#### C O U R S E   O U T L I N E

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- Week Number 1:*    Shallow foundations:
- Types of shallow foundations, application of each type, design requirements, code provisions for allowable stresses and settlements
- Week Number 2:*    Design of isolated footings:
- Design of isolated footings, safety factors against stability and structural failure, construction considerations
- Week Number 3:*    Combined footings:
- Design of combined footings, the beam on elastic foundation approach, coefficient of subgrade reaction, computer applications
- Week Number 4:*    Strap footings: Design of footings and strap
- Week Number 5:*    Strap footings:

## APPENDIX A-128

- Safety factors against stability and structural failure
- Week Number 6:* Mat foundations:
- Types and usage of mat foundations, classical design approach, the beam on elastic foundation approach, construction considerations
- Week Number 7:* Retaining walls and structures:
- Types of retaining walls, usage and limitations of each type, reinforced concrete (RC) cantilever retaining walls, overall and structural stability, construction considerations
- Week Number 8:* Sheet-pile walls:
- Types of sheet-pile walls, applications, methods of sheet pile design, modes of sheet pile failure, design of anchored sheet-piles
- Week Number 9:* Sheet-pile walls:
- Design of cantilever sheet-pile walls
- Week Number 10:* Sheet-pile walls:
- Structural details, construction considerations, modes of failures
- Week Number 11:* Piles:
- Types and usage of piles, bored and driven piles, timber, RC and steel piles, methods of pile construction
- Week Number 12:* Single piles:
- Design of single piles, single pile capacity, settlement of single pile
- Week Number 13:* Pile groups:
- Pile group capacity, settlement of pile group, pile group construction
- Week Number 14:* Pile-load test:
- Pile load test, objective, procedure, test result interpretation, pile integrity test
- Week Number 15:* Pile caps:
- Design and construction of pile caps
- Week Number 16:* Final Exam.

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### COURSE COORDINATOR AND DEMAND

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*Course Coordinator:* Dr.sameh Abu El Soud.

*Course Demand:* Required

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