



# Philadelphia University

Faculty of Engineering and Technology  
Department of Civil Engineering  
Second Semester 2020/2021

## Course Information

**Title:** Construction Materials (0670214)  
Sun, Tue, Thu 9:10-10:00

**Prerequisite:** Calculus II (0250102)

**Credit Hours:** 3 credit hours (15 weeks per semester, approximately 45 contact hours)

**Textbook:** A. M. Neville, and J.J Brooks, **Concrete Technology**, Second Edition-2010, Prentice Hall

**References:** A. M. Neville, **Properties of Concrete**, Fifth Edition-2011.

**Course Description:** This course is designed to provide an advanced understanding of cement chemistry, hydration reaction of Portland cement, chemical and physical interaction of aggregates and admixtures with the hydrated cement paste and their effects on the performance of fresh and hardened concrete. Concrete durability problems. Quality of water. Concrete operations, mixing, handling, compacting, and curing of concrete. Testing of concrete. Concrete mix design.

**Website:** <http://www.philadelphia.edu.jo/academics/>

**Instructor:** **Dr. Mais Aldwaik**  
**Email:** Aldwaik.1@osu.edu  
**Office:** Civil engineering building, room 318  
**Office hours:** Sun, Tues, Thurs: 10:00-11:00  
Mon, Wed: 9:45-11:15 (I will be available online on MS Teams during these times)

## Course Outline (Classes will be conducted online via Microsoft Teams)

Week	Topic
1	Concrete as a structural material.
2	Cement; types, manufacturing, properties, hydration, and tests.
3	Aggregates; classifications, mechanical and physical properties.
4	Quality of water; mixing water, curing water, and tests.
5	Mixing, handling, placing, and compacting concrete.
6	Fresh concrete; workability, segregation, bleeding, and tests.
7	Admixtures; air entraining, accelerators, set-accelerators, set-retarders, and water-reducers.
8	Development of strength; curing, influence of temperature, and maturity rule.
9	Strength of concrete; compressive, tensile, flexural, splitting, and tests.

<b>10</b>	Fatigue strength, impact strength, resistance to abrasion, and bond to reinforcement.
<b>11</b>	Elasticity and creep.
<b>12</b>	Deformation and cracking independent of load; shrinkage, swelling, and thermal movement.
<b>13</b>	Permeability and durability; sulphate attack, attack by sea water, acid attack, alkali-aggregate reaction, and corrosion of reinforcement.
<b>14, 15</b>	Concrete mix design.

### **Course Learning Outcomes with reference to ABET Student Outcome**

Upon successful completion of this course, student should:

1.	Develop an understanding of concrete as a structural material	1,2
2.	Develop an understanding of cement types, manufacturing, properties, hydration, and testing	1,7
3.	Analyze aggregate data and classify its types, mechanical and physical properties	2,6
4.	Develop an understanding of quality of water and admixtures used in concrete production	2,7
5.	Apply knowledge to decide best method for concrete mixing, handling, placing, and compacting	6,7
6.	Evaluate fresh concrete properties based on testing results	6
7.	Evaluate hardened concrete properties based on testing results	6
8.	Perform concrete mix design	1,2,7

### **Assessment Guidance** (subjected to change based on COVID-19 government updates)

Evaluation of the student performance during the semester (total final mark) will be conducted according to the following activities:

**Exams:** Students will be subjected to one scheduled mid exam during the semester.

**Quizzes:** Two quizzes of (10-15) minutes will be conducted during the semester. The materials of the quizzes are set by the lecturer.

**Homework:** Two homeworks will be assigned during the semester. You are usually given one week to submit each home work. Homework should be solved individually and submitted before or on a set agreed date.

Cheating by copying homework from others is strictly forbidden and punishable by awarding the work with zero mark.

**Collective Participation:** Brain storming and collective discussions will be carried out during any lecture. Individual students will be assessed accordingly.

**Final Exam:** Students will undergo a scheduled final exam at the end of the semester covering the whole materials taught in the course.

### **Grading policy**

Midterm Exam	30%
Home works, Quizzes, and term work	30%
Final Exam	40%
Total:	100%

### **Attendance Regulation**

The semester has in total 45 credit hours. Total absence hours from classes and tutorials must not exceed 15% of the total credit hours. Exceeding this limit without a medical or emergency excuse approved by the deanship will prohibit the student from sitting the final exam and a zero mark will be recorded for the course. If the excuse is approved by the deanship the student will be considered withdrawn from the course.