



**College of Engineering**  
**Civil Engineering Department**  
**First Semester (191)**

**CE 312 Course Syllabus**

Course code	Title	Credit Hr.
CE 312	Structural Materials	3-3-4

<b>Instructor:</b>	Dr. Moruf O. Yusuf
<b>Office Number:</b>	2223, UOHB Main Campus
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<b>Lab Instructor:</b>	Adeshina A. Adewumi

**Office hours:**

\*Or by appointment

Sunday	Monday	Tuesday	Wednesday	Thursday
10:00-11:00 A.M	01:00-02:00 PM	10:00-12:00 PM	01:00-02:00 PM	10:00-11:00 AM

**Lecture/Lab Information**

Lecture	Lab
<b>Location:</b> Room 1303	<b>Location:</b> Room 0607, CE Concrete Lab
<b>Time:</b> 08– 09:40 AM (Mon) / 11:00 - 11:50 AM (Wed)	<b>Time:</b> 2 – 4:50 PM. (Wednesday)

**Designation: Required**

**1. Course Description**

Composition and properties of hydraulic cements; characteristics of local aggregates and water; properties of fresh concrete; production, handling and placement of cement and fresh concrete in the local environment; properties of hardened concrete; mix design; special concretes; introduction to pavement types; asphalt cement types, properties and usage; properties of aggregate for asphalt concrete mixes; asphalt concrete mix design concept; types, engineering properties, and usage of structural steel; introduction to aluminum, timber, glass, plastics and other structural materials. Laboratory sessions on tests of concrete constituents, fresh and hardened concrete, aggregate gradation and mix design; flexure behavior of reinforced concrete beams; physical properties and testing of asphalt binders, asphalt concrete mix design; hardness test, tensile and torsion tests on metals, measurement of Poisson's ratio and stress concentration and bending tests on steel beams.

**2. Textbook**



- Material for Civil and Construction Engineers by Michael S Mamlouk and John P. Zaniewski, 4<sup>th</sup> ed., Publisher, Pearson.
- Design and Control of Concrete Mixture by Kosmatka, S.H. and Panarese, W.C., 14th Edition, Portland Cement Association, Skokie, Illinois.
- **Laboratory Manual:** CE 312 Lab Manual

### 3. Prerequisite: CE 211

### 4. Course Objectives

The overall objectives of this course are to:

- i. Introduce concrete materials, preparation, properties, strength and durability characteristics
- ii. Introduce the experimental procedures for concrete mix design or proportioning
- iii. Introduce various concrete production activities or processes.
- iv. Introduce the asphalt concrete, structural steel, aluminium, timber, glass and plastic.

### 5. Course Outcomes

After successful completion of this course, students should be able to:

- i. understand concrete material constituents, properties and proportions
- ii. understand concrete mix design and properties of concrete.
- iii. introduce asphalt, steel, timber, glass and plastic as construction materials
- iv. design and conduct experiments on concrete materials, analyze and interpret experimental data.

### 6. Mapping Between Course Outcomes and Student Outcomes

Student outcomes Course outcomes	1	2	3	4	5	6	7
i							✓
ii		✓					
iii					✓		
iv						✓	

### 7. Major Topics Covered in the Course

No.	Content	Chapter	Contact Hours
1	Introduction to concrete and cement manufacturing process, cement types, and properties of cements, and mixing water	5-11	1
2	Mixing water	5	3
3	Admixtures and blended cements	6	3
4	Aggregate sources, tests on aggregate, characteristics of local aggregates	6	4



3	Proportioning of concrete mixes	7	4
4	Batching, mixing, handling, placing, and finishing of concrete	7	4
5	Properties of fresh concrete and curing of concrete	7	1
6	Hot weather concreting	7	3
7	Properties of hardened concrete	7	4
8	Introduction to concrete durability	7	2
9	Introduction to special concretes	7	2
10	Introduction to reinforced concrete	11	2
11	Asphalt concrete	9	4
12	Structural steel	3	2
13	Aluminum	4	2
14	Glass/plastic	10	2
15	Timber	-	2

## 8. UOHB Rules and Regulations:

### A. Attendance in the class (or Lab):

Attendance in the class will be strictly observed starting from the first day of classes. Students shall be warned after 2 and 5 unexcused absences. However, after 8 unexcused or 10 total absences (excused and unexcused absences), DN grade shall be awarded. Student shall be solely responsible for his DN grade and its accompanied repercussion or negative effects. The conditions are spelt out in the table below.

	Number of unexcused absences			Total absences (excused* + unexcused)
	Warning I	Warning II	DN	DN
30 course lectures per semester	2	5	8	10
Laboratory session	1	2	3	4

The following should be noted

- Students must bring text book, notebook, calculator and pen to the class
- Attendance in the classes will be taken within five minutes of the beginning of the class. Any student who arrives class within 5 minutes from the start of class will be marked as late. If the student is marked late 3 times, then this is equivalent to 1 unexcused absence. Student who arrives after 5 minutes is considered absent with no excuse.

#### \*Note:

Officially authorized excuse of absences must be obtained from Deanship of Student Affairs and presented to the instructor **no later than two days** following the resumption of class attendance.

**B. Waiting Time:** If the instructor is late, students are expected to wait for 15 minutes and then they are free to go

### C. Academic Dishonesty:



Academic misconduct committed either directly or indirectly by an individual or group is subject to disciplinary action. Prohibited activities include but not limited to the following practices:

- **Cheating**, including but not limited to unauthorized assistance from material, people, or devices when taking a test, quiz, or examination; writing papers or reports; solving problems; or completing academic assignments.
- **Plagiarism**, including but not limited to paraphrasing, summarizing, or directly quoting published or unpublished work of another person, including online or computerized services, without proper documentation of the original source.
- **Impersonation** or taking an exam in proxy.
- Providing others with information and/or answers regarding exams, quizzes, homework or other classroom assignments unless explicitly authorized by the instructor.

#### D. Penalties for Violations of Academic Integrity

Having witnessed or otherwise identified an apparent violation of the academic integrity policy, the faculty member may either impose or recommend an appropriate penalty, depending upon the seriousness of the offense.

The instructor may impose any one of the following penalties:

- a written notice of warning, with a copy placed in the student's file with the advisor;
- a reduced grade on the assignment;
- a grade of F (zero if graded numerically) for the assignment;
- a reduced grade for the course;
- a grade of F for the course.

#### E. Class/Lab Rules

- Use of **mobile phones** is **not allowed** during the class period.
- **Smoking, eating or drinking** is **not permitted** at any time.
- **Excuse** must be sought and granted before **leaving the class** for any reason.
- Lab dress code: boot, trousers and shirt



## F. Assignments and Quizzes

- Problems or questions will be assigned regularly. Students will be required to solve these problems and submit the solutions within one week or as may be determined by the instructor.
- No assignments will be accepted after its due date.
- There will be no makeup quiz.
- Students should make every effort to meet all announced deadlines. Any constraint to meet the deadline shall be reported to the instructor for him to determine whether an extension is required or not.

## G. Communication

The students shall constantly use the blackboard to communicate among themselves and with the instructor. Students are encouraged to check their e-mails daily to check whether there exists any special instruction or information from the instructor.

## 9. Schedule of Classes

Week	Date	Topics	Section/Ref.	Assessments
1	02/09/19	Cement composition and manufacture	1.0	
	04/09/19	Cement oxide compositions	3.4	<b>HW 1</b>
	04/09/19	LAB 1: Introduction to Concrete Material Lab		<b>Quiz 1</b>
2	09/09/19	Types of cement		
	11/09/19	Mixing water	4.1	
	11/09/19	LAB 2: Normal Consistency and setting time of Portland cement		
3	16/09/19	Chemical and mineral admixtures for concrete, blended Cements		
	18/09/19	Chemical and mineral admixtures for concrete, blended Cements	5.1	
	18/09/19	LAB 3: Effect of mineral admixture on the normal Consistency and setting time of Portland cement		
4	23/09/19	<b>National Day</b>		
	25/09/19	Characteristics and gradation of aggregates	5.2-5.8	
	25/09/19	LAB 4: Physical characteristics of coarse aggregate (Bulk, apparent and SSD densities, <b>Major 1 (Sunday: 29th September 2019) 6 – 8:00 PM</b>	(CH. 1-5)	
5	30/09/19	Gradation of aggregates	5.1-5.8	<b>HW 2</b>
	02/10/19	Gradation of aggregates	5.1-5.8	<b>Quiz 2</b>
	02/10/19	LAB 5: aggregate gradation, fine to coarse aggregate and fineness modulus (combined)		
6	07/10/19	Properties of cement	6.1-6.7	
	09/10/19	Properties of hydrated cement	6.7	
	09/10/19	LAB 6: Batching mixing and placing, handling and casting of concrete		
7	14/10/19	Concreting practice	7.2	
	16/10/19	Fresh properties of concrete	7.2	
	16/10/19	LAB 7: Workability and flow test		
8	21/10/19	Mix Design/proportioning	7.1	<b>HW 3</b>
	23/10/19	Mix Design/proportioning	7.1	<b>Quiz 3</b>
	23/10/19	<b>Mid- Lab Exam (Wednesday: 23rd October 2019) 2 – 4:50 PM</b>		



9	28/10/19	Curing concrete	7.3	
	30/10/19	Hot weather concreting (problems and solutions)		
	30/10/19	LAB 8: Compressive strengths (cube and cylinder) of Portland cement, mortar and concrete		
10		<b>Major 2 (Sunday: 3rd November 2019) 6 – 8:00 PM</b>	(CH. 6-7)	
	04/11/19	Properties of hardened concrete (stress strain relationship)	7.4.1-7.4.4	
	06/11/19	Properties of hardened concrete (early volume change)	7.4.1-7.4.4	
	06/11/19	LAB 9: Tensile and flexural strengths of Portland cement, mortar and concrete		
11	11/11/19	Introduction to concrete durability	7.6.7	<b>HW4</b>
	13/11/19	Introduction to special concretes (e.g., polymer, sulfur, fiber reinforced, roller compacted, self-compacting and high-strength concretes)	7.6.8-7.6.11	<b>Quiz 4</b>
	13/11/19	LAB 10: Properties of hardened concrete 2 Properties of hardened concrete (permeability/DIN Test)		
12	18/11/19	Pavements and Bituminous Materials		
	20/11/19	Asphalt Concrete Mixtures (Density and void analysis of analysis)	9.8-9.9	
	20/11/19	LAB 11: Properties of hardened concrete 2 (Shrinkage of mortar)		
13	25/11/19	Introduction to reinforced concrete		<b>HW 5</b>
	27/11/19	Structural Steel production	3.1-3.13	<b>Quiz 5</b>
	27/11/19	LAB 12: Tensile strength of a steel bar		
14	02/12/19	Structural steel heat treatment and mechanical testing		
	04/12/19	Use of aluminum, glass and plastics	4.1-4.6	
	04/12/19	LAB 13: Torsional strength of a steel bar		
15	09/12/19	Glass and plastics	-	
	11/12/19	Timber (wood grades: hardwood and softwood)	10.1-10.8	
	11/12/19	<b>Final Lab Exam (Wednesday: 11th December 2019) 2 – 4:50 PM</b>		
16	14/12/19	FINAL EXAMS	-	
	16/12/19	FINAL EXAMS		

#### 10 Schedule of Exams for CE 312:

Examination	Major I	Mid-Lab	Major II	Final-Lab	Final Exam
Week No.	5	8	10	15	16-17
Date	Sunday Sept 29, 2019	Wednesday Oct. 23rd, 2019	Sunday Nov 03, 2019	Wednesday Dec. 11 <sup>th</sup> , 2019	See final exam schedule

#### Note:

- i. Make-up exam will be given only in case the affected student has an approved medical excuse authorized by the Student Affairs Unit and the University Rector
- ii. Any potential conflicts with other exams must be reported **in advance** for adequate adjustment.



### 10. Assessment Plan for the Course

Assessment Policy	%	Letter Grading Scale	
		Marks	Letter Grade
Quizzes	5	95 – 100	A+
HomeWorks	5	90 – less than 95	A
Lab Exercises	10	85 – less than 90	B+
Mid-term lab	10	80 – less than 85	B
Term project	10	75 – less than 80	C+
First major exam	15	70 – less than 75	C
Second major exam	15	65 – less than 70	D+
Final exam	20	60 – less than 65	D
<b>Total</b>	<b>100</b>	Less than 60	F

### 12. ABET Category Contents

Engineering Science	15%	(0.45 credit hours)
Engineering Design	15%	(0.45 credit hours)
Engineering Applications	70%	(2.1 credit hours)

Prepared/Modified by: Dr. Moruf O. Yusuf

Signature:

Date: 01-09-2019