

**Hong Kong University of Science and Technology**  
**Department of Civil and Environmental Engineering**

Rubric Title of course	CIVL 2810 Construction Materials
Instructor	LEUNG, Christopher Kin Ying QIU, Jishen
Teaching Assistants	LAM, Shing Chi (Coordinator) DAGUIO, Reina Nette Ruiz QUIATCHON, Pauline Rose Jamili LI, Shihao ZHOU, Qianyu QIN, Chuhao
Co-requisite Credit	CIVL 2120 3
Text book	Domone, P. and Illston, J.M. (2010) "Construction Materials: Their Nature and Behaviour", 4 <sup>th</sup> Edition, Spon Press
Reference book(s):	Li, Z.J., Zhang Y.M., Leung, C., Zhang, Y.S., Chen, H.S. (2014) "Construction Materials" China Architecture & Engineering Press Ashby, M.F. and Jones, D.R.H. (2012) "Engineering Materials 1: An Introduction to Properties, Applications and Design, Volume 1, 4 <sup>th</sup> Edition, Elsevier Mehta, P.K. and Monteiro, P.J.M. (2006) "Concrete: Microstructure, Properties and Materials", McGraw Hill
Learning Objectives	On successful completion of this course, students are expected to be able to:  (1) understand basic properties of engineering materials and various factors affecting material behavior; (2) understand the basis of material tests and correctly interpret the results; (3) understand the effect of environmental and mechanical actions on the long-term behavior of materials; (4) specify the appropriate construction material for a given project (5) make sound engineering judgements when new construction materials or modifications to existing construction materials are proposed.

Topics	<p>(1) Basic behavior of engineering materials: Linear elasticity, plasticity, creep and fracture/fatigue</p> <p>(2) Concrete science and technology: (i) properties of cement and aggregates (ii) cement replacement materials and admixtures (iii) fresh properties of concrete (iv) concrete at early age (v) hardened concrete: strength and deformation behaviour (vi) concrete durability</p> <p>(3) Steel: Types of steel, welding, corrosion protection</p> <p>(4) Polymer and composites Classes of polymers, fiber reinforced polymers, applications in civil engineering</p> <p>(5) Wood Wood structure and properties, wood products for structural application</p> <p>(6) Bituminous pavement materials Properties of bituminous materials and requirements for pavement construction</p>
Lab Tests	<p>Lab I: Aggregate Lab II: Cement Lab III: Fresh concrete Lab IV: Demonstration tests of concrete modulus measurement and steel uniaxial tension Lab VI: Testing of hardened concrete</p>

<p>Relationships to the program objectives</p>	<p><b>1. Provide professional skills in design, construction and management</b>  This course provides fundamental knowledge in the physical, chemical and mechanical properties of common construction materials, which provide basic knowledge for graduates to select the proper material for a project considering structural, construction and durability aspects.</p> <p><b>2. Train students with good communication skills</b>  The course requires students to conduct laboratory test in groups, finish laboratory test reports in groups, and present their findings from experiment in collaboration with other group members.</p> <p><b>3. Stimulate self-learning and innovative problem solving skills</b>  The course requires students to identify suitable analytical techniques to complete the homework and look for information in the literature to write the laboratory reports.</p>						
<p>Relationships to program outcomes</p>	<p><b>A. Acquire fundamental knowledge in mathematics and science</b>  This course conveys fundamental knowledge in materials science and mechanics which are useful for materials selection and structural design. Students will also obtain knowledge of the physical, chemical and mechanical properties of commonly used construction materials.</p> <p><b>C. Conduct experiments and analyze results</b>  Students will conduct the laboratory tests and analyze the results to determine the properties of common construction materials.</p> <p><b>F. Develop technical competency to design civil engineering components and systems, with an understanding of the principles behind the design methodologies</b>  Based on material properties, students will learn to analyze the deformation and failure behavior of structural members. They will also be exposed to issues related to practical construction and long-term durability of structures that are important concerns in design.</p> <p><b>H. Obtain in-depth knowledge in at least one specialized area</b>  Students will learn in-depth knowledge in mechanical and physical properties of common construction materials, which is important to the structural design of buildings and infrastructures.</p> <p><b>I. Communicate ideas effectively and able to work in teams</b>  Students will collaborate with their group-mates to conduct laboratory tests and write reports. At the end of the semester, they need to make a short presentation on their major findings.</p>						
<p>Assessment of Outcomes</p>	<p>1. Home works and final exam will be given to assess students' understanding of the subject during the learning process. (Outcomes A, F and H)</p> <p>2. Five lab reports and a presentation will be graded to assess students' ability in materials test and communication. (Outcomes C and I)</p> <p>3. Grade:</p> <table data-bbox="792 1835 1240 1936"> <tr> <td>Homework</td> <td>25%</td> </tr> <tr> <td>Lab. Report + Presentation</td> <td>25%</td> </tr> <tr> <td>Final Exam</td> <td>50%</td> </tr> </table>	Homework	25%	Lab. Report + Presentation	25%	Final Exam	50%
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