CIVIL 210 – INTRODUCTION TO STRUCTURES  
(15 Points, FC 2017)

**COURSE CO-ORDINATOR & LECTURER:**  
Dr. Quincy Ma  
Room 401.711, ext 88766  
Room 906.225  
email: q.ma@auckland.ac.nz  
Office hours: TBA

**TUTORIAL STAFF:**  
To be confirmed

<table>
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<tr>
<th>TIMES</th>
<th>LECTURES:</th>
<th>Monday 2 – 3pm Room 260-092 (OGGB3)</th>
<th>Tuesday 2 – 3pm Room 301-G050 (LrgChem)</th>
<th>Wednesday 2 – 3pm Room 260-073 (OGGB4)</th>
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<tr>
<td>TUTORIAL:</td>
<td>Monday 11 – 12pm Rooms: 303-G13, 303-G14, 303-G15</td>
<td>Wednesday 11 – 12pm Rooms: 303-G13, 303-G14</td>
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<td>(starts week 2, select one to attend)</td>
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**ASSESSMENT:**  
Tests  
3x1 hour tests  
(1@ 5%, 2@15%)  
Dates, Time & Place  
15 March, 2-3 pm, OGGB4  
12 April, 8-9am  
260-098 (FPAA)  
31 May, 8-9am  
260-098 (FPAA)  
Project  
15 %  
(5% for fortnightly homework)  
Final exam  
50% (3 hours)

Note: Student must achieve 50% or greater in the exam to pass the course

**LEARNING OBJECTIVES:**  
This course, together with CIVIL 211 and 250 form the core Part 2 structural engineering content of the BE Civil programme. Principles of equilibrium and elasticity are applied to structures and components in order to determine internal forces (actions) and deformations. The techniques of structural analysis that are developed are an essential tool in the design process.  
The course consists of lectures, a weekly clinic/tutorial and a project. In addition you will be expected to learn from additional reading, problem solving (vital) and other work outside formal contact hours. The course is well supported by the recommended texts which also provide a good source of additional problems. There will be regular worksheets with problems for self-instruction and testing your understanding. Most course material will be posted on Canvas.
COURSE OUTLINE:

- Basic concepts of structural behaviour - loading, support, internal actions, strength, stiffness and stability. The role of structural and solid mechanics in design. Overview of principal structural and architectural forms.
- Equilibrium, concept of free body diagram; determination of internal actions - axial force, shear force, bending moment and torque. Shear force and bending moment diagrams. Application to the analysis of various types of statically determinate structures such as beams, simple frames, trusses, gravity dams, retaining walls, arches and suspension bridges.
- Limit state design – strength and serviceability limit states, nominal loads and strengths, load factors and strength reduction factors, design loads and reliable strengths.
- Elementary elasticity - stress, strain and their relationship. Principal values, Mohr circle.
- Engineering beam theory; properties of cross sections, moment-curvature relationship, flexural stress, properties of plane surfaces, elastic deflections, moment-area method, combined bending and axial load.

TEXTS:

- Recommended:
  Hibbeler, R.C. Structural Analysis (9th Edition), Prentice Hall, 2014