# 3 Teaching and Learning Activities

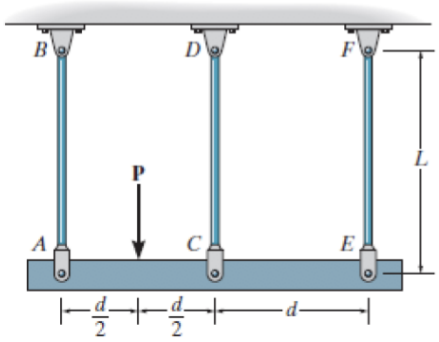
| Weeks | Lecture | Tutorial | Prac/Lab | Assessments Due |
|---|---|---|---|---|
| Week 1<br>05-03-2018 | Lecture 1: Force methods v.s. displacement methods | No tutorial | No practical | |
| Week 2<br>12-03-2018 | Lecture 2: Slope deflection method for analysis of beams and frames | Tutorial 1 | No practical | - Tutorial and practical submissions |
| Week 3<br>19-03-2018 | Lecture 3: Slope deflection method for analysis of beams and frames (continue) | Tutorial 2 | No practical | - Tutorial and practical submissions |
| Week 4<br>26-03-2018 | No lecture (Good Friday public holiday) | No tutorial | No practical | |
| Week 5<br>02-04-2018 | Lecture 4: Slope deflection method for analysis of beams and frames (continue) | Tutorial 3 (Tutorial quiz 1) | Practical 1 | - Quizzes<br>- Tutorial and practical submissions |
| Week 6<br>09-04-2018 | Lecture 5: Moment distribution method for analysis of beams and frames | Tutorial 4 | Practical 1 | - Tutorial and practical submissions |
| Week 7<br>16-04-2018 | Lecture 6: Moment distribution method for analysis of beams and frames (continue) | Tutorial 5 | Practical 2 | - Tutorial and practical submissions |
| Week 8<br>23-04-2018 | Lecture 7: Matrix method for plane truss analysis | Tutorial 6 (Tutorial quiz 2) | Practical 3 | - Quizzes<br>- Tutorial and practical submissions |
| Week 9<br>30-04-2018 | | | | |
| Week 10<br>07-05-2018 | Lecture 8: Matrix method for plane truss analysis (continue) | Tutorial 7 | Practical 4 | - Tutorial and practical submissions |
| Week 11<br>14-05-2018 | Lecture 9: Matrix method for beam | Tutorial 8 | Practical quiz | - Quizzes<br>- Tutorial and practical submissions |
| Week 12<br>21-05-2018 | Lecture 10: Matrix method for frame analysis | Tutorial 9 (Tutorial quiz 3) | No practical | - Quizzes<br>- Tutorial and practical submissions |
| Week 13<br>28-05-2018 | Lecture 11: Matrix method for frame analysis (continue) | Tutorial 10 | No practical | - Tutorial and practical submissions |
| Week 14<br>04-06-2018 | Lecture 12: A brief introduction to nonlinear analysis | Tutorial 11 (Tutorial quiz 4) | No practical | - Quizzes<br>- Tutorial and practical submissions |
| Week 15<br>11-06-2018 | | | | |
| Week 16<br>18-06-2018 | | | | - Final Exam |
| Week 17<br>25-06-2018 | | | | - Final Exam |

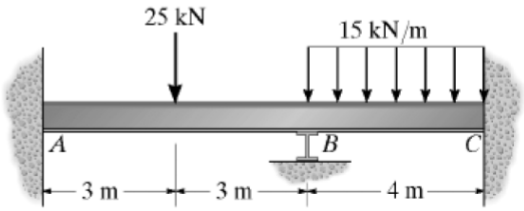
The above timetable should be used as a guide only, as it is subject to change. Students will be advised of any changes as they become known.

# STRUCTURAL ANALYSIS LEC SUM

## LECTURE 1 – SLOPE DEFLECTION METHOD FOR BEAMS AND FRAMES 1

- Statically determinate: all forces can be determined strictly from equilibrium equations;
- Statically indeterminate: No. of unknown forces > equilibrium equations.



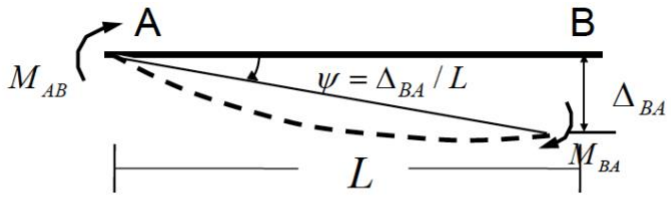

Two methods are available to analyze indeterminate structures, depending on whether we satisfy force equilibrium or displacement compatibility conditions.

**Force Method** satisfies displacement compatibility and force-displacement relationships; it teats the forces as unknowns.

**Displacement Method** satisfies force equilibrium and force-displacement relationships; it treats the displacements as unknowns

The use of force method is limited to structures which are not highly indeterminate. This issue can be overcome by displacement method.

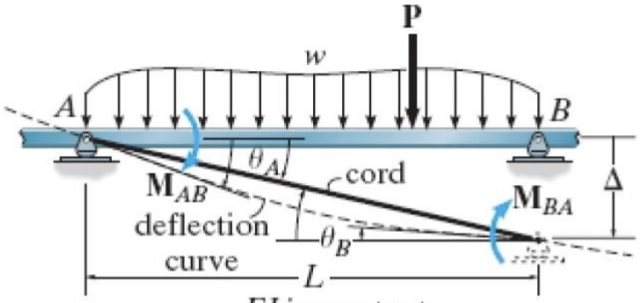
For each span AB, it has 4 DOF ($\theta_A, \Delta_{AB}, \theta_B, \Delta_{BA}$)




Clockwise moment or rotation of either end of the member is POSITIVE chord rotation, $\psi = \Delta_{BA} / L$ , is POSITIVE when Clockwise.

## 2.3 Slope Deflection Equations

Relationships between end moments and displacements




DOF for the general beam is $\theta_A, \theta_B, \psi (= \Delta / L)$

$$M_{AB} = \frac{2EI}{L}(2\theta_A + \theta_B - 3\psi) + FEM_{AB}$$

$$M_{BA} = \frac{2EI}{L}(2\theta_B + \theta_A - 3\psi) + FEM_{BA}$$