1	Course Code:	**CIVL4370**
2	Course Title:	Computer Methods of Structural Analysis
3	Course Credits:	3
4	Instructor:	Tianju Xue
5	Duration / Offering Term:	Spring semester
6	Lecture/tutorial/lab hour per week	Two 1.5-hour lectures per week; one tutorial session per week
7	Exclusion (if any):	
8	Corequisite (if any)	
9	Enrollment requirement (e.g., Instructor's approval is required):	N.A.
10	Course Description: (within 150 words)	Computer methods are of fundamental importance for modern structural analysis. The purpose of this course is, on one hand, to present the stiffness method for matrix structural analysis, which provides an introduction to the finite element method. On the other hand, the course also illustrates how these tools are realized in structural analysis software. The focus is on planar and spatial trusses, continuous beams, planar and spatial frames, with a brief dissuasion on grid and shell structures. This course is on intermediate level, which aims to provide future structural engineers the tools to analyse realistic civil engineering structures. Moreover, the course provides an opportunity for the students to build an intuition for structural behaviour under static and dynamical loading.
11	Topics	1. Matrix Stiffness Method 2. Stiffness Formulation for 2D/3D Trusses 3. Stiffness Formulation for 2D/3D Frames 4. Boundary Conditions 5. Symmetry, Constraints, Offsets and Thermal Strain 6. Basics of Finite Element Analysis
12	Intended learning outcomes (ILOs) of the course (CILOs):	On successful completion of this course, students are expected to be able to: CILO-1. Idealize a civil engineering structure into a mechanical model (suitable for structural analysis) CILO-2. Form the stiffness and loading matrices of an idealized structure, with a focus on building and bridge structures CILO-3. Perform a matrix structural analysis of an idealized structure with the help of a mathematical software. CILO-4. Simulate and analyse a realistic civil engineering structure using a (commercially available) structural analysis software
13	Contribution of Learning Outcomes to Programs of Study	PO1. Acquire fundamental knowledge in mathematics and science on which civil engineering research and practice are based Achieved through CILO-1, CILO-2 PO2. Understand fundamental principles of engineering science relevant to civil engineering disciplines Achieved through CILO-1, CILO-2, CILO-3 PO3. Acquire an ability to apply modern engineering and IT tools effectively and efficiently for engineering analysis, design and communication Achieved through CILO-4

		PO5. Develop an ability to identify and formulate civil engineering problems, and propose feasible solutions with an appreciation of their underlying assumptions, uncertainties, constraints, and technical limitations Achieved through CILO-1, CILO-4 PO6. Develop technical competency to design civil engineering components and systems, with an understanding of the principles behind the design methodologies Achieved through CILO-1, CILO-2, CILO-3, CILO-4 PO8. Obtain in-depth knowledge in at least one major area of specialization within civil engineering Achieved through CILO-1, CILO-2, CILO-3, CILO-4 PO10. Recognize the importance of seeking further specialization within civil engineering and the need for life-long learning Achieved through CILO-1, CILO-4
14	Textbook / Reference books:	Lewis P. Felton & Richard B. Nelson, Matrix Structural Analysis, John Wiley & Sons, 1997. Aslam Kassimali, "Matrix Analysis of Structures, 2nd Edition", Cengage Learning, 2012. W. McGuire, R. H. Gallagher & Ronald D. Ziemian, Matrix Structural Analysis, 2nd Edition, John Wiley & Sons, 2000.
15	Grading Scheme	Assignments (20%) Mid Term Exam (30%) Final Exam (50%)
16	Grading Type (PP/P/F/Letter)	Letter
17	With endorsement of UG coordinator	