Department: Civil & Environmental Engineering **Division: Civil engineering**
Level and Major: Graduate – General Course

Course Title: Finite element method **Number of Credits: 3**
Prerequisite (Corequisite): Structural analysis (I), Concrete Technology Lecturer: -

Course Topic

- General introduction of finite element method and initial classification based on the type of element including; elements discussed matrix analysis (axial, continuous beam, truss ,grid, fram) elements used in elasticity issues ,bending of the plate
- Introduce the weighted residuals and Galerkin method and its application in finite components to solve one-dimensional problems
- Introducing the method of virtual work and energy and formulating two and three dimensional elasticity problems with the help of the mentioned methods
- Difficulty matrix of three-node triangular elements (CST)for stress and strain states
- Hardness matrix of higher order regular triangular elements(QST,LST,…)
- Compatible nodal force vector and equivalent to the effect of wide loads and tractions for two –dimensional problems
- Discussion of programming for finite component elements and explanation of how to solve equations optimally (skyline technique, sky solver or active column solver)
- difficult matrix of two –dimensional isoparametric quadrilateral elements including ;elements whose nodes form a network (4,9,16,25nodes)serndipity element such as :8-node element and …
- isoperimetric triangular element hardness matrix(irregular QST and LST)
- explain numerical integration and its application in quadrilateral or triangular elements
- Hardness matri xo fisoparametric quardrilatera lelement swit hthe numbe ro fvariabl enodes)element wit hthe numbe ro fvariabl enodes between 9_4fo ruse i nirregular networkin(g
- hardness matrix of three-dimensional solid elements including; brick-shaped elements (8,20,27 node elements(pyramid-shape delement) s4,1...,، nod eelement(swedge-shape d elements (6,15,…..node elements)
- the effect of heat and how is it applied to elasticity – related issues (vectors of compatible nodal forces equivalent to the heat in 2 and 3 dimensional problems(
- application of the finite components in field problems for example ;using from the finite components to solve differential equations equivalent to Laplace equation ,Helmholtz and etc. explain about scientific issues related to the above equations such as calculating hydrodynamic pressures ,seepage problems or heat equations
- hardness matrix elements with axi-symmetric problems in the case of triangular or quadrilateral use
- an introduction to bending surfaces and finite elements related to it

Course Description:
Reading Sources:
Course Goals and objectives:
Evaluation:
Course topics:
The course aims t:o