

# Finite Element Analysis II

0540.6411

Semester B, 2019–20

url: <http://www.eng.tau.ac.il/~harari/Courses/Methods2/>

Class Tuesday 15–18, Wolfson 238

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**Hours:** Tuesday, 14–15 (or by appointment)

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## Topics

Review of linear, static finite element analysis

*Dynamics:*

Formulation of linear dynamic problems

Parabolic, hyperbolic and elliptic eigenvalue problems

Time-stepping algorithms for parabolic and for hyperbolic problems

Algorithms for elliptic eigenvalue problems

*Nonlinear analysis:*

Elementary nonlinear problems

Solution of nonlinear algebraic equations

Finite deformation (hyper-)elasticity

Finite deformation elasto-dynamics

Iterative strategies for large-scale systems

## Book

Hughes, *The Finite Element Method*, Dover, 2000 (Prentice-Hall, 1987, out of print).

## References

Bathe, *Finite Element Procedures*, Prentice-Hall, 1996.

Belytschko et al., *Nonlinear Finite Elements for Continua and Structures*, Wiley, 2000.

Brenner & Scott, *The Mathematical Theory of Finite Element Methods*, 2nd Ed., Springer, 2002.

Cook et al., *Concepts and Applications*. . . 3rd Ed., Wiley, 1989 (4th Ed., 2001).

Crisfield, *Non-linear Finite Element Analysis*. . . Vol. 1: Essentials, Wiley, 1991.

Dennis & Schnabel, *Numerical Methods for Unconstrained Optimization*. . . SIAM, 1996.

Golub & Van Loan, *Matrix Computations*, 3rd Ed., John Hopkins, 1996.

Johnson, *Numerical Solutions of Partial Differential Equations*. . . Cambridge, 1987.

Luenberger, *Linear and Nonlinear Programming*, Addison-Wesley, 1984.

Strang & Fix, *An Analysis of the Finite Element Method*, Prentice-Hall, 1973.

Szabó & Babuška, *Finite Element Analysis*, Wiley, 1991.

Zienkiewicz & Taylor, *The Finite Element Method*, Vol. 1, Butterworth-Heinemann, 2000.

## Grading

Homework problems (to final) 0%

Computer assignments (required) 0%

Project (50%)

Final 100% (05.07.20)