AE 6769 / ME 6769 – Linear Elasticity

Spring 2025

Credit:	3-0-3 (3 credits, 3 hours per week)
Prerequisites:	Graduate standing; Principles of Continuum Mechanics (ME6201) or equivalent (recommended); Mechanics of Deformable Bodies (COE3001) or equivalent (recommended)
Instructor:	Dr. Stephane Berbenni
	Email: stephane.berbenni@georgiatech-metz.fr
Office Hours:	• *TBD*
Textbook (optional):	• Barber, J.R., *Elasticity*, Kluwer Academic Publishers, Dordrecht, 2002 (2nd edition).
Other reference books:	• Bower, A.F., Applied Mechanics of Solids, CRC Press, 2009; (http://solidmechanics.org/) • Timoshenko, S.P. and Goodier, J.N., Theory of Elasticity, 3rd Ed., McGraw-Hill, 1970; • Love, A.E.H., A Treatise on the Mathematical Theory of Elasticity, 4th Ed., Dover, 1944; • Landau, L.D., and Lifschitz, E.M., Theory of Elasticity (English Translation by Sykes, J.B., and Reid, W.S.), Pergamon/Addison Wesley, 1959. (physicists' view of elasticity)
Objectives:	This class will introduce governing equations of linear elasticity and will focus on solutions of boundary value problems in two and three dimensions using several formulations and methods.
Topics:	-Review of continuum mechanics and field equations (3 weeks): Strain, stress, strain compatibility, stress equilibrium, linear elasticity constitutive law, uniqueness of solution, boundary conditions. -Two-dimensional elasticity (9 weeks): *Plane strain, plane stress, Airy stress function method, *Problems in Cartesian coordinates: rectangular beams, general solution, *Problems in polar coordinates: circular hole problems, Michell general solution, contact problems *Singular solutions: dislocations, cracks, Kelvin problem. - Three-dimensional elasticity problem (2 weeks) *Principle of virtual work *Green's function method,

* Galerkin vector and applications

Assignments: Homework assignments will be graded, and the solutions will be posted on Canvas. No late assignments will be accepted (except acceptable reason). All class handouts will be posted on Canvas.

Evaluation:
30% Homework
30% Mid-term
40% Final Exam

Grading Scale: Your final grade will be assigned as a letter grade according to the following scale:

A	90-100%
B	80-89%
C	70-79%
D	60-69%
F	0-59%

Important dates:
1st class day: *TBD* (introductive lecture)
Last instructional class day: *TBD*
Drop day: *TBD*
Mid-term examination: *TBD*
Recess week: *TBD*
Final examination: 2 hours 50 minutes (*TBD* during the semester). The final examination week is *TBD*.

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Student-Faculty Expectations Agreement:
At Georgia Tech we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. See http://www.catalog.gatech.edu/rules/21/ for an articulation of some basic expectation that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.