

# **EML 6934 – CONTACT MECHANICS**

**Textbook:** *Contact Mechanics* by K. L. Johnson, Cambridge University Press

**Reference books:** *Rolling Bearing Analysis* by T. A. Harris, 3<sup>rd</sup> edition, Wiley Interscience  
*Mechanics of Fretting Fatigue* by Hills and Newell

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**Goals:** This course will provide an introduction to many aspects of the mechanics of contact between non-conforming surfaces. Contact between non-conforming surfaces touch first at a point along a line, and even under load, the dimensions of the contact patch are generally small compared with the dimensions of the bodies themselves. In these circumstances the contact stresses comprise a local 'stress concentration' which can be considered independently of the stresses in the bulk of the two bodies. The basic approach used to solve contact problems will be to build up stress distributions by the simple superposition of basic 'point force' solutions- the Green's function method. Complex potentials and integral transform methods are only mentioned in the passing. Point, line and elliptical contacts subjected to normal and tangential loads, rolling and sliding contacts, micro-slip and creep, partial slip and fretting, rolling contact between inelastic bodies, dynamic effects and impact, and contact between rough surfaces will be studied in detail. Stress analysis results will be used to evaluate contact fatigue life. Applications of contact mechanics to important engineering problems in rolling element bearings, gear contacts, cams, and blade attachments will be discussed.

**Grading:** Course grade will be based entirely on homework assignments. Several detailed design projects will be assigned during the course of the semester. Use of computer programs such as MATLAB and MATHCAD will be essential for completing the assignments.