

MECH 326 Reading Guide

Module 1: Fracture

Overview

The readings outlined in this guide are intended to prepare a foundation of knowledge and skills that will be used in the MECH 326 classes and tutorials. You will have a short multiple choice Readiness Assurance Process (RAP) Quiz on this material. The quiz will primarily test your ability to recall this material; the emphasis is not to test your ability to apply or use the material (that will come later).

The readings are divided into three categories:

- **Required:** the primary source of material for the Readiness Assurance Process (RAP) Quiz. Each student is expected to complete the required readings.
- **Beneficial:** additional analyses, derivations, explanations and examples to provide in-depth understanding of the course material. These readings help develop a more complete understanding of course concepts necessary for the tutorials, exercises, exams, and design projects. It your choice whether or not you do the beneficial readings.
- **Supplementary:** good information for any mechanical designer to know. Useful for the course, but not part of tutorials or exams.

All readings are drawn from the course text: Budynas, R.G. and Nisbett, J.K., *Shigley's Mechanical Engineering Design*, McGraw-Hill. Section number references are to the 10th Edition. The 9th Edition sections are the same, with the exception that an additional section appears in 5-13.

Readings

	Section	Title	Notes
●	5	-	A short introduction to the main topics of the chapter
●	5-1	Static strength	Additional information to help orient you to the purpose of the chapter topic
●	5-2	Stress concentration	Review material that is helpful information for the introduction to fracture mechanics section (5-12) and for later in the course.
□	5-3	Failure theories	A short overview of the various static failure theories; we won't be using these too much
-	5-4	Maximum-Shear-Stress Theory for Ductile Materials	One of two failure theories for ductile materials you should have seen before; we won't be using this too much

●/□	5-5	Distortion-Energy Theory for Ductile Materials	While technically not required for our work on fracture, this failure theory is important for other work in the course and so is required reading. (Example 5-1 is beneficial but not required)
-	5-6 to 5-11	Additional ductile and brittle failure theories	You are welcome to review this material, but it will not appear in the course
●	5-12	Introduction to Fracture Mechanics	This is the bulk of the material we will be using in MECH 326 and it consists of an introduction to the growth of cracks in mechanical elements.
-	5-13	Important Design Equations	A summary of the key equations presented in the chapter. Not bad to skim over, but most of the theories represented are not part of the assigned readings.