**Syllabus**

Mechanical Strengths and Behaviors of Solid Spring, 2018

M2794.012000

Instructor: Professor Youn, Byeng Dong ([bdyoun@snu.ac.kr](mailto:bdyoun@snu.ac.kr)) (Building 301, #1514)

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High performance, safety and durability must be ensured when designing mechanical systems. Understanding mechanical behaviors (stress, strain, and displacement) of solids is thus of great importance. This course aims at delivering the mechanical behaviors (stress and strain) and failure mechanisms caused by deformation and material failures. Two primary parts include material strength and mechanical behavior. The former attempts to describe elastic response, dislocation, fracture and fatigue, plasticity theory, strain hardening, and creep. On the other hand, the latter presents mechanical responses (stress and strain) subject to static and/or dynamic mechanical loadings.

Textbook: Norman D. Dowling

- Mechanical Behavior of Materials, 4th Edition, Pearson, 2013

Reference: (1) J. A. Bannantine et al., Fundamentals of Metal Fatigue Analysis,

Prentice-Hall, 1990

(2) Robert C. Juvinall, Machine Component Design, 5th Edition, John Wiley

& Sons Inc., 2012

Course Schedule:

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| Week | Topic | Etc. |
| 1 | Introduction; Structure and deformation in materials |  |
| 2 | Structure and deformation in materials; A Survey of Engineering Materials |  |
| 3 | Mechanical Testing |  |
| 4 | Stress-Strain Relationships and Behavior |  |
| 5 | Yielding and Fracture under Combined Stresses; Fracture of Cracked Members |  |
| 6 | Fracture of Cracked Members |  |
| 7 | Fatigue of Materials | Midterm  Exam |
| 8 | Fatigue of Materials; Variable; Amplitude Loading; Stress-based Approach to Fatigue |  |
| 9 | Stress-based Approach to Fatigue; Fatigue Crack Growth |  |
| 10 | Fatigue Crack Growth; Variable Amplitude Loading |  |
| 11 | Plastic Deformation Behavior and Models for Materials |  |
| 12 | Strain-based Approach to Fatigue |  |
| 13 | Time-Dependent Behavior: Creep |  |
| 14 | Surface Damage: Corrosion and Wear |  |
| 15 | Course Summary; Final Exam | Final Exam |

Evaluation: Two exams (Mid-term 25% & Final 30%), Homework (30%), One project (25%)

Consideration: Homework assignments will be provided in every class and they should be submitted by the due date in class. For fairness on grading assignments, late submission is not allowed.

All information related to the course will be given at eTL (http://etl.snu.ac.kr/).