

MATERIALS TESTING AND EVALUATION

Ivo DLOUHÝ

**Institute of Materials Science and Engineering,
Brno University of Technology, FME**

dlouhy@fme.vutbr.cz

tel.: 54114 3171

**Institute of Physics of Materials, Academy of
Sciences of the Czech Republic, Brno**

idlouhy@ipm.cz

tel.: 532 290 342

- **Introduction of the Institute**
- **Description of the course**
- **Organisational remarks**

- **Historical background and consequences**

course description

the main role of materials designer (engineer) during material selection:

- ✓ to exclude extreme elastic/plastic deformation of materials (depends on application)
- ✓ to avoid damage due to extreme material deformation – avoid human loss and/or economic loss
- ✓ to avoid fracture initiation and/or crack propagation

breakdown, collapse of structure, component due to failing, insufficiency, limited performance of the material

- > standard fields in education and science: “mechanical behaviour of material”, “material failures”, in Brno “limit states of materials”,
- > active, creative application of knowledge about materials behaviour under different conditions of loading, environments etc. “materials design”

remarks to organisation

course:

- ✓ selected chapters from the key parts of materials testing related to material response to mechanical loading
- ✓ standard course for study programs of materials engineering, machine and industrial design and mechanics of solids

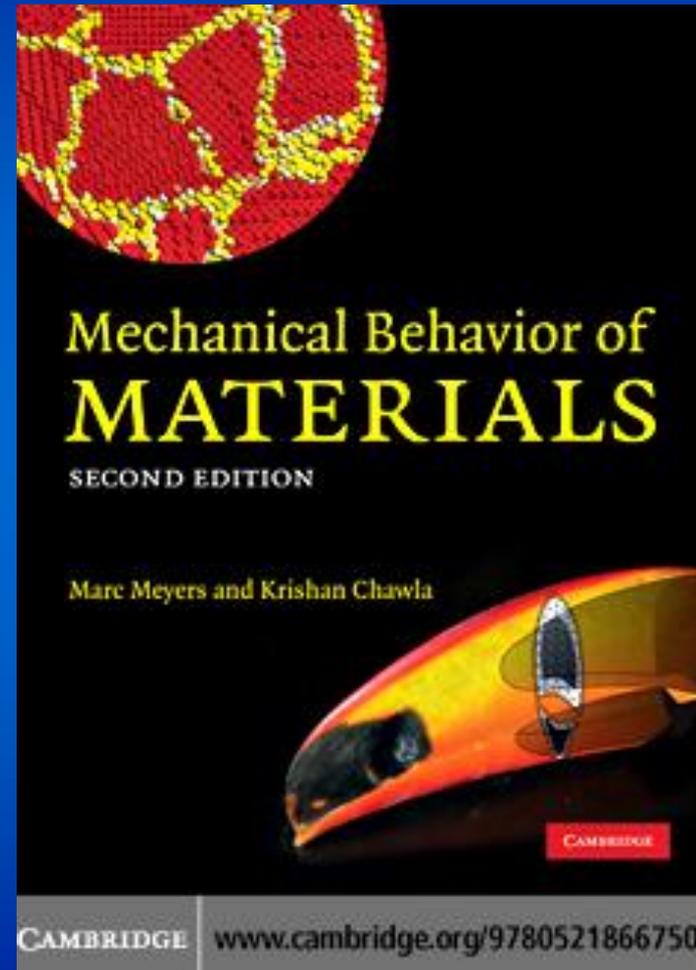
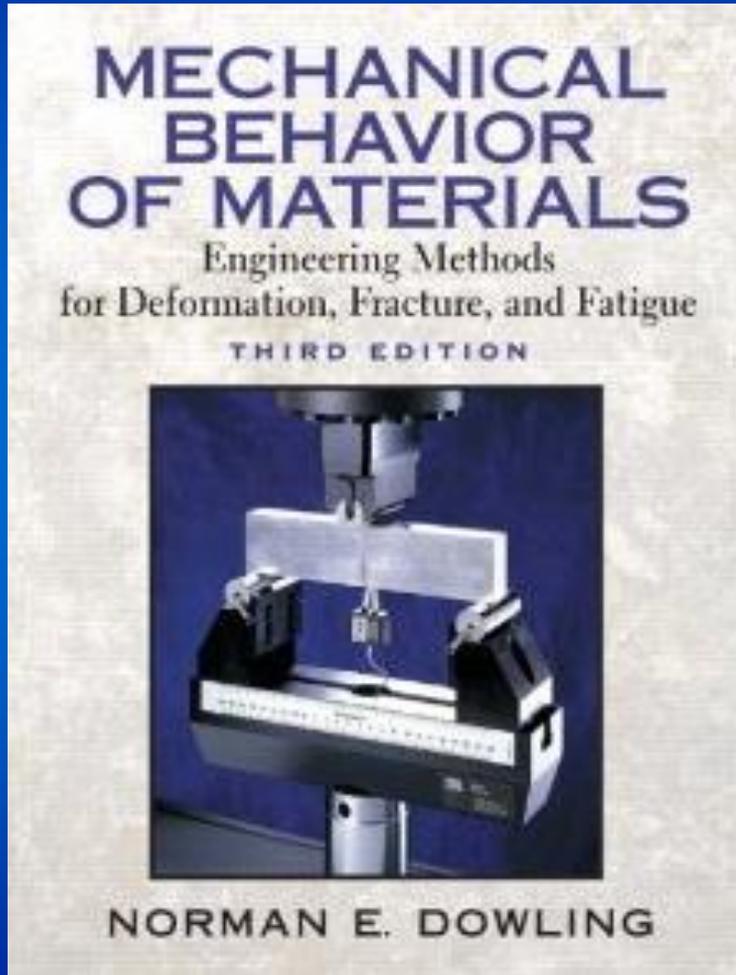
some lectures given by colleagues

- ✓ there will be co-operation to avoid duplicity
- ✓ outline shown later

remarks to organisation

- some topics only lectures, some topics seminar form and practical exercises (mechanical laboratory)
- almost all lectures in this lecture room
- time schedule 16:00 to 18:30 with one-two breaks (it depends on the progress of the lecture, sometimes also on my time availability) – possible changes ?
- problems, requests: me, Pantelejev, Valka
- basic literature: Dowling's book, Meyer Chawla's book, my presentations

remarks to organisation



remarks to organisation

LECTURES

- 2.10. Introductory remarks
History of the testing
- 9.10. Elasticity, anelasticity
- 16.10. Tensile test
- 23.10.
- 30.10. True stress-true strain diagram
- 6.11.
- 13.11. Empirical tests of ductility
- 20.11. Fracture mechanics, LEFM, EPFM
- 27.11. Fracture toughness
- 4.12. Fatigue (Pantelejev)
- 11.12. Fatigue (Pantelejev) / Creep (Valka)
- 18.12. Exam

Ceramics testing

Polymers testing

Practical excersises

Tensile test – measurements

