Research methodology in mechanics (SG2127), 3 hp=ECTS (2 p)
in the Masters program Engineering Mechanics

Time always: Wednesdays 10.15 – 12.00

Wednesday 29 October, E53 Osquars Backe 18
Hanno Essén

Topics: The basic concepts of mechanics, operational definitions, units, physical dimension, inertial frames and Newton's laws, the forces of nature, mathematical modeling, integrable systems and exact solutions, numerical solution, chaos, determinism contra stochastic behaviour.

Wednesday 5 November, Seminar room Solid Mechanics,
Qsquars Backe 1, plan 2
Fred Nilsson

Topics: General aspects of solid mechanics modeling.
Modeling at different levels:
a) Use of different beam models
b) Support flexibilities
c) Point loads,
d) Continuum versus discrete dynamic modeling.

Wednesday 12 November, H21 Teknikringen 33
Erik Lindborg

Topics: Atomistic contra continuum models of reality. (Partly based on: Toulmin, Stephen and Goodfield, June, **The architecture of matter)**

Wednesday 19 November, E53 Osquars Backe 18
Lanie Guttierez-Farewik

Topics: Biomechanics, human walking, and statistical significance

Wednesday 3 December, H21 Teknikringen 33
Fredrik Lundell

Topics: Theory and experiment in fluid mechanics.

Wednesday 10 December, E53 Osquars Backe 18
Presentation of essay-projects (Essén).

To pass this course the students must 1) attend the five classes above. (In case of absence the student may be asked to do an extra project.) 2) write and present an essay on a subject treated in the course (collaborations of two students encouraged). For more information contact Hanno Essén.

e-post: hanno@mech.kth.se

Essay topics for SG2127 and students that chose them Fall term 2008

Idealization contra approximation in modeling (Joel Bergström, Gustav Berg Backlind)

Measurement problems – random and systematic errors (Sebastien Thomas, Kristin Steingrimsdottir)

Quantities, units and physical dimension (Clement Merat, Guillaume Bonnet)

The importance of dimensionless numbers (Felix Jakob, Mario Metzler)

Integrable contra chaotic systems (Yasir Kamran, Wu Mingaiu)

Atomistic contra continuum models of matter (Aftab Ahmad, Naeem ur Rehman)

Statistical significance (Sadegh S. Khavidak, Mahdi Kazemi Hatami)

Reliability contra uncertainty in engineering (Tolga Olpak, Anna Daurskikh)

Space, time, and geometry (Xiao Xing)

Classification and subdivisions of mechanics (M. Tanwer Khan, Elsiddig Elmukashfi)

Foundations of energy and work (Sriram Mandayam)

Historical aspects of early mechanics (Tomas Kopp*)

On the 10th of December each student gets 5 minutes to present a summary. I will require the written essay in *electronic* form (word, rtf, or pdf) to my e-mail.

Please prepare one or two overhead *transparencies*. Note that these should be made in a **copying machine**, since laser writers require extra heat resistant material which is not available in the corridors of the Mechanics department.

Two student collaboration per essay is the norm. Recommended length approximately three-four A4 pages. There should be a short summary in the beginning and some literature references at the end. Oral presentations of a few minutes each is required.

*Absent at presentations

Hanno Essén