LEARNING CONTENT IN ENGINEERING MECHANICS, STATICS & STRENGTH OF MATERIALS

Many universities and technical colleges in Germany consolidate the study of statics and strength of materials in a single course titled Engineering Mechanics I.

Here we present a current example from the Brandenburg Technical University, Cottbus, department of Engineering Mechanics and Strength of Materials

Brandenburgische Technische Universität Cottbus

LECTURES, TUTORIALS AND EXERCISES

1. Modelling in Mechanics
2. Vectors in Mechanics
3. Equilibrium of Free Bodies
4. Equilibrium of Fixed Bodies
5. Equilibrium of Fixed Systems
6. Centre of Gravity and other Centres
7. Friction
8. Trusses
9. Internal Beam Loading
10. Stresses and Strains
11. Distortion
12. Technical Bending
13. Elastic Line
14. Overlaying of Simple Load Cases
15. Buckling

Source: Website of the Brandenburg Technical University Cottbus, www.tu-cottbus.de/fakultaet3/de/mechanik/lehre

CONTENT

Engineering Mechanics is a basic subject underlying all engineering studies. The first part of the Engineering Mechanics tutorial cycle teaches methods of systematic modelling and solving of static problems. Building on the axioms of mechanics, within the framework of rigid-body mechanics teaching covers the equivalence and equilibrium of force systems, calculation of the centre of gravity, internal forces and moments in beams and trusses, and friction problems.

An introduction to elastostatics and strength of materials is provided by study of the concept of stress and distortion and of Hooke's Law, which is subsequently applied to tension/compression, torsion and bending problems.

METHODOLOGY

Lectures and tutorials are supplemented by weekly exercises conducted as demonstrations and as group working, in a 14-day cycle. While the demonstrations present examples of specific applications, the group exercises are intended to enable students to devise their own solutions by way of experimentation and then present their results to their fellow classmates.

ALSO VERY WELL SUITED TO VOCATIONAL TRAINING APPLICATIONS

Although we are looking at a university curriculum in this case, we should stress that the teaching of the fundamentals of statics and strength of materials does of course also plays a key role in vocational training for many technical professions.

The demonstration and experimentation units we offer have been tried and proven in technical courses at many vocational training colleges and Institutes of Technology. We offer apparatus enabling students to conduct exercises in order to learn fundamental principles or to explore subjects in greater technical detail, according to the specific need.

LEARNING CONTENT

The GUNT apparatus set out in this catalogue provides the perfect accompaniment to curricular studies.

On the right-hand side we provide an alphabetical listing of the curricular elements which can be covered with GUNT demonstration and experimentation units.

For the Strength of Materials subject you will find a similar listing of learning content on pages 106 - 107.

Learning content in STATICS which you can cover with GUNT demonstration and experimentation units

FORCES AND MOMENTS

KEYWORD	CODE (PAGE)
Combination of Forces	TM 110 (10)
	TM 115 (15)
Concurrent Forces	TM 110 (10)
Conditions of Equilibrium in Statics	SE 110.53 (18)
Coplanar Force System	TM 110 (10)
Determination of Bar Forces	TM 115 (15)
	FL 111 (16)
Equilibrium of a Rigid Body	SE 110.53 (18)
Equilibrium of Forces	TM 110 (10)
	TM 110.01 (12)
Equilibrium of Moments	TM 110 (10)
	EM 049 (17)
Force Transmission	TM 110.02 (13)
Free Body Diagram	SE 110.53 (18)
Friction	TM 110.01 (12)
Gearing	TM 110.03 (14)
Hooke's Law	TM 110.01 (12)
Inclined Plane	TM 110.01 (12)
Lever Principle	TM 110 (10)
	EM 049 (17)
Lifting Work	TM 110.02 (13)
Mechanical Advantage/ Velocity Ratio	TM 110.02 (13)
Method of Joints	FL 111 (16)
Parallelogram of Forces	TM 110 (10)
	TM 115 (15)
Potential Energy	TM 110.02 (13)
Pulley Block	TM 110.02 (13)
Resolution of Forces	TM 110 (10)
Static Friction/Dynamic Friction	TM 110.01 (12)
Support Reactions	SE 110.53 (18)
Transmission Ratio	TM 110.03 (14)

FRICTION

KEYWORD	CODE (PAGE)
Equilibrium of Forces	TM 110 (10)
	TM 110.01 (12)
	TM 225 (23)
Dynamic Friction	TM 110.01 (12)
	TM 200 (22)
	TM 210 (20)
	TM 225 (23)
Friction	TM 110.01 (12)
	TM 200 (22)
	TM 210 (20)
	TM 225 (23)
Frictional Forces on Journal Bearings	TM 232 (24)
Inclined Plane	TM 110.01 (12)
	TM 225 (23)
Slip-Stick Effect	TM 210 (20)
Static Friction	TM 110.01 (12)
	TM 200 (22)
	TM 210 (20)
	TM 225 (23)

FORCES IN A TRUSS

KEYWORD	CODE (PAGE)
Determination of Bar Forces	FL 111 (16)
	SE 110.21 (26)
	SE 110.22 (28)
	SE 130 (30)
Free Body Diagram	SE 110.21 (26)
	SE 110.22 (28)
	SE 130 (30)
Maxwell-Cremona Diagram	SE 110.21 (26)
	SE 110.22 (28)
	SE 130 (30)
Method of Joints	FL 111 (16)
	SE 110.21 (26)
	SE 110.22 (28)
	SE 130 (30)
Method of Sections (Ritter's)	SE 110.21 (26)
	SE 110.22 (28)
	SE 130 (30)
Statically Indeterminate System	SE 110.22 (28)
Support Reactions	SE 110.21 (26)
	SE 110.22 (28)
	SE 130 (30)
Truss	FL 111 (16)
	SE 110.21 (26)
	SE 110.22 (28)
	SE 130 (30)
Zero-Force Members	SE 110.21 (26)
	SE 110.22 (28)
	SE 130 (30)

INTERNAL REACTIONS / METHODS OF SECTION

KEYWORD	CODE (PAGE)
Bending Moment Diagram	WP 960 (36)
	WP 962 (39)
Deflection of Beams	WP 960 (36)
	WP 961 (38)
	WP 962 (39)
Internal Forces and Moments	WP 960 (36)
	WP 961 (38)
	WP 962 (39)
Internal Forces on the Beam	WP 960 (36)
	WP 961 (38)
	WP 962 (39)
Method of Sections	WP 960 (36)
	WP 961 (38)
	WP 962 (39)
Shear Force and Bending Moment Diagrams	WP 960 (36)
Shear Force Diagram	WP 960 (36)
	WP 961 (38)

BRIDGES, BEAMS, ARCHES

KEYWORD	CODE (PAGE)
Cable under Dead-Weight	SE 110.50 (40)
Cable under Point Load	SE 110.50 (40)
Cable under Uniformally Distributed Load	SE 110.18 (42)
Cantilever Girder	SE 110.12 (44)
Catenary	SE 110.50 (40)
Conditions of Equilibrium in Statics	SE 110.53 (18)
Deformation of a Frame	SE 110.16 (48)
Distributed Load	SE 110.18 (42)
	SE 110.12 (44)
	SE 110.17 (46)
	SE 110.16 (48)
Equilibrium of a Rigid Body	SE 110.53 (18)
Gerber Beam	SE 110.12 (44)
Hinged Beam	SE 110.12 (44)
Internal Forces and Moments	SE 110.18 (42)
	SE 110.12 (44)
Line of Influence	SE 110.12 (44)
Method of Sections	SE 110.12 (44)
Moving Load	SE 110.12 (44)
	SE 110.17 (46)
Multipart Structure	SE 110.12 (44)
Parabolic Arch	SE 110.16 (48)
Shear Force and Bending Moment Diagrams	SE 110.12 (44)
Springing Line	SE 110.17 (46)
Static Indetermancy	SE 110.12 (44)
	SE 110.17 (46)
	SE 110.16 (48)
Statically Indeterminate System	SE 110.22 (28)
	SE 110.16 (48)
Support Reactions	SE 110.12 (44)
	SE 110.17 (46)
	SE 110.16 (48)
Suspension Bridge	SE 110.18 (42)
Three-Hinged Arch	SE 110.17 (46)