

Mechanical Engineering

Control engineering for HVAC systems SO713M

Norwegian title: Reguleringsteknikk fagrettet

Credits : 2 (6 ECTS credits)

Evaluation : Written test

Textbooks : Arvid Grindal: Reguleringsteknikk for ingeniøren (Control Engineering)

Subjects

- Basic control theory.
- Sensors and signal transmission.
- Sentral computer control.
- Electric motors.
- Electric wiring diagrams.
- HVAC - systems.

AUTOMATION ENGINEERING 1 SO221M

Norwegian title: Automatiseringsteknikk 1

Credits : 2 (6 ECTS credits)

Evaluation : Written test

Textbooks : P. Erlandsen: Digitale styringer, grunnlag
Erlandsen / Jakobsen: Prosessregulering, grunnlag
A. Hofstad: PLS-teknikk
Lecture Notes, Standards

Subjects

1. Logic control Systems. Boolean Algebra. Reduction of Logic Functions, Binary Logic Elements, Flip - Flops, Timers, Counters. Logic Symbols and Diagrams. Analysis and Synthesis of Combinative and Sequential Control Systems. Ladder Diagrams. Function Charts, PLC Programming.

2. Process Control. Block Diagrams, Instrumentation Symbols / Diagrams. PID Control Action, Controller Adjustments. Multivariable Systems, Cascade Control, Feedforward Control.

Automation engineering 2 SO415M

Norwegian title: Automatiseringsteknikk 2

Credits : 2 (6 ECTS credits)

Evaluation : Written test

Textbooks : P. I. Bye: Kompendium i PLS – teknikk.

Subjects

1. Continued course in combinative and sequential control systems and PLC-programming. Physical realization and testing of electronic and pneumatic control systems.

2. General electrotechnics. 1 phase and 3 phase. D.C, A.C. and stepper motors. Motor drives. Sensors and transducers. Measurement system.

Design of aluminium structures SV417M

Norwegian title: Aluminiumskonstruksjoner.

Credits : 2 (6 ECTS credits)

Evaluation : Written text

Textbooks : Tarald Rørvik: Aluminiumskonstruksjoner.
Innføring i material og konstruksjonslære.
Handbok 46. NBI 1997.
Dørum, Kalstad og Yttervoll:
Aluminiumskonstruksjoner. Studieveiledning.

Subjects

Production of alloys. Alloy designation system. Strain and heat hardening. Material properties. Connections. Welding. Design value of action. Partial safety factor. Elastic and plastic capacity by axial force, shear and bending. Resistance of compression members. Local buckling. Classification of cross sections. Lateral torsional buckling. Structural fire design. Fatigue of structures. Bolted and welding connections.

Design of HVAC-systems SO719M

Norwegian title: Vvs- prosjektering

Credits: 2 (6 ECTS credits)

Evaluation : Written test

Textbooks : Lecture notes

Subjects

- Computer aided design (AutoCAD, FastCAD)
- Thermal environmental engineering - system simulation
- Air handling units
- Duct system calculations
- Project/Quality management
- Contract law and contract administration
- Noise detection, calculation and prevention.

Dimensioning of steel structures SO416M

Norwegian title: Dimensjoneringsteknikk

Credits : 3 (9 ECTS credits)
Evaluation : Written test
Textbooks : A. Dørum: Utmatting av konstruksjoner.
A. Dørum: Oljehydraulikk.
Den Hartog: Advanced Strength of Materials.
L. Segerlind: The Finite Element Method.
Meriam/Kraige: Dynamics.

Subjects

1. General fatigue. Strain gauge measuring. Loads and load effects.
Fracture mechanics. LEFM. CTOD.
Crack growth. Paris equation.
Miner-Palmgren summation. Load spectra. SN-curves. Low cycle and high cycle.
Improving the fatigue strength of welded joints.
2. Mechanisms. Dynamics. Kinematics of rigid bodies. Rotation. Translation.
General plane motion. Curvilinear translations. Absolute motion. Relative motion.
Motion relative to rotating axes.
3. Oil hydraulics. Hydraulic theories. Hydraulic systems. Components. Project design.
Diagrams. Filtration and fluids.

Edb 2 / CAD 2 BV313M

Norwegian title: Edb 2/ Dak 2

Credits : 2 (6 ECTS credits)
Evaluation : No exam, passed / not passed
Textbooks : Dragseth / Erlandsen: DAK2 Compendium

Subjects

- AutoCAD + Inventor.
- 3D Drawings: User Coordinate System, Line Modelling, Surface Modelling, Solid Modelling and Rendering.
- Type of materials, Light exposure, Shadow effect and Plots.

Engineering thermodynamics 1 LO252M

Norwegian title: Teknisk termodynamikk 1

Credits: 2 (6 ECTS credits)
Evaluation : 3 written tests
Textbooks : Fundamentals of Engineering thermodynamics 3-ed SI-units, Moran/Shapiro.

Subjects

- Principles of Thermodynamics

Mechanical Engineering

- Mass and energy balance
- The Law's of Thermodynamics
- Thermodynamic cycles
 - Gas Power cycles
 - Vapour Power Cycles
 - Refrigeration and heat pump cycles
- Entropy

Engineering thermodynamics 2 LO253M

Norwegian title: Teknisk termodynamikk 2

Credits: 2 (6 ECTS credits)

Evaluation : 3 written test

Textbooks : Fundamentals of Engineering thermodynamics 3-ed SI-units, Moran/Shapiro.

Subjects

- Availability (exergy analysis)
- Heat Transfer
- Ideal Gas mixtures and psychrometrics
- Compressible flow through nozzles and diffusers
- Reacting mixtures and Combustion

Engineering thermodynamics LO251M

Norwegian title: Teknisk termodynamikk

Credits: 2 (6 ECTS credits)

Evaluation : 3 written tests

Textbooks : Fundamentals of Engineering thermodynamics 3-ed SI-units, Moran/Shapiro.

Subjects

- Principles of Thermodynamics
 - Mass and energy balance
 - The Law's of Thermodynamics
- Thermodynamic cycles
 - Gas Power cycles
 - Vapour Power Cycles
 - Refrigeration and heat pump cycles
- Entropy
- Heat Transfer
- Ideal Gas mixtures and Psychrometrics

Finite element methods BO400M

Norwegian title: Elemenetmetoder

Credits : 2 (6 ECTS credits)
Evaluation : Practical test by the computer
Textbooks : Supplementary literature
Algor tutorials

Subjects

Use of complete commercial program:

Algor. FEM used in structural design and other continuous field-problems, i.e. heat-transfer, fluid mechanics etc. Combining several element types. Meshing and FEM analysis of imported geometry. Stiffness matrix, boundary conditions.

Fluid mechanics SV723M

Norwegian title: Strømningsteknikk

Credits: 2 (6 ECTS credits)
Evaluation : Written test
Textbooks : Jan M. Øverli: Strømningsmaskiner, Bind 3
Compendium

Subjects

- Pumps:
- Total head, efficiencies and power demand. Dynamic similarity and specific speed. Parallel- and serial mounted systems.
- Compressors and turbines:
- Vapour Power Cycles. Gas Power Cycles.
- Fluid Mechanics and
- Thermodynamics for Turbomachinery.
- Axial Flow Turbines.
- Axial Flow Compressor.
- Centrifugal Turbines.
- Centrifugal Compressor.

Fluid power SO815M

Norwegian title: Fluidteknikk

Credits : 3 (9 ECTS credits)
Evaluation : Written test
Textbooks : Per I. Bye: Oljehydraulikk
Evensen/Ruud: Pneumatikk.
Generell innføring
Per I. Bye: Programmerbare logiske styresystemer

Subjects

Mechanical Engineering

- History and basic principles
- Fluids for hydraulic systems
- Hydraulic pumps, motors, and valves
- Hydraulic filters, accumulators, heat exchanger, fluid conductors and connectors
- Hydraulic system design
- Operation, Maintenance and Troubleshooting
- Electrohydraulic Servo Systems and Proportional Valve Systems
- Physical principles of pneumatic systems
- Logic Elements
- Sequential Circuit Design Basic Principles
- Air-intake system and distribution
- Valves and Actuators
- Programmable Controller
- Input / output and program processing
- Basic sequence instructions
- Step ladder instructions
- Functional instructions

Heating systems SO718M

Norwegian title: Oppvarmingsteknikk

Credits: 2 (6 ECTS credits)

Evaluation : Written test

Textbooks : L. I. Stensaas: Vannbaserte oppvarmings- og kjølesystemer.

Subjects

- Heat transmission calculations, NS 3031.
- Water heating systems in buildings.
- Expansion systems.
- Balancing of systems.
- Oil- and gas firing.
- District heating systems.
- System controls.
- Computer-calculations.

M CAD BV240

Norwegian title: DAK

Credits : 2 (6 ECTS credits)

Evaluation : No exam, passed / not passed.

Textbooks : Dørum: Øvingshefte DAK
and DAK2 Compendium

Subjects

Mechanical Engineering

AutoCAD: General 2D-Drawing Technique: Layers, Hatching, Dimensions, Blocks, Tolerances, Isometric Drawing and 2 ½ - D Drawing. 3D- Drawing: User Coordinate System, Line Modelling, Surface Modelling, Solid Modelling, Rendering and Plots.

Machine elements LO243M

Norwegian title: Maskindeler

Credits : 4 (12 ECTS credits)

Evaluation : Written test

Textbooks : Dørum, Arne:
Maskindeler 1
Dørum, Arne:
Maskindeler 2

Subjects

- Design of pressure vessels. Fatigue.
- Smith diagram.
- Pressure and shrinking connections.
- Belt drive. Shafts. Ball and roller bearings.
- Dimensioning of screws. Gear trains.
- Dimensioning of welded joints.
- SN-curves. Miner summation.
- Wedges and splines. Slide bearings. Joints. Brakes. Springs. Screw diagram.
- Capacity of pillars and beams.

Maintenance and availability SO816M

Norwegian title: Vedlikehold og driftssikkerhet

Credits : 3 (9 ECTS credits)

Evaluation : Written test

Textbooks : Per I. Bye: Vedlikehold og driftssikkerhet.

Subjects

- Maintenance in Context
- Establishing a Maintenance Plan and Schedule
- Maintenance Organisation and Strategy
- Dependability
- Failure Statistics
- Computerised and Manually Maintenance Documentation System
- Machine Condition Monitoring using:
 - Vibration Analysis
 - Thermodynamic Condition Monitoring
 - Oil Analysis
 - Non Destructive Testing (NDT)
- Cost analysis
- Life-cycle cost and life-cycle profit

Manufacturing and welding SO314M

Norwegian title: Bearbeiding og sveising

Credits : 2 (6 ECTS credits)
Evaluation : Written test
Textbooks : Rolstadås: Verkstedteknikk (2 chapters)
Halmøy: Sveiseteknikk

Subjects

- Operations research and production planning.
- Shielded Metal Arc and Submerged Arc Welding.
- Gas Metal Arc and Flux Cored Arc Welding.
- Gas Tungsten Arc and Plasma Arc Welding.
- Electroslag and Electrogas Welding.
- Resistance and Flash Welding.
- Oxyfuel Gas and Diffusion Welding.
- Electron Beam and Laser Beam Welding.
- Oxygen and Plasma Arc Cutting.
- Air Carbon Arc and Laser Beam Cutting.

Marin dynamics SIN 1015

Norwegian title: Marin dynamikk

Credits : 2,5 (7,5 ECTS credits)
Evaluation : Written test
Textbooks: Compendium and other teaching material will be delivered or announced during the lectures.

The students are doing their marine study at NTNU (Norwegian University of Science and Technology).

Subjects

Systems with one degree of freedom and modelling of continuous systems using generalized coordinates. Calculation of natural frequency for beams using differential equation and energy method. Calculation of forced response in time- and frequency-plane, modal superposition. Ship hull response and motions of typical offshore structures as floaters, pendulum towers and tension-leg platforms. Irregular waves and wave spectra. Short- and longtime statistics for waves. Use of transfer functions and statistics for response. Special dynamical effects from vortex shedding. Anchor line.

Mechanical Engineering

Marine design and marine engineering, basic course 1 SIN 0510

Norwegian title: Marin prosjektering- og maskinerikunnskap, grunnkurs 1

Credits : 2,5 (7,5 ECTS credits)

Evaluation : Written test

Textbooks: Compendium and other teaching material will be delivered or announced during the lectures.

The students are doing their marine study at NTNU
(Norwegian University of Science and Technology).

Subjects

Preparations to design work, use of theory and general methods. Design of machinery based on operation profile. Examples of arrangement and dimensioning of machinery. Mechanical and hydraulic power transmission.

Elementary introduction to electric power concepts and dimensioning of electric power system.

Stationary flow in pipes, types of pumps and their characteristics. Dimensioning of system for loading, unloading and bilge.

Forms of charter and splitting up of costs in marine freight. Comparison of solutions, analysis of sensitivity and optimization. Securing quality in marine industry, formulation of building specifications. Design as subjects, axioms in design.

Marine design and marine engineering, basic course 2 SIN 2005

Norwegian title: Marin prosjektering- og maskinerikunnskap, grunnkurs 2

Credits : 2,5 (7,5 ECTS credits)

Evaluation : Written test

Textbooks: Compendium and other teaching material will be delivered or announced during the lectures.

The students are doing their marine study at NTNU
(Norwegian University of Science and Technology).

Subjects

Total exploitation and economization of energy with a simultaneous demand for low pollution. Elementary introduction to heat transport and convection. Dimensioning of heat exchangers, evaporators and condensers.

Freeboard, subdivision and damage stability.

Methods of calculations of growth and costs.

Mass forces and balancing of rotors. Vibration systems with 1-6 degrees of freedom. Isolation of vibration.

Introduction to and use of computer programs for design and data bases of ships. Planning and implementation of tests for delivery and class.

Marine hydrodynamics and structures, basic course 1 SIN 1501

Norwegian title: Marin hydrodynamikk og konstruksjonsteknikk, grunnkurs 1

Mechanical Engineering

Credits : 2,5 (7,5 ECTS credits)
Evaluation : Written test
Textbooks: Compendium and other teaching material will be delivered or announced during the lectures.

The students are doing their marine study at NTNU
(Norwegian University of Science and Technology).

Subjects

Basic potential flow and linear waves. Wave forces on fixed and floating structures. Motion of floating structures.

Buckling of columns. Structural arrangement and mode of operation for truss platforms and floating platforms. Criteria of dimensioning, rules and regulations.

Marine hydrodynamics and structures, basic course 2 SIN 1010

Norwegian title: Marin hydrodynamikk og konstruksjonsteknikk, grunnkurs 2

Credits : 2,5 (7,5 ECTS credits)
Evaluation : Written test
Textbooks: Compendium and other teaching material will be delivered or announced during the lectures.

The students are doing their marine study at NTNU
(Norwegian University of Science and Technology).

Subjects

Structural mode of operation, analysis of load effects and dimensioning of ships and platforms: Wave loads and motions of ship in waves. Analysis of plates, shells and membranes. Stress analysis of ships and platforms. Criteria for dimensioning against buckling and fatigue.

Marine technology 1 SIN 0501

Norwegian title: Marin teknologi 1

Credits : 2,5 (7,5 ECTS credits)
Evaluation : Written test
Textbooks : Compendium and other teaching material will be delivered or announced during the lectures.

The students are doing their marine study at NTNU
(Norwegian University of Science and Technology)

Subjects

Information about shipping, oil activities

and fisheries, significance for economics and employment. Historical traits of development, the influence of disasters on rules and regulations. Rules given by official directorates and classification societies. Description of systems, considerations on lifetime, reference models, functional requirements, planning models. Technical drawing, sketches, CAD. Hydrostatic calculations, coefficients of form. Intact stability, metacentre, inclining experiment, trim. Stability at large angles, GZ-curves. Effect of shifting of loads on stability. Freesurface effect. Resistance and propulsion, model testing, ship trials.

Marine technology 2 SIN 1001

Norwegian title: Marin teknologi 2

Credits : 2,5 (7,5 ECTS credits)
Evaluation : Written test
Textbooks : Compendium and other teaching material will be delivered or announced during the lectures.

The students are doing their marine study at NTNU
(Norwegian University of Science and Technology).

Subjects

Description of hull constructions and technical drawings for building of the hull. Loading on a ship, hull girder, shearing force and bending moment. Basic construction mechanics, analysis of beams, trusses and grillages using the unit-load method. Analysis of cross sections: stresses, torsion and shear lag effects. Dynamical stability. Damage stability. Description and analysis of machinery for propulsion and auxiliary systems. Stages and profiles of operation. Basic formulas for power, heat exchange, balances of energy and dynamics with rotation.

Marine technology 3 SIN 2001

Norwegian title: Marin teknologi 3

Credits : 2,5 (7,5 ECTS credits)
Evaluation : Written test
Textbooks: Compendium and other teaching material will be delivered or announced during the lectures.

The students are doing their marine study at NTNU
(Norwegian University of Science and Technology).

Subjects

Types of propulsors, geometry, theory of flow and description of model testing. Factors and parameters having influence on propulsion. Hull efficiency. Steering and manoeuvring. The displacement method, equilibrium of nodal points. Matrix methods of analysis of frames and steel platforms.

Mechanical Engineering

Basic system theory on reliability and security, introduction to concepts and definitions. Relation to probability. System-models, system-structures and network of reliability. Consideration on availability, operation break and economy. Survey of methods for judgment of security and hazards.

Material and production planning, logistics SO814M

Norwegian title: Material- og produksjonsstyring (MPS)

Credits : 2 (6 ECTS credits)

Evaluation : Written test

Textbook: ”Logistikk for konkurransekraft”
Gøran Persson og Helge Virum, ad Notam Gyldendal 1995

Subjects

- The sceem of logistic.
- Distribution, transportation and storage.
- The distribution work.
- Prognosis and the planning of storage and production.
- Material- and production planning
- MRP. (MRP II)
- OPT
- JIT (Toyota production system-TPS)
- Logistics and purchase/bargain activities.
- Visions, goals, strategies and quality control in logistic work.

Materials science LO142M

Norwegian title: Materiallære

Credits : 3 (9 ECTS credits)

Evaluation : Written test

Textbooks : Almar-Næss:
Metalliske materialer
Compendiums

Subjects

- Overview construction materials.
- Destructive and non-destructive tests.
- Metallographic structures and properties of materials.
- Strength, plastic deformation, hardness and fracture.
- Phase Diagrams.
- Iron, steel, carbon steel and stainless steel.
- Copper, Brass and Bronze.
- Aluminium and alloys.
- Magnesium and alloys.
- Titanium and alloys.

Mechanical Engineering

- Plastic materials.
- Ceramics.

Mechanics LO107M

Norwegian title: Mekanikk

Credits : 3 (9 ECTS credits)

Evaluation : Written test

Textbooks :Fridtjov Irgens: Statikk, 6th ed. Tapir 2000.
Fridtjov Irgens: Fasthetslære 6th ed. Tapir –1999

Alternatively:

J. L. Meriam, L. G. Kraige:

Engineering Mechanics

Statics. SI version 4th ed. Wiley 1998.

Gere & Timoshenko:

Mechanics of materials 4th ed. PWS Publishing Company 1997

Subjects

Statics:

Basic Concepts in Mechanics. Concurrent Forces. Two-Dimensional Force Systems. Equilibrium. Structures. Cables and Ropes. Shear Force and Bending Moment. Parallel Forces.

Mass Centre. Centroids and Moments of Inertia of Plane Areas.

Strength of Materials:

Analysis of Stress and Strain. Elastic Materials. Torsion. Stresses in Beams. Deflections of Beams. Statically Indeterminate Structures. Buckling.

Operation technology, basic course SIN 2010

Norwegian title Driftsteknikk, grunnkurs

Credits : 2,5 (7,5 ECTS credits)

Evaluation : Written test

Textbooks: Compendium and other teaching material will be delivered or announced during the lectures.

The students are doing their marine study at NTNU
(Norwegian University of Science and Technology).

Subjects

Structure of the maintenance organization including maintenance systems and strategies. Failure mechanisms and operational disruption and degradation processes in ship hull and machinery systems. Consequences for system efficiency, safety, environment and costs. Optimization of operation by utilising condition monitoring and various inspection techniques. The theoretical basis including statistics and reliability, for the concept "Reliability centred maintenance – RCM". Hazard and operability analysis, administration of safety work.

Piping systems SV708M

Norwegian title: Rørsystemer

Credits : 2 (6 ECTS credits)

Evaluation : Written test

Textbooks : Åge Ø. Waløen m/fl.: Kompendium i konstruksjon av rørsystemer.
Supplementary papers.

Subjects

- Principles of Piping Design
- Plan and Isometric Drawing
- Pipes and Fittings
- Process Equipment
- Stress and Strain Calculation
- Use of complete commercial program: Algor

Production and quality engineering SO414M

Norwegian title: Verkstedteknikk med kvalitetsteknikk

Credits : 3 (9 ECTS credits)

Evaluation : Written test

Textbooks : Hågeryd L., Bjørklund S., Lenner M.:
Moderne Produksjonsteknikk, del 1 og 2

Subjects

- Introduction to production engineering.
- Product development and production.
- Choice of production technology.
- Measurement and measuring methods.
- Quality inspection.
- Metal cutting-, turning-, milling-, and grinding processes.
- Cutting fluids.
- Laser-, water jet-, and abrasive jet cutting.
- Electro chemical-, electrical discharge-, and electron beam machining.
- Industrial robots.
- CNC equipment and programming.
- Directive of machinery.

Quality management SO812M

Norwegian title: Kvalitetsstyring

Credits : 2 (6 ECTS credits)

Evaluation : Written test

Textbooks : Asbjørn Aune, "Kvalitetsdrevet ledelse, Kvalitetsstyrte bedrifter"

Gyldendal 2000

Subjects

Quality definitions and quality work. (ISO-8402)
Quality: -cost,-improvement, -prices, -systems, -documentation
ISO-9000, system and certification. Certification and revision process.
Fail mechanism in technical equipment.
Reliability measuring and calculation.
FTA, FMECA, RCM.
Quality management of reliability and safety.
Safety demands, causes and protections for accidents.
Health, environment, safety (HMS)

Refrigeration systems SO721M

Norwegian title: Kuldeteknikk

Credits : 2 (6 ECTS credits)
Evaluation : Written test
Textbooks : Given at Lecture Start

Subjects

- Principles of refrigeration
- Vapour compression systems
- Mass and energy balances
- Plant-capacity-and losses
- Effects of varying running conditions
- Components in refrigeration plants
- Cooling-load calculations
- Refrigerants and Carriers
- Basic controls

Sanitary engineering SV712M

Norwegian title: Vann og avløpsteknikk

Credits: 2 (6 ECTS credits)
Evaluation : Written test
Textbooks : Institutt for vassbygging, NTH: Grunnkurs i VAR-teknikk 1 og 2.

Subjects

Dimensioning of main water pipes and sewage and drainage pipes.
Water reservoir, elevated basin, pumps and pump systems.
Treatment plant for fresh water and sewage disposal plants.

Sanitation SO724M

Norwegian title: Sanitærtetnikk

Mechanical Engineering

Credits: 2 (6 ECTS credits)

Evaluation : Written test

Textbooks : L. I. Stensaas: Sanitærteknikk

Subjects

- Basic laws of flow in filled and partly filled pipes.
- Dimensioning of water pipes and sewers in buildings.
- Hot water supply systems.
- Pumping systems for fresh water and for drainage water.
- Short course in surveying.
- Designing a complete plant.

Service and operation of machinery systems SV805M

Norwegian title: Operasjon og drift av maskinsystemer

Credits: 2 (6 ECTS credits)

Evaluation : Written test

Textbooks : G. Fiskaa: Operasjon og drift av maskinerisystemer (1997)
(Operation and service of machinery systems.)

Subjects

Typical operational damages, failure modes and failure effects experienced in different machinery systems.

Methods for detection and reduction of the extent of operational problems and damages.

The importance of operational loads, operational modes and system condition for the occurrence of damages.

Condition monitoring methodology and equipment for diesel engines, gas turbines, steam plants, boilers, pumps and compressors.

Operational demands on the quality of fuel and lubricating oils, fuel and lubricating oil treatment and analysis.

Effects from the condition of auxiliary systems on the operational economy and safety for the total system.

Environmental effects from various machinery systems.

Technical drawing / cad LO236M

Norwegian title: Teknisk tegning/ dak

Credits: 2 (6 ECTS credits)

Evaluation : Written test

Textbooks : Lundkvist og Øien: Maskintegning
Bergland: Tegneøvinger
Dørum: Øvingshefte DAK

Subjects

Drawing rules after Norwegian Standard (ISO). Tolerances.

Mechanical Engineering

Surface roughness. Form and position. Isometric drawing.
Introduction to CAD. (AutoCAD) Commands. Technical drawing.
Prototype drawing. Building of library.
Isometric and 3D-drawing.

Thesis PO795M

Norwegian title: Hovedprosjekt

Credits : 5 (15 ECTS credits)
Evaluation : Written test

Subjects

- The objective of the diploma is to train the student in scientific methods and research.
- The students work in groups of 2 or 3 and thus get used to groupwork.
- Evaluation is based on a written report.

Thesis PO796M

Norwegian title: Hovedprosjekt

Credits : 6 (18 ECTS credits)
Evaluation : Written test

Subjects

- The objective of the diploma is to train the student in scientific methods and research.
- The students work in groups of 2 or 3 and thus get used to groupwork.
- Evaluation is based on a written report.

Thesis PO797M

Norwegian title: Hovedprosjekt

Credits : 4 (12 ECTS credits)
Evaluation : Written test

Subjects

- The objective of the diploma is to train the student in scientific methods and research.
- The students work in groups of 2 or 3 and thus get used to groupwork.
- Evaluation is based on a written report.

Ventilating systems in buildings SO725M

Norwegian title: Ventilasjonsteknikk

Credits : 4 (12 ECTS credits)
Evaluation : Written test

Mechanical Engineering

Textbooks : L. I. Stensaas: Ventilasjonsteknikk Teknisk Forlag: Ventilasjon Ståbi

Subjects

- Principles of heat and mass transfer.
- Ventilating process in hx-diagram.
- Basics of physiologi. Indoor environmental technologi.
- Indoor climate engineering.
- Duct system calculations.
- Acoustics in ventilating systems.
- Capacity calculations - HVAC.
- Air flow in ventilated rooms.
- Components in indoor climate systems.
- Computer-calculations.
- Industrial ventilation.