

Food Technology, HiST

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Applied physics FO105N

Norwegian title: Anvendt fysikk

Credits: 6 ECTS credits
Evaluation: Written examination
Textbooks: Brady, J. E. (2004) *Generell kjemi, Grunnlag og prinsipper* (2nd ed.). Trondheim: Tapir Akademisk Forlag. ISBN 82-519-1579-1 (in Norwegian) (It is possible to use the English version of James E. Brady's *General Chemistry*.) Other textbooks will be specified at the beginning of the module.

Objective

The module aims to introduce students to basic physical principles and calculations with physical units. The module provides a fundament for understanding technological processes and the principles of measurements involved in food processing.

Content

Energy, power and physical units; Heat, heat capacity and phase transitions; Moist air, ventilation and air conditioning; Thermodynamics: Temperature expansion, ideal gases, thermal properties of solids, liquids and gases; Osmosis; Radiation and radioactivity; Nature of light, geometrical optics, polarization, spectra and spectroscopy; Electrical technology.

Biochemistry with biotechnology FO220N

Norwegian title: Biokjemi med bioteknologi

Credits: 6 ECTS credits
Evaluation: Written examination
Textbook: Champe, P. C., Harvey, R. A., and Ferrier, D. R. (2005) *Biochemistry* (3rd ed.). USA: Lippincott Williams and Wilkins.

Content

The module gives a theoretical basis of fundamental biochemical reactions, which are common to all living organisms. This gives a fundament to understand and solve all problems connected to the biochemical reactions involved when food are stored and/or processed. The module also gives a general understanding of biotechnology and biotechnological methods used in the food industry. Future aspects in these fields are also discussed.

Enzymes and Coenzymes; Metabolism of Carbohydrates and Lipids; Regulation of Metabolism; Nucleic Acids, Genetics and Biosynthesis of Proteins; Blood, Hormones, Immune system; Photosynthesis

Business Economics FO251N

Norwegian title: Bedriftsøkonomi

Credits: 6 ECTS credits
Evaluation: Written examination
Textbook: Banken, K. and Nyhuus, E. M. (1999) *Innføring i bedriftsøkonomi*. Oslo: Cappelen Akademisk Forlag

Objective

To give an understanding of economic methodology in business. The module gives a basic understanding of economic theory as a foundation for planning and control. The students will learn useful methods to evaluate the economic consequences of different initiatives in industry.

Content

Elementary cost accounting and balance sheet; Analysis of account; Expense; Demand; Elasticity of demand; Marginal cost; Market theory; Price discrimination; Product costing; Contribution ratio analysis; Bottleneck; Investment appraisal; Capitalization and financing; Financial management; Planning and budgeting.

Dissertation Project HO301N

Norwegian title: Hovedprosjekt

Credits: 6 ECTS credits
Evaluation: Dissertation and oral presentation of the work
Textbook: Høgskolen i Sør-Trøndelag, Matteknologisk utdanning (2006)
Veiledningshefte for hovedprosjekt. Trondheim: Tapir Akademisk Forlag, Kompendieforlaget

Minimum entry requirement: 102 credits

Objective

The dissertation project will give the students an opportunity to gain a multi-disciplinary view of food science. The students shall obtain skills in project planning and carrying out laboratory analysis and/or product development and/or production planning. By working in groups and being in close contact with external or internal collaborators, the students will acquire abilities in co-working and professional communication.

Content

Project planning theory, academic writing, reference search, and statistics.

Food Hygiene FO320N

Norwegian title: Hygiene

Credits: 6 ECTS credits
Evaluation: Written examination
Textbooks: Granum, P. E. (red) (1999) *Smittsomme sykdommer fra mat*. (2nd ed.) Kristiansand S: Høyskoleforlaget AS.
Karlsen, H. (2006) *Sentrale emner i næringsmiddelhygiene*. Trondheim: Tapir Akademisk Forlag, Kompendieforlaget

Content

Laws and regulations; Foodborne infections and intoxications; Personal hygiene; Other hazards in food; Water - supply, quality and treatment; Hygienic principles of food production and processing; Hygienic principles of structure and layout of food premises and equipment;

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Hygienic principles of storage, transport and retailing; Cleaning and disinfection; Environmental hygiene relating to the food industry; Hazard Analysis Critical Control Point (HACCP).

Food Introduction Project FO180N

Norwegian title: Matprosjekt

Credits: 6 ECTS credits
Evaluation: Report and oral presentation
Textbook: No reading list is given.
The students compile a curriculum of reference literature.

Objective

To introduce the students to food technology by an applied approach, through exercises, lectures and a written assignment on a given topic (related to products in the retail trade).

Content

Basic food technology related to the practical exercises and the written assignment; Practical teamwork.

Food Technology – Fish, Meat and Unit Operations FO350N

Norwegian title: Matteknologi – fisk, kjøtt og enhetsoperasjoner

Credits: 10 ECTS credits
Evaluation: Written examination
Textbooks: Lynum, L. (1996) *Fisk som råstoff* (2nd ed.). Trondheim: Tapir Forlag.
Lynum, L. (2005) *Videreforedling av fisk*. Trondheim: Tapir Forlag.
Hemmer, E. (1997) *Kjøtt-teknologi*. Trondheim: Tapir Forlag.

Objective

The module aims to introduce students to food processing technology that fall within the meat and fish industry. The theoretical basis of ingredients and of unit operations and equipment for fish and meat processing are described.

Content

Knowledge about ingredients from fish and meat; Processing of the main kinds of fish and meat products produced in Norway; Technological processing and how to plan and evaluate different processes; Packing and labelling; Preservation and storage; Law and regulations.

Food Technology – Milk, Vegetables and Unit Operations FO360N

Norwegian title: Matteknologi – melk, vegetabler og enhetsoperasjoner

Credits: 10 ECTS credits
Evaluation: Written examination
Textbooks: Nybraaten, G. and Mehli, L. (2007) *Vegetabilteknologi*. HiST compendium.

Nielsen, E. W. (2001) *Mælkekemi*. Odense: Erhvervsskolernes Forlag.
Nielsen E. W. and Ullum, J. A. (2004) *Mejerilære 2*(5th ed.). Odense: Erhvervsskolernes Forlag.
Tetra Pak Processing Systems AB (2003) *Dairy Processing Handbook* (2nd ed.). Lund, Sweden: Tetra Pak Processing Systems AB. ISBN 91-631-3427-6
Fellows, P. J. (2000) *Food processing technology: Principles and practice*. (2nd ed.) Cambridge: Woodhead Publishing Limited and CRC Press LLC. ISBN 1-85573-533-4

Content

Knowledge about ingredients from milk and vegetables.

Processing of the main kinds of food produced in Norway; Technological processing and how to plan and evaluate different processes; Packing and labelling; Preservation and storage; Law and regulations.

General Chemistry FO120N

Norwegian title: Generell kjemi

Credits: 9 ECTS credits

Evaluation: Written examination

Textbook: Brady, J. E. (2004) *Generell kjemi, Grunnlag og prinsipper* (2nd ed.). Trondheim: Tapir Akademisk Forlag. ISBN 82-519-1579-1 (in Norwegian)
(It is possible to use the English version of James E. Brady's *General Chemistry*.)

Content

Atomic theory, the periodic table, electronegativity and molecular shapes. Orbital theory and chemical bonding. Thermodynamics and chemical reaction mechanisms. Stoichiometry. Chemical equilibrium, acids - bases, pH and buffers. Electrochemistry. The chemistry of water.

Management and Organisation Theory FO340N

Norwegian title: Organisasjon og ledelse

Credits: 6 ECTS credits

Evaluation: Written examination

Textbook: Omholt, K. and Nesse, J. G. (1995) *Mennesker, organisasjon og ledelse* (2nd ed.). Oslo: Universitetsforlaget.
Set papers.

Content

Organisation Theory; Organisation Models; Leadership and Management; Personnel Management; Personnel Planning; Company Law and Formation

Marketing/International Marketing FV300N

Norwegian title: Markedsføring, eksportmarkedsføring

Credits: 6 ECTS credits
Evaluation: Written examination
Textbook: -

Content

Introduction to marketing in organisations and society; The marketing environment; Marketing planning; Buying Behaviour in the consumer and in the business markets; Market segmentation; Marketing strategy; The Marketing mix; Ethics in marketing; International marketing; Excerpts of company funding and financial analysis

Mathematics FO101N

Norwegian title: Matematikk

Credits: 9 ECTS credits
Evaluation: Written examination
Textbook: Oldervoll, T., Orskaug, O. and Vaaje, A. (2003) *SINUS for ettårig forkurs, ingeniørutdanning og maritim høyskoleutdanning*. Oslo: Cappelens Forlag.

Objective

The module aims at the use of calculus for analysis of practical problems. This covers mathematical modelling and extraction of quantitative information in actual situations. Examples are taken from special subjects at the school.

Content

Real numbers, exponents and logarithms, inequalities and equations; Functions with one variable; Exponential-, power- and logarithmic functions; Introduction to trigonometry; Differentiation and integration; Elementary statistics

Microbiology 1 FO150N

Norwegian title: Mikrobiologi 1

Credits: 6 ECTS credits
Evaluation: Written examination
Textbook: Madigan, M. T. and Martinko, J. M. (2006) *Brock: Biology of Microorganisms* (11th ed.). Upper Saddle River, New Jersey: Pearson Prentice Hall, Pearson Education International.
Karlsen, H. (2007) *Hygiene for Mikrobiologi 1*. Trondheim: HiST compendium.

Objective

The module aims to introduce students to microorganisms. Applied work in the laboratory will be an important part of the module.

Content

The cell biology of microorganisms; A survey of bacteria, fungi and viruses; Microbial nutrition and preparation of culture media; Cultivation of microorganisms; Foodborne diseases and spoilage of food; Hygiene; Control of microbial growth

Microbiology 2 FO330N

Norwegian title: Mikrobiologi 2

Credits: 6 ECTS credits
Evaluation: Written examination
Textbooks: Madigan, M. T. and Martinko, J. M. (2006) *Brock: Biology of Microorganisms* (11th ed.). Upper Saddle River, New Jersey: Pearson Prentice Hall, Pearson Education International.
Frøyen, O. J. (2006) *Matmikrobiologi*. Trondheim: Tapir Akademiske Forlag, Kompendieforlaget.

Content

Microbial metabolism; Microbial genetics; Infections and defences against infections; The taxonomy of bacteria and fungi in foods; Enumeration of microorganisms in food; Effects of extrinsic and intrinsic factors on microorganisms in food; Microbial spoilage of foods

Nutrition FO211N

Norwegian title: Ernæring

Credits: 6 ECTS credits
Evaluation: Written examination (70 %) and a personal dietary survey (30 %)
Textbooks: Whitney, E. and Rolfes, S. H. (2005) *Understanding Nutrition* (10th ed.). USA: Thomson Wadsworth
Den store matvaretabellen (2001, 2nd ed.). Oslo: Gyldendal Undervisning. ISBN 82-05-28499-7 (*Norwegian Composition of Food*)
Selected parts of *Nordic Nutrition Recommendations 2004*. ISBN 92-893-1062-6

Content

The module gives a general knowledge of the nutritive influence on health, the responsibility of the food industry to follow the national nutritional policy, and the basics of nutrition research.

Topics:

Norwegian and Mediterranean diet and food habits; Digestion, the interactions of metabolism; The nutrients, nutritional evaluation of diets and products, of fat- and protein-quality; Energy and weight control; Life cycle and activity; Nutrition and diet related diseases: diabetes, atherosclerosis, food-allergy and -intolerance, allergy hygienics; Discussion of current interest (e.g. antioxidants, food-additives)

Immunologic laboratory exercise (4 h) and individual food survey (3 days)

Organic Chemistry and Food Chemistry FO130N

Norwegian title: Organisk kjemi og matkjemi

Credits: 9 ECTS credits

Evaluation: Written examination

Textbooks: Hart, H., Craine, L. E., Hart, D. J. and Hadad, C. M. (2007) *Organic Chemistry, a short course*, (12th ed.). Boston: Houghton Mifflin Company
Nybraaten, G. (2004) *Næringsmiddelkjemi*. Trondheim: HiST compendium.

Content

Nomenclature of organic compounds; Hybrid orbitals and resonance structures; The main functional groups - their properties and reaction patterns; Reaction mechanisms (addition, elimination, substitution and radical reactions); Stereoisomerism; Carbohydrates; Amino acids and proteins; Browning reactions; Lipids and Rancidity; Colours and flavours

Practice FO200N

Norwegian title: Praksis

Credits: 30 ECTS credits

Textbooks: No reading list is given.
The trainee compiles a curriculum of relevant reference literature for the reports.

Duration: Six months as a trainee in the Food industry, Laboratory or Food Research

Objective

The trainee will

- acquire knowledge of production processes, and understand the connection between theory and practice
- learn to understand how different departments of the establishment work together
- learn to work within a group of people in real life situations

Content

The trainee takes part in the daily work at different departments/situations in the company according to a given schedule. The trainee has to present 6 written reports on subjects from his or her work experience during these six months of practicing.

Preservation technology FO140N

Norwegian title: Konserveringsteknologi

Credits: 6 ECTS credits

Evaluation: Written examination

Textbooks: Fellows, P. J. (2000) *Food processing technology: Principles and practice*. (2nd ed.) Cambridge: Woodhead Publishing Limited and CRC Press LLC. ISBN 1-85573-533-4

Objective

The module aims to introduce students to food processing technology. The theoretical basis of unit operations and the equipment is described and effects of unit operations on food quality are discussed.

Content

Food preservation and processing technology: Blanching, pasteurisation, heat sterilisation, drying, freeze drying, freezing, chilling, chemical preservation, fermentation, irradiation, frying, baking, roasting, extrusion, modified- and controlled atmosphere packaging and storage, and packaging.

Process Technology FO173N

Norwegian title: Prosessteknologi

Credits: 9 ECTS credits

Evaluation: Written examination

Textbooks: Tetra Pak Processing Systems AB (2003) *Dairy Processing Handbook* (2nd ed.). Lund, Sweden: Tetra Pak Processing Systems AB. ISBN 91-631-3427-6
Other textbooks will be specified at the beginning of the module.

Objective

The module aims to give students basic knowledge of general processes for the production of food through topics from physics, chemical engineering, and regulation technology. The module aims to prepare the students for the practice period.

Content

Fluid-mechanics, sedimentation, centrifugation, pumps, heat transfer, heat exchangers, thermodynamics, refrigerating engineering, heat pumps, thermal engineering, control engineering, materials technology.

Quality Control and Internal Control FV301N

Norwegian title: Kvalitetsstyring og internkontroll

Credits: 6 ECTS credits

Evaluation: Written examination

Textbooks: Hannisdal, A. (2006) *Kvalitetsstyring og internkontroll i næringsmiddelindustrien*. Trondheim: HiST compendium.

Objective

The module will give an introduction to systematic work with quality control and quality assurance in the food industry.

Content

Quality assurance; Standards and public regulations; Certification, accreditation and quality audits; Document system and quality manual; Purchasing; Quality control, traceability, nonconformity and corrective action; Quality costs; Internal control and quality assurance in the food industry; Quality improvement; Environmental management

Sensory Evaluation FO230N

Norwegian title: Sensorisk analyse

Credits: 4 ECTS credits
Evaluation: Assessed coursework
Textbook: Lawless, H. T. and Heymann, H. (1999) *Sensory Evaluation of Food. Principles and Practices*. New York: Kluwer Academic/Plenum Publishers. ISBN 0-8342-1752-X.
Lecture notes.

Content

Sensory perception; Evaluation techniques; Selection; Training and monitoring of assessors; General test conditions; Sensory analysis in quality control, research and product development; Statistic interpretation of sensory analysis results.
3-4 students work in groups, designing and administrating a sensory analysis on a given product. The report, including theory and the planning of the analysis, comprise the term report.

Statistics FO242N

Norwegian title: Statistikk

Credits: 8 ECTS credits
Evaluation: Written examination
Textbook: Løvås, G. G. (2004) *Statistikk - for universiteter og høyskoler* (2nd ed.) Oslo: Universitetsforlaget. ISBN 82-15-00224-2

Content

Basics in descriptive statistics probability theory, random variables, probability models, expectation and variance, discrete models such as binomial-, Poisson- and hypergeometric distribution, continuous distributions such as the normal distribution and the Student's t-distribution, estimation, confidence interval, testing hypotheses, correlation and linear regression. Briefly about chi-square testing, analysis of variance and process control with Shewharts chart. Exercises in statistical software (Excel).