



**NTNU**  
Norges teknisk-naturvitenskapelige  
universitet

**MASTER OF SCIENCE**

# **DEGREE PROGRAMMES**

## **2000 - 2001**

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Note to the English translation

If there is a discrepancy between the Norwegian original text and this English translation, the Norwegian text is the authoritative version.

## **EXTRACTS FROM ACT OF 12 MAY 1995 RELATING TO UNIVERSITIES AND COLLEGES**

### **§42. EXCLUSION**

1. A student who despite written warning by the Board repeatedly behaves in a manner which seriously disturbs the work of fellow students or other activities at the institution can be excluded by the Board from specific parts of the institution for up to one year. If a student after receiving a written warning from the Board continues not to respect such exclusion, the Board can exclude him or her from the course of study for up to one year.
2. A student who has behaved in such a seriously culpable manner as to endanger the life or health of patients, clients, kindergarten children, pupils, or others with whom the student comes into contact in connection with clinical or practical training, or who in relation to them commits serious breaches of the obligation to observe secrecy or behaves with grave impropriety towards them, can on the decision of the Board be excluded from the course of study for up to three years.
3. A student who has behaved as described in subsections 1 and 2 of § 54 can on the decision of the Board be excluded from the institution and deprived of the right to take examinations at institutions under this Act for up to one year. The Ministry issues more detailed routines concerning information routines etc.
4. A decision to exclude a student requires at least a two-thirds majority. The student can appeal against such a decision according to the rules in the Public Administration Act. The Ministry is the appeal body.
5. The student is entitled to seek the assistance of a lawyer or other spokesman from the time when the question of exclusion is raised, or in the event from the time when the first written warning was given. The cost of such assistance is to be met by the institution.

### **§50. EXAMINATIONS AND MARKING**

1. The Board shall see that students' knowledge and skills are tested and assessed in an impartial and academically reliable way. Assessment shall also safeguard the academic standards of the course of study in question.
2. The Board or, as the Board shall decide, the Department concerned appoints examiners for examinations, tests, assessments of assignments or other assessments the results of which are entered on the certificate or included in the mark given for the course of study in question. Each candidate shall be assessed by at least two examiners, of whom at least one shall be external. The Board can make exceptions to the provision in the previous period in connection with the holding of a given examination if it is not possible to provide a qualified external examiner, or in connection with the assessment of practical training or the like.
3. The oral parts of examinations and tests shall be public unless regard for the examination or test arrangements indicates otherwise. The Board can make exceptions to the rule about public examinations in particular cases at the request of the examination candidate concerned when there are pressing reasons for doing so.
4. Marks shall be made known within three weeks unless for special reasons more time is required. The Board can make exceptions in respect of particular examinations and can in temporary regulations according to subsection 6 set a longer time limit when it is not possible to provide the number of qualified examiners required to complete the marking within three weeks. The Board can in a regulation according to subsection 6 set a longer time limit for dissertations and similar extensive written work.
5. New assessments according to subsection 2 of § 51 and subsection 4 of § 52 shall be carried out by new examiners. Marks can be changed in the appellant's favour and disfavour. If the final mark is set on the basis of both a written examination and an oral test, and an appeal against a mark for the written part of the examination is upheld, a new oral test shall be held to determine the final mark.
6. The Board issues regulations governing the taking and arrangement of examinations and tests, including the conditions for retaking an examination or test or for permission to retake practical training, and rules concerning registration and the conditions for registration for examinations. Where professional training

courses are concerned for which national framework plans have been laid down according to subsection 2 of § 46, the regulations must be based on the general provisions concerning examinations and assessment contained in the framework plan. The Board can delegate the issuing of supplementary rules concerning special circumstances relating to particular examinations to individual Departments.

#### **§51. COMPLAINTS OF PROCEDURAL ERRORS AT EXAMINATIONS**

1. A candidate who has taken an examination or test can complain of procedural errors within three weeks of the date when he or she became or should have become aware of the circumstance on which the complaint is based. Such complaints are ruled on by the Board or by the Board's Appeals Committee on behalf of the Board.
2. If an error was committed which can have affected the student's performance or its assessment, the mark shall be rescinded. If the error can be corrected by remarking the papers submitted, they shall be remarked. Otherwise a new examination shall be held with new examiners. The mark awarded in a second assessment according to the present section can be appealed against according to the rules in § 52.
3. If a request for reasons for or an appeal against a mark has been submitted, the time limit for an appeal according to this section is reckoned from the date when the student receives the explanation or when the appeal is finally ruled on.
4. If the Board or the Board's Appeals Committee finds that formal errors were committed and that this can reasonably be supposed to have affected the performance of one or more candidates or the assessment of that performance, the decision can be taken to carry out a new assessment or to hold a new examination or test.

#### **§52. EXPLANATIONS OF AND APPEALS AGAINST MARKS**

1. A student is entitled to an explanation of the marks awarded for his or her performance. At oral examinations or assessments of practical skills, a request for such an explanation must be made immediately on notification of the mark. Requests for explanations of other assessments must be submitted within one week after the candidate learned of the mark, but never more than three weeks after the announcement of the mark.
2. Explanations shall normally be given within two weeks after the candidate requested them. They shall state the general principles on which the assessment was based and explain the assessment of the candidate's performance. Explanations can be given orally or in writing at the examiner's discretion.
3. If written guidelines for assessments have been issued, they shall be available to students after the marks have been decided.
4. A student can appeal in writing against a mark awarded for his or her performance within three weeks of the announcement of the examination results. The performance shall then be reassessed. If a request for an explanation of a mark or a complaint of errors in the question-setting, the examination procedure or the assessment procedure has been made, the time limit for appeals according to this section is reckoned from the date when the student receives the explanation or when the appeal is finally ruled on.
5. Appeals cannot be lodged against marks awarded for oral performances or against other assessment which because of the nature of the test can not be reviewed. Appeals against marks for preliminary examinations can only be lodged by candidates who did not pass. Appeals cannot be lodged against marks set following new assessments according to this section.

#### **§54. ANNULMENT OF EXAMINATIONS OR TESTS**

1. The Board can annul an examination or test or approval of a course if the student
  - a. obtained admission to the examination or test by using a false certificate or by other dishonest means, or
  - b. cheated or attempted to cheat in the course of or prior to the final assessment of the examination or test concerned, or while taking the course in question.
2. The Board can annul credit for or approval of a course of education, or exemption from an examination or test, if the student obtained it by using a false certificate or by other dishonest means.
3. Annulment decisions according to subsection 1 or 2 can be appealed to the Ministry or to a special appeals body appointed by the Ministry.
4. The right to annulment has no time limit.

5. An annulment decision entails an obligation to return any certificates or mark transcripts to the institution. If such certificate or mark transcript is not returned to the institution at the proper time, the institution can obtain the assistance of the court of execution to secure its return, in accordance with the rules in Chapter 13 of the Act relating to the Enforcement of Claims.
6. If the certificate can form the basis of authorisation for the exercise of a profession or trade, the institution shall notify the authority concerned of the annulment.
7. Other institutions under the present Act can be informed of the annulment of an examination or test. The Ministry issues more detailed rules concerning information routines etc.

# REGULATIONS FOR THE MASTER OF SCIENCE PROGRAMMES IN TECHNOLOGICAL STUDIES AT THE NORWEGIAN UNIVERSITY OF TECHNOLOGY AND SCIENCE (NTNU)

Approved by the Senate on 27 April 1999 Effective as of the academic year 1999/2000

## General

Students taking a Master of Science degree programme in technological studies at NTNU are to comply with the Examination Regulations at NTNU (approved by the Senate on 19 June 1997) and the Regulations for the Degree of sivilingeniør at NTNU (approved by the Senate on 16 September 1998) in so far as these regulations have relevance for the Masters programmes.

## Specific regulations relating to the clauses in the Examination Regulations at NTNU and the Regulations for the Degree of sivilingeniør at NTNU:

### §1. Objectives

In addition to the specifications in the Examination Regulations at NTNU and the Regulations for the Degree of sivilingeniør at NTNU the following also applies for registered students with non-Norwegian educational backgrounds who have been admitted to a Master of Science degree programme in technological studies at NTNU.

### §3. Organization of the programme

#### 3.1 Programme content

The Master of Science degree programme comprises two years of full-time study that is divided into four semesters.

#### 3.2 Programme duration and level

One semester's study will normally be worth 10 credits and the entire degree programme 40 credits. The taught courses in the degree will normally comprise three semesters and the master's thesis one semester. The courses will be a combination of compulsory and elective subjects.

Teaching can be part of separate courses or it can be integrated into the courses for the sivilingeniør (master's-level) degree or equivalent.

#### 3.3 Approval of curriculum

The faculty with the disciplinary responsibility for the particular masters programme is the body to approve the curriculum for students.

#### 3.4 Thesis

If the thesis does not receive a pass mark, it is permitted to submit a new thesis once only.

When a thesis that has received a pass mark, a student cannot submit a second thesis on a voluntary basis.

### §4. Part-time study

It is not permitted to take a Master of Science degree programme on a part-time basis.

### §6. Examination schedule

Students that do not pass the ordinary examination are automatically registered for the re-sit examinations.

In courses that have been taught in the summer semester, ordinary examinations will be in August. For students that do not pass these examinations, re-sit examinations will be held in October. In courses that have been taught in the autumn semester, the ordinary examinations will be held during this semester, and the re-sit examinations will be in January. In courses that have been taught in the spring semester, ordinary examinations will be held during that semester, and the re-sit examinations will be in August.

### §10. Number of examination attempts

#### 10.1 Limits to the number of examinations

A student is not normally permitted to take an examination in the same course more than three times. This stipulation comes into force in the academic year 2000/2001 and any attempts to pass examinations before then are not considered.

A student that has not passed an examination in one course in the degree after the maximum number of attempts, has his or her place withdrawn from the Master of Science degree programme.

The Committee for Degree of sivilingeniør at NTNU is empowered to grant exemptions from this clause regarding the number of examination attempts.

Appeals to the decision of this committee can be addressed to the University Appeals Board.

#### 10.2 Maximum duration for thesis work

A student is not normally permitted to be registered for thesis work for more than two years after he/she is qualified to start work on a master's thesis.

The Committee for Degree of sivilingeniør at NTNU is empowered to grant exemptions from this clause regarding the maximum duration for thesis work.

Appeals to the decision of this committee can be addressed to the University Appeals Board.

#### 10.3 Transfer to the second year

Transfer to the second year of the programme is between the second and third semester. This transfer is only permitted for students that have passed at least half of the required credits in the first two semesters.

### **§11a. Permitted languages in examinations**

#### 11.1 Teaching language

All teaching is to be given in English.

#### 11.2 Languages in exercises and examinations

In joint courses with students taking the degree of sivilingeniør, all examination question papers and topics for exercises are to be in both English and Norwegian.

### **§18. Exemption**

Students with four years or more of relevant university education can apply for one semester's exemption of the Master of Science degree programme. All applications for exemption are to be handled in accordance with the Examination Regulations at NTNU and the Regulations for the Degree of sivilingeniør at NTNU.

### **§26. Effectuation**

The above regulations for the Master of Science Degree Programmes in Technological Studies at NTNU come into force as of the academic year 1999/2000 and replace the previous Regulations for Master of Science Degrees Programmes at NTH of 19 February 1994.

# REGULATIONS FOR EXAMINATIONS AT THE NORWEGIAN UNIVERSITY OF SCIENCE AND TECHNOLOGY (NTNU)

Passed by the University Senate on 19 June, 1997 in accordance with the Act of 12 May 1995 relating to Universities and Colleges §50 sub-section 6 with adjustments dated 28 May 1998 and 16 September 1998. (The regulations pertaining to examinations are given with the paragraph symbol (§) in front).

## REGULATIONS FOR THE SIVILINGENIØR DEGREE AT THE NORWEGIAN UNIVERSITY OF SCIENCE AND TECHNOLOGY (NTNU)

Passed by the University Senate on 16 September 1998, in accordance with §27 in the regulations in the Act of 12 May 1995, with adjustments dated 29 March 2000. (The regulations pertaining to degree programmes are given in *italics* with a section number in front).

### Section I. OBJECTIVES AND DEFINITIONS

#### §1. Objectives

Rules regarding examinations and evaluations at the Norwegian University of Science and Technology (NTNU) are stipulated in these regulations. The regulations will insure that exams are properly administered and provide information on the university's and the students' rights and obligations.

These regulations apply to the following programmes and degrees:

- arts and humanities (cand.mag./cand.philol.)
- fine art at the Trondheim Academy of Fine Art
- natural science (cand.mag./cand.scient.)
- medicine (cand.med.)
- music at the Trondheim Conservatory of Music
- education/teaching
- psychology (cand.pyschol.)
- social sciences (cand.mag./cand.polit.)
- architecture (sivilarkitekt)
- engineering (sivilingeniør)

When relevant, these regulations apply for nautical science, masters programmes and doctoral programmes. Regulations concerning programme content, level and course combinations in the individual programmes are set in the individual programme degree requirements or in other regulations.

#### 1.1 Objectives

*The regulations regarding degree programmes stipulate the rules regarding examinations and evaluations within the sivilingeniør degree programme at the Norwegian University of Science and Technology (NTNU).*

*When relevant, these regulations apply for degree programmes in Architecture and Nautical Science, doctoral degree programmes and Master of Science programmes. This also applies for other students taking examinations in individual courses, in accordance with the Act relating to Universities and Colleges, §40.3*

#### 1.2 Awarding body for the sivilingeniør degree

*The degree of sivilingeniør is awarded by the University Senate.*

#### §2. Definitions

Arts and natural science programmes: Programmes leading to a degree in history/philosophy, social and natural sciences (cand.mag., cand.philol., cand.polit., cand.scient.).

Professional programmes: Programmes leading to the degree cand.med., cand.pyschol., sivilarkitekt/sivilingeniør, along with practical pedagogical programmes, art programmes at the Trondheim Academy of Fine Art and music programmes at the Trondheim Conservatory of Music.

Course catalogue: A publication containing course and degree programmes, subject listings and degree requirements. The catalogue contains course descriptions including prerequisites, type of exam, type of evaluation and number of credits.

Degree: The title awarded a student at an educational institution when he/she has completed the requirements of a given programme. The Ministry of Education, Research and Church Affairs decides which degrees NTNU can award.

Degree regulations: The regulations of a particular degree programme. The University Senate sets the degree regulations.

Programmes of study: A given set of courses in a particular degree that a student has been accepted for and has been given the right to study.

Subject: Related courses listed in the course catalogue and which are defined as a unit.

Course: The lowest unit for which an examination can be given and a grade assigned.

Examination: The final evaluation in a subject/course. An examination is given in all subjects/courses in which the course catalogue states that a grade will be given.

Evaluation: An evaluation (not final) in a subject/course. The evaluation can be part of an examination or be a prerequisite/condition for being able to take the examination.

## **2.1 Definitions in the degree requirements**

Specialization: Programme of study in the sivilingeniør programme that a student is accepted to at NTNU and has the right to study.

Inter-faculty programme of study: A programme of study that is a cooperative effort between two or more faculties and which the student is accepted for and has been given the right to study.

Major field: A specialization within the second or third parts (see below).

Course combination: A specific combination of compulsory courses and/or electives within a major field.

Course set: A group of courses approved as part of a student's sivilingeniør degree.

Parts of the degree: The sivilingeniør degree is organized in three parts:

1. First part: Semesters 1-4
2. Second part: Semesters 5-7
3. Third part: Semesters 8-10

Thesis: The final dissertation done in the tenth (10th) semester.

Programme committee: Committee for an inter-faculty programme of study.

Compulsory courses: Courses required in a given programme of study.

Electives: Courses which may be chosen in a given programme of study.

Voluntary courses: Courses selected by a student that do not require special approval to become part of the compulsory/chosen set of courses in accordance with §3.3.

## **Section II. GENERAL REGULATIONS**

### **§3. Structure of programmes**

Usually all students receiving degrees from NTNU must successfully complete the introductory course, examen philosophicum.

Specific requirements for the individual programmes are stipulated in the degree regulations.

#### **3.1 Programme structure**

*The sivilingeniør programme is a five-year programme divided up into parts, including the thesis.*

#### **3.2 Programme requirements**

*The number of credits for each course reflects the scope of the course. Full-time study is normally 10 credits per semester, 20 credits per year.*

#### **3.3 Approval of courses – changing courses**

*Usually all courses taken in the first and second years are compulsory. In semesters in which it is possible to choose electives, the faculty must approve the courses. Courses comprising a unit (course set) must not have examinations on the same day.*

*When approved by the faculty, courses from one faculty may be substituted by courses from another faculty. The faculties will normally not allow compulsory courses to be substituted. Fundamental and basic courses cannot be substituted. However, if, changes in the catalogue necessitate it, exceptions to these regulations on substituting courses may be made. Electives can be changed even if the allowed number of attempts at examinations as stated in §10 have been exceeded. The decision rests with the student's faculty that will make a decision based on an academic evaluation. The faculty also decides if an optional course with a passing grade can be included in the course set. Such a course may not be more than five (5) credits.*

#### **3.4 Transfer of credits for courses taken at NTNU prior to starting the degree programme**

*With the approval of the student's faculty, courses taken prior to acceptance into the sivilingeniør degree programme can be included in the compulsory courses/electives.*

### **3.5 Thesis**

#### **3.5.1 Assignment of a thesis topic**

A student must have passed examinations in all compulsory and elective courses before work on the thesis can begin. The faculty may make exceptions to this rule. Consideration must be given to:

- the number of courses remaining
- whether or not the courses remaining are essential for completion of the thesis

Before a thesis topic can be assigned the student must receive a passing grade in the preliminary project in the ninth (9th) semester and the required industrial work placement must be completed and approved.

#### **3.5.2 Individual or group thesis work**

A thesis may be done:

1. by an individual
2. by a group, but graded individually
3. by a group, but given one grade

All students have the right to write their thesis individually. Group work may be chosen if students form their own group and the supervisor concerned approves it. If a group is to be graded individually, the individual efforts of each student must be readily discernible. When the thesis is produced by a group, the students must enter into a written contract in advance, signed by the students and the supervisor concerned. Special forms are to be used for such contracts.

#### **3.5.3 Thesis done in conjunction with a company/institution outside NTNU**

The faculty may grant permission to do the thesis work at a company/institution outside NTNU. In this case the candidate should have an academic supervisor at NTNU and a supervisor at the company/institution at which the thesis will be done. When the subject for the thesis is allotted, a contract may be entered into by the student, the supervisor at NTNU and the company or institution concerned, which covers the use and application of specifications and results obtained from the thesis. Contract forms with standard texts are to be used. The student's faculty must approve the contract.

#### **3.5.4 Timeframe for the thesis**

The thesis must be done within a specified period of time. The faculty sets the starting date and time allotted for the thesis. Generally, the thesis should be completed within 20 weeks. The time allotted may be extended if:

- the student has a paid teaching position at the department
- the student's work is delayed due to sickness or other pressing reasons
- the thesis is being done abroad

#### **3.5.5 Use of the thesis**

NTNU may use the submitted thesis including supplements for teaching and research purposes.

The thesis may not be used for any other purpose such as publication or financial gain unless a separate agreement has been signed between NTNU and the student.

#### **3.5.6 Thesis repetition**

If the thesis does not receive a passing grade, the student may repeat the thesis once. A thesis that has received a passing grade may not be repeated.

### **§4. Part-time study**

Most programmes of study at NTNU may be completed on a part-time basis. Additional regulations regarding part-time study are given in the degree regulations.

#### **4.1 Course distribution**

A student may choose to take all courses for one year over two academic years. Between 2-5 courses must be taken in the first year. The remaining courses may be taken the following year, along with any courses that were not passed in the first year of part-time study. When academic considerations dictate, if there have been changes in the course catalogue from the first to the second year of part-time study, the courses must be adjusted in accordance with the course catalogue that is in effect when the second year of part-time study begins.

A student wishing to study part-time must notify the faculty in writing by 15 September. Notification must be given on the appropriate form. The course combination agreed upon is binding and must be approved by the faculty.

#### **4.2 Other regulations**

Students who have studied part-time in an academic year will be registered as full-time students in the following academic year. A student who wishes to continue as a part-time student must notify the faculty again in the manner stated in §4.1.

*A thesis may not be done as part-time study.*

### **§5. Leave of absence**

When granted, a leave of absence will preferably be for a full academic year. For shorter periods, a leave of absence is granted until the end of the semester. Under compelling circumstances, a leave of absence for a period longer than a full academic year may be granted. Compelling circumstances can be illness or military service. Additional regulations regarding a leave of absence are stipulated in the individual degree regulations. During a leave of absence exam registration is postponed.

#### **5.1 Consideration of applications and deadlines**

*The student's faculty decides whether or not a leave of absence will be granted. Normally, applications for a given academic year must be submitted by 15 September.*

#### **5.2 Period of absence and justification**

*A leave of absence granted on the basis of "compelling circumstances" can be one year/academic year. A student applying on his/her own accord for a leave of absence for reasons that are not "compelling" must have completed more than 12 credits in the sivilingeniør degree programme at NTNU.*

#### **5.3 Examinations during leave of absence**

*Examinations may be repeated during a leave of absence. Examinations in compulsory/elective courses taken during a leave of absence are included in the total number of allowed examination attempts as stipulated in §10.*

## **Section III. EXAMINATIONS**

### **§6. Examination schedule**

Examinations in the arts and natural science programmes are held every semester in all subjects/courses that are being given that semester. Examinations for courses taken during the summer are considered regular examinations and are thus subject to the examination regulations.

Examinations in the professional degree programmes are usually held once a year at the completion of each course. These examinations are hereafter referred to as "ordinary examinations". Students who do not receive a passing grade for the ordinary examination or who wish to improve their grade may take the examination again. These examinations are hereafter referred to as "compulsory and voluntary re-sit examination", respectively. Additional information on re-sit examinations is given in the degree regulations. Ordinary examinations are referred to as autumn examinations and spring examinations. Examinations given in connection with summer courses are referred to as summer examinations.

The University Senate sets the dates for ordinary examinations. The dates of the examinations are given in the course catalogue.

#### **6.1 Examination schedule**

*Examinations are held once a year shortly after the course has ended.*

*Re-examination is held before the beginning of the next autumn semester.*

*The Student and Academic Division sets the schedule for the examination period.*

*For courses in which there are relatively few participants, the teacher and students can, by consensus, adjust the scheduled date of oral examinations. The teacher must report any such changes to the Student and Academic Division.*

#### **6.2 Scheduling changes for re-examination**

*In case of scheduling changes for ordinary examinations the following guidelines for registration for re-examination apply:*

*A. Changes from spring to autumn examinations*

*Both compulsory and voluntary re-sit examination are postponed such that the re-sit examination takes place after one semester. The spring examination is not arranged.*

*B. Changes from autumn to spring examination*

*Both compulsory and voluntary re-sit examination are postponed one semester such that the new ordinary examination is held after 1 ½ years. The re-sit examination is held as usual in August. The autumn examination is not arranged. (Voluntary re-sit examination may be taken the spring semester of the same academic year as the examination was passed if the course is also given in the spring semester. A separate application must be sent to the Student and Academic Division.)*

### **§7. Deadlines for examination registration**

The deadline for registration for autumn examinations is 15 September.

The deadline for registration for spring examinations is 15 February.

Students in the arts and natural science programmes are normally responsible for registering themselves for examinations. Students in the professional degree programmes are normally registered automatically.

Students choosing to take an examination in a subject that is not part of the compulsory/elective courses are responsible for registering for examinations before the deadlines stated above.

Further regulations regarding examination registration are stipulated in the degree regulations.

### **7.1 Examination registration in compulsory/elective courses**

*In compulsory/elective courses, a student is registered for the examination associated with the given year in which the first ordinary examination for the respective course is given. If the student fulfils the requirements for admittance to the ordinary examination in accordance with the degree regulations in §8 and he/she does not pass the ordinary examination, then he/she will automatically be registered for the following re-sit examination. The student will subsequently be registered for each ordinary examination and re-sit examination until the examination is either passed or the limit in the number of permitted re-sit examinations is reached, see §10.*

### **7.2 Permission to take advanced courses and examination registration**

*A student in the 1st or 2nd year courses is permitted to take up to 10 credits of compulsory/elective courses from the next part. A student in the 3rd and 4th year courses who has passed all the examinations in his/her previous year is permitted to take examinations in compulsory/elective courses from the course catalogue for the next year that total more than 10 credits providing this is accepted by that student's faculty. The examinations in the selected courses must not conflict with other courses the student is taking. The student wishing to take courses from the next year must apply to the faculty on the prescribed form before 15 September for courses having an autumn examination and before 15 February for courses having a spring examination. The decision on whether or not the student will be permitted to take advanced courses rests with the faculty. The student will automatically be registered for the examination in the courses that have been approved.*

*Registration in these courses is binding in the same way as the rest of the registration in the normal courses.*

### **7.3 Registration for examinations in voluntary courses**

*A student may take an examination in a course that is not included in his/her courses. It is the student's responsibility to register within the deadlines set in §7.*

*Re-sit examination in voluntary courses is not permitted.*

## **§8. Admittance to examination**

A student must fulfil the general and specific admittance requirements in order to be allowed to take the examination. The student must register for the examination in accordance with the regulations for registration, fulfil the requirements of the respective degree regulations and/or course catalogue, and pay the semester fee.

### **8.1 Conditions for admittance to examination**

*Prior to each examination the University Director decides what conditions must be fulfilled to allow admittance to an examination.*

*Candidates who have not completed compulsory exercises or who have not fulfilled other requirements in the course catalogue for admittance to an examination will not be permitted to take the examination.*

*Candidates who have not paid the required semester fee to the Student Welfare Organization (Studentsamskipnaden) in Trondheim, will not be admitted to the examination.*

*Students who are refused admittance to an examination will receive a failing grade.*

### **8.2 Admittance to re-sit examination**

*Students who do not meet the conditions for admittance to the ordinary examination will normally not be admitted to the re-sit examination. If a student receives permission from the teacher responsible for the course to finish the exercises in the period between the ordinary examination and the re-sit examination, then the student must send the Student and Academic Division confirmation by 1 July that the exercises have been approved and he/she is allowed to register for the re-sit examination.*

## **§9. Examination status**

Examination status refers to :

- completion of the exam
- failing the exam
- being registered for the examination and not taking it
- not completing the examination or absence from the examination without prior approval

Prior approval may be given in the case of sickness or sickness/death in the immediate family. See §15 concerning regulations on absence due to illness.

In programmes where it is possible to withdraw from examination, the deadlines are 15 April and 1 November for the spring and autumn semesters respectively.

A student who has handed in his/her examination paper cannot subsequently request that the paper is not to be graded.

### **9.1 Absence from examination**

*Students who without prior approval do not take examinations in compulsory/elective courses for which they are registered for in accordance to the regulations stated in §7, will receive a failing grade for the examination.*

### **9.2 Nullification of examination results**

*Students cannot demand that examination results are nullified.*

### **9.3 Withdrawal from examinations**

*Students can withdraw from examinations in courses in their subject within a deadline that is announced prior to each examination period. Note that this right does not apply to first-time examinations. If a student has withdrawn from an examination within the deadline, this does not affect the possibility of repeating an examination which is limited according to §10.1 in the degree regulations.*

## **§10. Repetition of examinations**

As a rule, a student may not take the ordinary examination in the same subject or course more than three times. The same subject/course is defined as a subject/course having the same course code. Under special circumstances dispensation to this regulation may be given.

Limitations on the total number of repeated attempts to pass an examination in the form of the "three-time" rule or other limitations are given in the degree regulations.

A definition of what constitutes a valid re-examination is given in §§7 and 9.

### **10.1 Restrictions on the total number of re-examinations**

*A student cannot normally take an examination in the same course/subject more than four times. This limit in number of attempts in re-examination applies from the academic year 2000/2001 so that any attempts to take examinations prior to then will not be counted. A student who has not passed an examination in the compulsory courses in the subject by the stated number of attempts loses his/her student status in the sivilingeniør degree programme. The same will happen if a student has not passed an examination in a compulsory course within 3 years of first-time registration for that course. Elective courses can be replaced by others in accordance with the degree regulations, see §3.3 final paragraph.*

*The committee for the sivilingeniør degree programme is empowered with the right to waive the regulations regarding the limitation on the number of re-examinations in special circumstances. Any decision made can be appealed to the University Appeals Board.*

### **10.2 Time limitations for the thesis**

*Normally a student cannot be registered for thesis work for more than two (2) years after having fulfilled the conditions necessary for beginning the thesis.*

*Under certain extenuating circumstances, the committee for the sivilingeniør degree programme may waive the regulations regarding the time limitation for the diploma thesis.*

*Any decision can be appealed to the University Appeals Board.*

### **10.3 Study progression regulations**

*If a student has more than three (3) uncompleted courses from the previous year, he/she will not be admitted to the next year. The number of credits for these three (3) courses cannot be more than 10 credits.*

*In the case where such progression results in conflicts in the examination schedule, it will not be possible to demand that the examination date is changed. In this case the student must postpone the course in the higher year's course until the next examination period.*

## **§11. Type of examination**

The type of examination for each course is given in the course catalogue. When permitted by the respective degree regulations, the type of examination for re-sit examinations may differ from that of the ordinary examination.

### **11.1 Types of examination for ordinary examinations**

*The type of examination is given in the course description for the individual courses listed in the course catalogue.*

## **11.2 Types of examinations for re-sit examinations**

*Based on a proposal by the teacher responsible for the course, the University Director decides whether a re-sit examination will be written or oral. Questions concerning this matter should be directed to the Student and Academic Division.*

*If the ordinary examination consists of exercises (such as submitted work, reports) then the re-sit examination will also consist of exercises.*

### **§11a. Language used in the examination**

Rules concerning the language of the examination are stated in §7 in the regulations in the Act of 11 April 1980 sub-section 5 concerning language use in public services.

Additional details on the routines for the manner in which the rules will be implemented are given in the supplementary regulations to the degree regulations.

## **§12. Examination procedures**

As a rule, the oral part of an examination or evaluation is open to the public. If the candidate so wishes and there are compelling arguments for doing so, in accordance with the Act relating to Universities and Colleges §50 sub-section 3, the faculty can make an exception to this rule.

Additional information regarding examination procedures is given in the individual degree regulations or in specific procedural guidelines such as instructions for examination candidates, examination supervisors and teachers responsible for a course.

### **12.1 Examination guidelines**

*Prior to each ordinary examination period, the Student and Academic Division will provide information on the current procedures and other practical information regarding examinations.*

*Examinations will either be written or oral.*

*Written examinations will normally be between 4 to 6 hours.*

*Written examinations will normally begin at 9 a.m. (09.00).*

*The date of the ordinary examination is given in the course catalogue.*

*The schedule for re-sit examinations will be prepared and announced by the Student and Academic Division and normally the student will be informed directly.*

*Normally the candidate will receive a letter containing information about the oral examination, including on the time and place of the examination.*

*Information about permitted examination support, (e.g. calculator, books etc.) that may be used during the examination are listed in the course catalogue*

*The teacher responsible for the course or an appointed substitute will be available during the written exam. This person may only answer questions regarding possible errors, omissions or ambiguities in the text of the examination question paper. The candidate may be asked to present these questions in writing to the teacher responsible for the course or the appointed substitute.*

*The candidate is to follow the instructions given by the examination supervisor.*

## **§13. Special arrangements for an examination**

In order for the examination conditions to be identical for all candidates, students requiring special arrangements in connection with the examination must inform the Student and Academic Division of their needs at least 14 days before the first examination in an examination period.

If there is a need for special arrangements but this is registered after the deadline, exceptions may be made. Special arrangements include special physical needs or additional time.

### **13.1 Additional time or other arrangements for an examination**

*Students require a medical certificate or other documentation to substantiate why they may be entitled to additional time for an examination and/or other special arrangements or equipment during a written examination. A written application must be sent to the Student and Academic Division at least 14 days prior to the first examination in the examination period in question.*

## **§14. Incomplete examinations**

A student who begins a written examination, but who does not submit an examination paper or submits a blank paper, must sign a statement stating that he/she has terminated the examination.

(Degree regulations unnecessary.)

## **§15. Illness in connection with examinations**

If a student becomes ill before an examination, an application with a medical certificate is to be delivered or sent to the Student and Academic Division, postmarked no later than one week after the date of the examination

concerned. Information about which examination was missed and the period for which the student was ill must be included in the application.

Similar regulations apply for documenting other reasons for absence from examinations. If a student becomes ill during an examination, the candidate must inform the chief examination supervisor in the examination hall or, at an oral examination, one of the examiners. The student must then immediately see a doctor and submit a medical certificate in accordance with the regulations stated above.

### **15.1 Registration for an examination after legitimate absence**

*Students who have a legitimate excuse for absence from an exam in a compulsory/elective course will automatically be registered for the exam in the next examination period (see the degree regulations §7.1).*

*In optional courses the next possibility for taking the examination is in the next ordinary examination period even if the student is prevented from taking the examination due to extenuating circumstances (see the degree regulations §7.3).*

### **15.2 Total number of examination attempts with legitimate absence**

*Legitimate absence from the examination does not count as an examination attempt as stated in the degree regulations §10.*

### **15.3 Postponement of examination for elected student representatives**

*Students who have been elected to a student representative post and who wish to postpone first-time examination in an ordinary examination to the following re-sit examination or the following ordinary examination, will receive acceptance of their absence from an examination. An application for such postponement must be sent to the Student and Academic Division within the same deadline stated regarding illness in connection with examinations. This application must state which examination the postponement is sought for and the examination period. Documentation of student representative status and the period the student is elected for is to be included.*

## **§16. Nullification of the examination**

The University Senate can nullify the examination or evaluation or course completion if the candidate breaks the regulations in §54 in the Act relating to Universities and Colleges.

The University Senate can also nullify the acceptance of an educational programme or exemption from an examination or evaluation if the same regulations are broken.

(Degree regulations unnecessary).

## **§17. Re-examination**

A student who has passed an examination may take it again given the limitations stipulated in §10 of these regulations. Such a re-examination usually will take place during the normal examination period.

For students repeating or postponing examinations, the syllabus is normally the standard syllabus for the course at the time the examination is taken, although if there have been significant changes in the syllabus there will be an opportunity to take the examination based on the old syllabus for at least one year after the new syllabus was initiated.

The final grade for a student who has repeated the same examination will be the highest grade achieved in the examinations the student has taken.

The degree regulations stipulate additional regulations concerning re-examination.

### **17.1 Re-examination for failed examinations**

*Examinations that a student has not passed may be repeated in accordance with the stipulations in the degree regulations §7.1.*

### **17.2 Voluntary re-examination of an examination already passed**

*One voluntary re-examination of an examination already passed is permitted for one course in each year.*

*The re-examination must take place at the next ordinary examination after the course has been passed. In courses given in the 9th semester, students are allowed a re-examination in the re-sit examination period providing such an examination is to be held. Registration for the ordinary examination (autumn and spring semesters) is made through the Student and Academic Division within the deadlines set in §7. Registration for the re-sit examination must be sent to the Student and Academic Division within the deadline announced each academic year.*

*Voluntary re-examination can only take place within the framework of the limitations stipulated in §10.1.*

*Voluntary re-examination is not permitted after the degree certificate has been issued.*

### **17.3 Voluntary repetition of examinations that have been passed, for elected student representatives**

Student representatives are permitted on a voluntary basis to take examinations that have been passed in subjects in the 1st, 2nd, 3rd, or 4th year (including the 9th semester) at the re-sit examinations if such an examination is held in that subject. This repetition is to normally take place at the first re-sit examination following the examination that has been passed. In special circumstances, student representatives may be permitted to postpone the voluntary repetition of examinations that have been passed longer than the degree regulations allow.

A separate application for voluntary repetition of examinations, including documentation of student representative status must be sent to the Student and Academic Division within the deadline stated in §7.

### **17.4 Repetition of course exercises**

For courses that are partially or completely assessed on the basis of exercises, the following regulations apply when the exercises are repeated:

Students who have not completed the required exercises after the ordinary examination has been taken must repeat the exercises in accordance with the requirements set in each individual case.

The faculty sets the requirements based on a recommendation of the teacher responsible for the course.

## **§18. Exemption from an examination and evaluation**

A student may be exempted from an examination or evaluation when equivalent requirements have been satisfied at the same or at another institution, and in some cases on the basis of another type of examination or evaluation. The decision about whether or not a student may be exempted rests with the faculty (See Act relating to Universities and Colleges §49) and may be appealed to the University Appeals Board.

When applications for exemptions are evaluated consideration is given to the content and depth of previous courses and examinations.

General exemption is given by the University Senate and is specified in the degree requirements.

Additional information concerning exemption applications is given in the individual degree requirements.

### **18.1 Procedure and deadlines for exemption applications**

The decision about whether a student may be exempted or not rests with the faculty.

The application must be sent on the prescribed form along with the necessary documentation.

The application deadline for exemption is before the registration deadline for first-time examinations in a course. In particular:

15 September for courses with the first-time examination in the autumn semester

15 February for courses with the first-time examination in the spring semester

### **18.2 Guidelines for exemption in compulsory courses on the basis of equivalent requirements being fulfilled at another institution**

An assessment of an exemption application will consider the following aspects of previous courses and examinations taken

- level
- scope
- content

in the above order of priority.

#### **Level**

The main criterion for exemption is that the previous education is at the same level as the sivilingeniør education at NTNU, and that the previous education as a rule was at a university or college. In certain circumstance education at an institution other than a university or college can be accepted if the exemption in question is for general basic courses. Education taken abroad must be at university level.

#### **Scope**

If the criterion for level is met then the scope of the education will be assessed. The scope of the course(s) being considered must be greater than or equal to the course for which the exemption application was submitted. The assessment will be gauged in credits or an equivalent unit.

#### **Content**

If the criterion for scope is met, then exemption can be considered even if the content of the course in the sivilingeniør programme is not completely covered, assuming that no essential part is missing from the syllabus.

#### **Overall assessment**

In certain situations an overall assessment of the applicant's previous education can form the basis for assessing exemption in one or more courses.

### **18.3 Substituting a compulsory course as an alternative to exemption**

When the basis of the application is previous education, students wishing to substitute a compulsory course can be granted such a substitution even if the course that is being substituted is only covered by 50 % in their previous education. The student will then be credited with the alternative compulsory course.

#### **18.4 Exemption on the basis of education from the same institution (NTNU)**

*If the exemption application is based on education done at the same institution (NTNU), then the course will normally be accepted as part of the programme and assigned a grade given that equivalent requirements were met when the student studied at another faculty.*

#### **18.5 Guidelines for assessment of exemption for compulsory courses based on another acceptable examination or evaluation**

*Exemption based on another acceptable examination or evaluation, in accordance with the Act relating to Universities and Colleges §49, can only be applied to applications regarding courses in the 2nd and 3rd parts of the degree. The basis for the application must be courses from a university or scientific college.*

*Exemption on the basis of an acceptable examination or evaluation can be given for up to 5 credits for each student.*

#### **18.6 Exemption from elective courses**

*A student will normally not be granted exemption from elective courses.*

*As a rule, where an elective is covered by previous education, the student must choose another elective.*

#### **18.7 Exemption from examinations**

*Students who have passed the common introductory course Examen philosophicum will be exempted from EXPHIL-module 1 and EXPHIL-module 2 in the sivilingeniør degree programme.*

*Students wishing such exemption must send an application together with documentation that the Examen philosophicum has been passed.*

### **Section IV. EXAMINATION MARKING**

#### **§19. Examiners**

All examinations/evaluations where the results will be on the transcript or be included as part of another grade in the degree programme will be assessed by at least two examiners. With the exception of an assessment of exercises and laboratory work where it is not possible to test the student's skills using a typical examination/evaluation, at least one of the examiners must be from outside NTNU.

The examiners will be appointed by the faculty in accordance with the Act relating to Universities and Colleges §50, sub-section 2. The appointment will normally be for a period of three years.

##### **19.1 Examiners**

*The faculties will appoint examiners in accordance with the examination regulations §19.*

#### **§20. Deadline for submission of grades**

According to the Act relating to Universities and Colleges §50 sub-section 4, grades must be awarded within three weeks unless there are extenuating circumstances that necessitate more time. Additional information is given in the regulations for the individual degree programmes.

##### **20.1 Deadline for awarding grades for individual courses**

*The University Senate can, in accordance with the Act relating to Universities and Colleges §50 sub-section 6, grant exemptions to the rule that grades must be awarded within three (3) weeks from the time of examination/evaluation.*

##### **20.2 Special deadlines**

*A deadline of three (3) months from the time of submission/date of examination is set for:*

- theses
- projects in the 9th semester
- courses judged solely on the basis of projects

### **Section V. GRADING**

#### **§21. Grading scale**

Examinations/evaluations are assessed using letter grades either in accordance with the scale used by the European Credit Transfer System (ECTS) or using passed/failed. In addition, when letter grades are used, a number grade will also be given in accordance with the specific degree regulations.

The ECTS scale consists of letter grades ranging from A to F. A being the highest grade and E the lowest passing grade.

The number grades range from 1.0 – 6.0 in increments of 0.1. 1.0 is the highest grade and 4.0 is the lowest passing grade.

If an examination consists of several smaller examinations, each of which receive their own grade, then the average will be calculated and a final grade given with one decimal point that will be rounded up if the second decimal is 5 or more.

### **21.1 Grading scale**

*It will be stated in the course catalogue if the course is assessed using a number grade or passed/failed.*

### **21.2 Grading of examinations and exercises**

*When stated in the course catalogue, an evaluation of exercises may be included as part of the course grade. If the grade in a course is set as a combination of examinations/evaluations and exercises, then the grade in both examinations/evaluations and exercises must be better than 4.0 in order for the course to be passed.*

### **21.3 Disagreement between examiners**

*If the examiners are unable to agree on a grade for a written examination paper, then the submitted examination paper will be assessed by a new examiner.*

## **§22. Final grade for the degree**

The final grade is the grade given at the conclusion of the degree programme.

It will be stated in the regulations for each degree programme whether or not a final grade is given and what rules apply for calculating it.

### **22.1 Final grade for the degree**

*The final grade for the degree is the weighted average of the registered grades obtained in all courses in the student's courses.*

### **22.2 Requirements for having the final grade calculated**

*In order to be assigned a final grade a student must have completed the examinations in courses that are at least worth 40 credits.*

*Students who do not meet this requirement will be given an average grade.*

## **Section VI. APPEALS**

### **§23. Explanation and appeals**

Examination candidates are entitled to request an explanation of the basis on which the examination grade was given in accordance with the regulations in the Act relating to Universities and Colleges §52.

Examination candidates have the right to appeal about the grade given and for formal procedural errors regarding the examination in accordance with the regulations in the Act relating to Universities and Colleges §§51-52.

#### **§23.1 Explanation and appeals concerning grades**

*Requests for explanations and appeals concerning the basis on which the examiners set the grade must be presented to the faculty responsible for the course.*

#### **§23.2 Appeals about formal procedural errors**

*Appeals about formal procedural errors are to be submitted to the Student and Academic Division.*

## **Section VII. DEGREE CERTIFICATE AND TRANSCRIPTS**

### **§24. Degree certificate**

A degree certificate will be issued at the completion of a degree programme, professional education programme or other educational programme. This will be done only once for the same degree/professional education/educational programme.

The degree certificate will contain information about the basis of the degree being awarded. If a final grade has been given it will be on the degree certificate. An average grade will be given for graduate study in the arts and humanities (hovedfag) along with the title and grade of the thesis. A transcript indicating the courses taken and the grades achieved will accompany the degree certificate.

If a candidate has taken more examinations than was needed to receive the degree, then he/she must give notice about which examinations he/she does not wish to have on the degree certificate.

The degree certificate will list the semester and year the degree requirements were completed.

The degree requirements provide additional information concerning the conditions that must be met in order for a student to receive an NTNU degree certificate. These conditions include rules concerning the proportion of an examination or degree programme that a student must take at NTNU.

#### **24.1 Degree certificate requirements**

*Students that have completed the sivilingeniør degree programme will receive a degree certificate where the final grade is given. The programme is completed when all course examinations in the compulsory/elective courses and the thesis are passed.*

### **§25. Transcripts**

Students who have completed subjects or course examinations may request a copy of the examination protocol. The protocol will contain the highest grade attained, the title of the course(s)/subject(s), the number of credits and what semester and year the examination was taken.

#### **25.1 Transcripts**

*After the results of the autumn examination period are registered, students will receive an updated transcript.*

#### **25.2 Certificate for voluntary courses**

*When the degree certificate is issued, students will receive a certificate for courses that are not part of the compulsory/elective course set.*

## **Section VIII. EFFECTUATION AND TRANSITIONAL REGULATIONS**

### **§26. Effectuation**

With the exception of §21, these regulations will be effectuated from the academic year 1998/99.

Regulations, rules and additional requirements concerning examinations and evaluations will remain in effect until they are replaced by new rules and regulations, and in so far as they do not conflict with the rule and regulations stipulated in the Act relating to Universities and Colleges.

#### **26.1 Effectuation**

*The degree requirements will come into effect beginning with the academic year 1999/2000. Changes made on 29 March 2000 were put into effect as of that date, however the arrangements for withdrawal from examinations, see §§9.3 and 10.1 apply from the academic year 2000/2001.*

### **§27. Degree requirements**

*The University Senate sets the degree requirements for the different degrees.*

(No additional degree requirements).

## **TRANSITIONAL REGULATIONS FOR THE NTNU SIVILINGENIØR DEGREE PROGRAMME IN CONNECTION WITH THE USE OF A NEW GRADING SYSTEM AT NTNU**

Passed by the University Senate on 27 April 1999.

**Until a new grading scale goes into effect, the following regulations apply to all students in the sivilingeniør and sivilarkitekt degree programmes:**

### **§21.1 Grading scale**

Examinations in the courses of the sivilingeniør degree programme may be graded using a scale of 1.0 - 6.0 in increments of 0.5.

For the introductory course Examen philosophicum and courses associated with other NTNU degree programmes, a grading scale of 1.0-6.0 in increments of 0.1 can be accepted in the sivilingeniør and sivilarkitekt degree programmes.

The thesis will be graded in increments of 0.25.

Grades of and including 1.0-4.0 are considered pass marks. Grades below 4.0 are considered fail.

### **§22.1 Final grade**

The final grade is given to one decimal, which is raised to the next higher if the following decimal is 5 or more.

These designations are used for the final grade:

|             |           |
|-------------|-----------|
| Outstanding | 1.0 - 1.5 |
| Very good   | 1.6 - 2.0 |
| Good        | 2.1 - 3.0 |
| Fair        | 3.1 - 4.0 |

These regulations go into effect immediately.

## GUIDE TO COURSE CATALOGUE

### TABLES

The tables show the subjects in relation to the overall degree programme, number of lectures, credits, grading scale etc. The following gives a guide to the specific boxes:

#### Ex (Course year and time of examination)

This box states which course year and examination period this examination can be taken for the first time in each subject. The examination period is marked **a** for the August examination, **h** for the autumn examination and **v** for the spring examination.

#### Subject no.

The subject number comprises 7 digits.

#### Subject title

This box gives the subject title in abbreviated form.

#### Note

This box includes any references to footnotes.

#### Weekly hours in summer, autumn and spring semesters

The boxes provide information about the weekly number of lessons each semester in each subject and which semester the teaching is given.

These weekly hours are divided into:

- F: Lecture hours per week
- Ø: Exercise hours with instruction
- S: Additional hours with self study

#### Vt (credits)

The credits give the weighting of each subject in the degree programme.

#### Grade

This box shows the basis for determining the grade:

- TE - Grade/Exam
- TØ - Grade/Exercises
- TEØ - Grade/Exam with exercises
- BE - Passed - failed / Exam
- BØ - Passed - failed / Exercises
- BEØ - Passed - failed / Exam with exercises
- I - No grade

## DESCRIPTION OF SUBJECTS

The description of subjects provides a survey of the topics covered in each subject. The description of subjects also gives the following information:

### Subject title

The subject titles in the course catalogue show:

- Abbreviated subject title (English)
- Complete subject title (English)
- Complete subject title (Norwegian)

### Teacher(s)

This indicates the teacher(s) who is responsible for the teaching etc. and who is the contact person for students and others.

### Weekly hours

This provides information about the weekly hours of each subject per semester and the semester teaching is given in.

### Time/venue

This provides information about when and where teaching will be given during the academic year.

### Examination

This provides information about the examination date for the subject in the academic year. (The examination date is only determined well in advance for subjects that are also part of the sivilingeniør degree. Other subjects will have the examination date decided after students have been registered for the examination.)

### Examination support

This gives information about which support can be used during examinations. The following codes are used:

- A1 - Calculator not allowed. No printed or hand-written aids allowed.
- A2 - Calculator not allowed. Certain printed aids allowed.
- A3 - Calculator not allowed. All printed and hand-written aids allowed.
- B1 - Type approved calculator with empty memory according to specified list allowed.  
No printed or hand-written aids allowed.
- B2 - Type approved calculator with empty memory according to specified list allowed.  
Certain printed aids allowed.
- B3 - Type approved calculator with empty memory according to specified list allowed.  
All printed and hand-written aids allowed.
- C1 - All types of calculators allowed. All printed and hand-written aids allowed.

### Exercises

This indicates if there are exercises in a subject and whether the exercises are compulsory or voluntary. (More details about exercises are given in the Description of Subjects). The following codes are used for exercises:

- O - Compulsory exercises
- F - Voluntary exercises
- I - No exercises

### Grades

This indicates the marking that has been used to determine a grade (see tables above).

# FACULTY OF CIVIL AND ENVIRONMENTAL ENGINEERING

Term 1, 2, 3 and 4

## HYDROPOWER DEVELOPMENT

| Ex | Subject no. | Subject title          | Note | Autumn<br>F Ø S |   |   | Spring<br>F Ø S |    |   | Vt  | Grade |
|----|-------------|------------------------|------|-----------------|---|---|-----------------|----|---|-----|-------|
| 1h | MSB5090     | HYDROPOWER PLAN 1 BC   |      | 8               | 8 | 8 |                 |    |   | 5   | TE    |
| 1h | MSB5091     | HYDROPOWER PLAN 2 BC   |      | 8               | 8 | 8 |                 |    |   | 5   | TE    |
| 1v | MSB5092     | HYDROPOWER PLAN 3 BC   |      |                 |   |   | 8               | 8  | 8 | 5   | TE    |
| 1v | MSB5098     | HYDROPOWER PROJECT     |      |                 |   |   |                 | 24 |   | 5   | TØ    |
|    |             | <b>Total weighting</b> |      | 48              |   |   | 48              |    |   | 20  |       |
| 2h | MSB5094     | RIVER SYSTEM ANAL AC   |      | 6               | 6 | 5 |                 |    |   | 3,5 | TE    |
| 2h | MSB5096     | WITHDRAWAL WATER AC    |      | 5               | 5 | 5 |                 |    |   | 3   | TE    |
| 2h | MSG0595     | ROCK ENGINEERING AC    |      | 6               | 6 | 5 |                 |    |   | 3,5 | TE    |
|    |             | <b>Total weighting</b> |      | 49              |   |   |                 |    |   | 10  |       |
|    |             | Diploma Thesis         | 1    |                 |   |   |                 |    |   | 10  |       |

Ex 1h = Term 1, Exam Autumn

Ex 1v = Term 2, Exam Spring

Ex 2h = Term 3, Exam Autumn

1) The Diploma Thesis is to be submitted in term 4 (spring term).

# FACULTY OF APPLIED EARTH SCIENCES

First year 2000/2001 and Second Year 2001/2002

## PETROLEUM ENGINEERING

| Ex | Subject no. | Subject title                              | Note | Autumn<br>F Ø S |   |   | Spring<br>F Ø S |   |   | Vt      | Grade | Specialization:<br>1 2 3 4 |   |   |   |
|----|-------------|--------------------------------------------|------|-----------------|---|---|-----------------|---|---|---------|-------|----------------------------|---|---|---|
| 1h | SIG4038     | RESERVOIR REC TECHN                        |      | 4               | 4 | 4 |                 |   |   | 2,5     | TEØ   | v                          | v | - | v |
| 1h | SIG4052     | FORMATION EVAL 1                           |      | 4               | 2 | 6 |                 |   |   | 2,5     | TE    | o                          | o | o | o |
| 1h | SIG4077     | HIGH DEV DRILLING                          |      | 4               | 1 | 7 |                 |   |   | 2,5     | TEØ   | v                          | v | o | v |
| 1h | MSG4110     | MATH/COMPUTER METHOD                       |      | 2               | 8 | 2 |                 |   |   | 2,5     | TØ    | o                          | o | o | o |
| 1h | MSG4130     | FUND PET ENG                               |      | 4               | 2 | 6 |                 |   |   | 2,5     | TE    | o                          | o | o | o |
| 1v | SIG4042     | RESERVOIR SIMULATION                       |      |                 |   |   | 4               | 4 | 4 | 2,5     | TEØ   | o                          | v | v | v |
| 1v | SIG4054     | FORMATION EVAL 2                           |      |                 |   |   | 3               | 3 | 6 | 2,5     | TEØ   | v                          | o | v | o |
| 1v | SIG4080     | PRESSURE CONTROL                           |      |                 |   |   | 4               | 1 | 7 | 2,5     | TEØ   | v                          | v | o | v |
| 1v | SIG4083     | FRACTURED RESERVOIR                        |      |                 |   |   | 3               | 2 | 7 | 2,5     | TE    | v                          | v | v | v |
| 1v | SIG4087     | WELL TECHNOLOGY                            |      |                 |   |   | 3               | 2 | 7 | 2,5     | TEØ   | o                          | o | o | o |
| 1v | MSG4140     | PETROLEUM ECONOMICS                        |      |                 |   |   | 3               | 2 | 7 | 2,5     | TE    | v                          | v | v | v |
|    |             | <b>Total weighting compulsory subjects</b> | 1    |                 |   |   |                 |   |   | 12,5/15 |       |                            |   |   |   |
| 2h | SIG4035     | RESERVOIR FLUIDS                           |      | 4               | 6 | 2 |                 |   |   | 2,5     | TEØ   | v                          | v | v | v |
| 2h | SIG4067     | INT MULTI-LAT WELLS                        |      | 3               | 2 | 7 |                 |   |   | 2,5     | TE    | -                          | v | v | - |
| 2h |             | Project + support topics                   |      |                 |   |   |                 |   |   | 7,5     | TEØ   | o                          | o | o | o |
|    |             | <b>Total weighting compulsory subjects</b> | 2    |                 |   |   |                 |   |   | 7,5     |       |                            |   |   |   |
| 2v |             | Diploma Thesis                             |      |                 |   |   |                 |   |   | 10      |       | o                          | o | o | o |

o - compulsory subjects

v - optional subjects

- 1) One subject must be chosen in the autumn semester (1h) in specialization 1, 2 and 4. Two subjects must be chosen in the spring semester (1v). In addition to the subjects listed, students can also choose from 1v Petroleum Geoscience and dr.degree courses if taught in English.
- 2) One subject must be chosen in the 3rd semester. In addition to the listed subjects, the students can choose dr.degree courses if taught in English.

Specialization:

- 1 Reservoir Engineering
- 2 Petroleum Production
- 3 Drilling Technology
- 4 Formation Evaluation

# FACULTY OF APPLIED EARTH SCIENCES

First year 2000/2001 and Second Year 2001/2002

## PETROLEUM GEOSCIENCES

| Ex | Subject no. | Subject title                              | Note | Autumn |   |   | Spring |   |   | Vt   | Grade | Specialization: |   |   |
|----|-------------|--------------------------------------------|------|--------|---|---|--------|---|---|------|-------|-----------------|---|---|
|    |             |                                            |      | F      | Ø | S | F      | Ø | S |      |       | 1               | 2 | 3 |
| 1h | MSG0590     | PETROLEUM GEOLOGY                          | 1    | 3      | 2 | 7 |        |   |   | 2,5  | TE    | 0               | 0 | - |
| 1h | SIG4024     | SEISMIC INTERPRETA                         |      | 2      | 3 | 7 |        |   |   | 2,5  | TEØ   | 0               | 0 | 0 |
| 1h | SIG4052     | FORMATION EVAL 1                           |      | 4      | 2 | 6 |        |   |   | 2,5  | TE    | -               | - | 0 |
| 1h | MSG4110     | MATH/COMPUTER METHOD                       |      | 2      | 8 | 2 |        |   |   | 2,5  | TØ    | 0               | 0 | 0 |
| 1h | MSG4120     | FUND PET GEO                               |      | 4      | 2 | 6 |        |   |   | 2,5  | TE    | 0               | 0 | 0 |
| 1v | SIG0515     | BASIN ANALYSIS                             |      |        |   |   | 2      | 3 | 7 | 2,5  | TE    | v               | v | v |
| 1v | SIG0527     | DIAGENESIS/RES QUAL                        |      |        |   |   | 2      | 2 | 8 | 2,5  | TE    | v               | 0 | v |
| 1v | SIG4047     | RESERVOIR SEISMICS                         |      |        |   |   | 4      | 1 | 7 | 2,5  | TE    | 0               | v | v |
| 1v | SIG4054     | FORMATION EVAL 2                           |      |        |   |   | 3      | 3 | 6 | 2,5  | TEØ   | v               | v | 0 |
| 1v | SIG4063     | GRAVIMETR MAGNETOMET                       |      |        |   |   | 4      | 1 | 7 | 2,5  | TE    | v               | v | v |
| 1v | MSG4140     | PETROLEUM ECONOMICS                        |      |        |   |   | 3      | 2 | 7 | 2,5  | TE    | v               | v | v |
|    |             | <b>Total weighting compulsory subjects</b> | 2    |        |   |   |        |   |   | 12,5 |       |                 |   |   |
| 2h | MSG0590     | PETROLEUM GEOLOGY                          | 1    | 3      | 2 | 7 |        |   |   | 2,5  | TE    | -               | - | v |
| 2h | SIG4017     | ENG ENVIR GEOPHYS                          |      | 2      | 2 | 8 |        |   |   | 2,5  | TEØ   | -               | v | v |
| 2h | SIG4060     | SEISMIC DATA                               |      | 3      | 2 | 7 |        |   |   | 2,5  | TEØ   | 0               | v | v |
| 2h |             | Project + support topics                   |      |        |   |   |        |   |   | 7,5  | TEØ   | 0               | 0 | 0 |
|    |             | <b>Total weighting compulsory subjects</b> | 3    |        |   |   |        |   |   |      |       |                 |   |   |
| 2v |             | Diploma Thesis                             |      |        |   |   |        |   |   | 10   |       | 0               | 0 | 0 |

o - compulsory subjects

v - optional subjects

- 1) Given as self study course combined with exercises.
- 2) Three subjects must be chosen in spring semester. In addition to the listed subjects, students can choose from 1v Petroleum Engineering and dr.degree courses if taught in English.
- 3) One subject must be chosen. In addition to the listed subjects, students can choose dr.degree courses if taught in English.

Specialization:

- 1 Seismics
- 2 Reservoir Geology
- 3 Formation Evaluation

# FACULTY OF MARINE TECHNOLOGY

Term 1 (May-July 2001)

Term 2 and 3 (Autumn 2001 and Spring 2002)

Term 4 (Autumn 2002)

## MARINE TECHNOLOGY

| Ex | Subject no. | Subject title                                      | Note | Autumn<br>F Ø S |    |    | Spring<br>F Ø S |    |   | Vt  | Grade |
|----|-------------|----------------------------------------------------|------|-----------------|----|----|-----------------|----|---|-----|-------|
| 1a | MSN1080     | <b>Compulsory subjects:</b><br>MARINE STRUCT BC    | 1    | 3               | 4  | 5  |                 |    |   | 2,5 | TE    |
| 1a | MSN1082     | MARINE DYN BC                                      | 1    | 3               | 4  | 5  |                 |    |   | 2,5 | TE    |
| 1a | MSN1570     | MARINE HYDRODYN BC                                 | 1    | 4               | 4  | 4  |                 |    |   | 2,5 | TE    |
|    |             | <b>Weighting compulsory course</b>                 |      | 10              | 12 | 14 |                 |    |   | 7,5 |       |
| 2h | MSG4110     | <b>Compulsory subjects:</b><br>MATH/COMPUT METHODS |      | 2               | 8  | 2  |                 |    |   | 2,5 | TØ    |
| 2h | SIN1040     | ELEM METHODS STRUCT                                |      | 3               | 4  | 5  |                 |    |   | 2,5 | TE    |
| 2h | SIN1540     | SEA LOADS                                          |      | 3               | 4  | 5  |                 |    |   | 2,5 | TE    |
|    |             | <b>Weighting compulsory course</b>                 |      | 8               | 16 | 12 |                 |    |   | 7,5 |       |
| 2h | SIN1548     | <b>Optional subjects:</b><br>STOCH THEORY SEALOAD  | 2    | 3               | 3  | 6  |                 |    |   | 2,5 | TE    |
| 2v | SIN1045     | FAT FRACT COLL STRUC                               | 3    |                 |    |    | 3               | 3  | 6 | 2,5 | TEØ   |
| 2v | SIN1046     | OFFSHORE STRUCTURES                                | 3    |                 |    |    | 3               | 3  | 6 | 2,5 | TEØ   |
| 2v | SIN1545     | NAVAL HYDRODYNAMICS                                | 3    |                 |    |    | 3               | 6  | 3 | 2,5 | TEØ   |
| 2v | SIN1546     | MARINE OPERATIONS                                  | 3    |                 |    |    | 3               | 3  | 6 | 2,5 | TE    |
| 2v | MSN1089     | MARIN STRUCT PROJECT                               | 4    |                 |    |    |                 | 12 |   | 2,5 | TØ    |
| 2v | MSN1579     | MARINE HYDRO PROJECT                               | 4    |                 |    |    |                 | 12 |   | 2,5 | TØ    |
| 3h |             | <b>Optional subjects</b>                           | 5    |                 |    |    |                 |    |   |     |       |
| 3h |             | Diploma Thesis                                     |      |                 |    |    |                 |    |   | 10  |       |

Ex 1a = Term 1, Exam August

Ex 2h = Term 2, Exam Autumn

Ex 2v = Term 3, Exam Spring

Ex 3h = Term 4, Exam Autumn, the Diploma Thesis is to be submitted in January next year.

- 1) The basic courses last 12 weeks, with exams in August.
- 2) Compulsory and optional subjects should contain 10Vt in term 2.
- 3) Select 3 of the subjects.
- 4) Select 1 of the subjects.
- 5) Subject containing 2,5Vt must be selected.

## FACULTY OF CIVIL AND ENVIRONMENTAL ENGINEERING

### MSB5090 HYDROPOWER PLAN 1 BC Hydropower Planning 1, Basic Course Vannkraftplanlegging 1, grunnkurs

Lecturer: Professor Ånund Killingtveit, Førsteamanuensis Rainer Kocheise

Coord.: Professor Ånund Killingtveit

Weekly hours: Autumn: 8F + 8Ø + 8S = 5Vt

Exam: Autumn 2000 Exam.support: B3 Exercises: O Grade: TE

**Objectives:** The course is offered in English to the students in the first year in the MSc programme "Hydropower Development". The course covers the basics in geo-subjects for civil engineers.

**Prerequisites:** Admission to the MSc programme requires as a minimum 3 year BSc in civil engineering/Water resources engineering and 2 to 5 years of relevant experience.

**Contents:** Each topic is dealt with over one or two weeks and the course covers: Engineering geology, Embankment Dams, Rock blasting and tunnelling, Properties of concrete, Soil Mechanics, Concrete dams/structures.

**Teaching methods:** Each topic is taught over one or two weeks. The lecturers come from the university, SINTEF and senior projecting engineers, all with international experience. Lectures and exercises in English.

**Course material:** Books from the series Hydropower Development and supplementary lecture notes (English).

**Type of examination:** Written.

### MSB5091 HYDROPOWER PLAN 2 BC Hydropower Planning 2, Basic Course Vannkraftplanlegging 2, grunnkurs

Lecturer: Professor Ånund Killingtveit

Weekly hours: Autumn: 8F + 8Ø + 8S = 5Vt

Exam: Autumn 2000 Exam.support: B3 Exercises: O Grade: TE

**Objectives:** The course is offered in English to the students in the first year in the MSc programme "Hydropower Development". The course covers the basics in hydro-subjects for civil engineers.

**Prerequisites:** Admission to the MSc programme requires as a minimum 3 year BSc in civil engineering/Water resources engineering and 2 to 5 years of relevant experience.

**Contents:** Each topic is dealt with over one or two weeks and the course covers: Basic and applied hydrology, Turbines and surge tanks, Hydraulics/Hydraulic design, Electro-mechanical equipment, Scour and sediment transport, Power House Design.

**Teaching methods:** Each topic is taught over one or two weeks. The lecturers come from the university, SINTEF and senior projecting engineers. All Lectures and exercises in English.

**Course material:** Books from the series Hydropower Development and supplementary lecture notes (English).

**Type of examination:** Written.

### MSB5092 HYDROPOWER PLAN 3 BC Hydropower Planning 3, Basic Course Vannkraftplanlegging 3, grunnkurs

Lecturer: Professor Ånund Killingtveit

Weekly hours: Spring: 8F + 8Ø + 8S = 5Vt

Exam: Spring 2001 Exam.support: B1 Exercises: O Grade: TE

**Objectives:** The course is offered in English to the students in the first year in the MSc programme "Hydropower Development". The course covers the basics in economics, environmental issues and project management for civil engineers.

**Prerequisites:** Admission to the MSc programme requires as a minimum 3 year BSc in civil engineering/Water resources engineering and 2 to 5 years of relevant experience.

**Contents:** Each topic is dealt with over one or two weeks and the course covers: Economic design criteria, Project management, Investment and socio-economic analysis, Implementation of hydropower/water resources projects, Environmental impact studies, Construction management.

**Teaching methods:** Each topic is taught over one or two weeks. The lecturers come from the university, SINTEF and senior projecting engineers, all with international experience. Lectures and exercises in English.

**Course material:** Books from the series Hydropower Development and supplementary lecture notes (English).

**Type of examination:** Oral.

**MSB5094 RIVER SYSTEM ANAL AC**  
**River System Analysis, Advanced Course**  
**Hydrofysiske vassdragsstudier, videregående kurs**

Lecturer: Professor Ånund Killingtveit

Weekly hours: Autumn: 6F + 6Ø + 5S = 3,5Vt

Exam: Autumn 2000 Exam.support: B1 Exercises: O Grade: TE

**Objectives:** The course is offered in English to the students in the second year in the MSc programme "Hydropower Development". The course objective is extended knowledge of computer/numerical model applications in river system studies.

**Prerequisites:** The course assumes completion of the basic course MSB5091 Hydropower Planning 2 in the first year of the MSc programme.

**Contents:** Discussion and application of the main computer models for river system analysis. Applied separately or integrated (River System Simulator).

**Teaching methods:** Lectures, workshops, computer model applications, both as exercises and applied on actual rivers.

**Course material:** Articles, reports and computer model descriptions (English).

**Type of examination:** Written.

**MSB5096 WITHDRAWAL WATER AC**  
**Withdrawal of Water from Sediment Carrying Rivers, Advanced Course**  
**Vannuttak i sandførende elver, videregående kurs**

Lecturer: Førsteamanuensis Haakon Støle

Weekly hours: Autumn: 5F + 5Ø + 5S = 3Vt

Exam: Autumn 2000 Exam.support: B1 Exercises: O Grade: TE

**Objectives:** The course is offered in English to the students in the second year in the MSc programme "Hydropower Development". The course covers planning, design and operation of headworks in sediment carrying rivers.

**Prerequisites:** The course assumes completion of the basic course MSB5091 Hydropower Planning 2 in the first year of the MSc programme.

**Contents:** Extended discussion of sediment transport theory and field studies. Planning criteria for headworks. Sampling programmes and routines for operation of headworks.

**Teaching methods:** Lectures, workshops, application of two-and-three-dimensional numerical models, literature survey (English).

**Course material:** Dr. Thesis by Nils B. Olsen and by Haakon Støle. Supplementary articles and reports (English).

**Type of examination:** Oral.

**MSB5098 HYDROPOWER PROJECT**  
**Hydropower Plants, Project Work**  
**Vannkraftverk, prosjekt**

Lecturer: Professor Ånund Killingtveit

Weekly hours: Spring: 24Ø = 5Vt

Exam: - Exam.support: - Exercises: O Grade: TØ

**Objectives:** The project assignment objectives are the application of integrated planning, covering technical, economic and environmental issues.

**Prerequisites:** The project work assumes completion of the basic courses: Hydropower Planning 1, 2 and 3.

**Contents:** The projects will result in a prefeasibility study for an actual river system.

**Teaching methods:** Lectures covering the planning process. Supervision as requested by the students.

**Course material:** Maps, hydrology- and geology data, cost data, etc.

**Type of examination:** Exercises.

**MSG0595 ROCK ENGINEERING AC**  
**Rock Engineering, Advanced Course**  
**Anvendt ingeniørgeologi, videregående kurs**

Lecturer: Professor Einar Broch, Professor Bjørn Nilsen

Coord.: Professor Einar Broch

Weekly hours: Autumn: 6F + 6Ø + 5S = 3,5Vt

Exam: Autumn 2000 Exam.support: A1 Exercises: O Grade: TE

**Objectives:** The course is offered in English to the students in the second year in the MSc programme "Hydropower Development". The course objective is extended applied knowledge in rock engineering.

**Prerequisites:** The course assumes completion of the basic course MSB5090 Hydropower Planning 1 in the first year of the MSc programme.

**Contents:** Extended coverage of priority topics such as tunnels, underground caverns, rock slope, stability, etc.

**Teaching methods:** Lectures, workshops, field studies, literature survey (English).

**Course material:** Bjørn Nilsen and Alf Thidemann: Rock Engineering, supplementary articles, cases, reports (English).

**Type of examination:** Oral.

## FACULTY OF APPLIED EARTH SCIENCES

### SIG0515 BASIN ANALYSIS

#### Basin Analysis Bassenganalyse

Lecturer: Professor Stephen Lippard

Weekly hours: Spring: 2F + 3Ø + 7S = 2,5Vt

Time: Spring:

F mo 12-14 GEØ2

Ø th 15-18

GEØ2

Exam: May 28

Exam.support: B1

Exercises: O

Grade: TE

**Objectives:** To give an overview of the formation and development of sedimentary basins.

**Prerequisites:** BSc.

**Contents:** Characterization of sedimentary basins according to tectonic environment. Formation of different basin types and the factors effecting sediment infilling. Methods to evaluate the burial and thermal histories of basins.

**Teaching methods:** Lectures and exercises.

**Course material:** P.A. Allen & J.R. Allen: Basin Analysis, Principles and Applications, Blackwell Scientific Publications.

**Type of examination:** Written.

### SIG0527 DIAGENESIS/RES QUAL

#### Diagenesis/Reservoir Quality Diagenese/reservoarkvalitet

Lecturer: NN

Weekly hours: Spring: 2F + 2Ø + 8S = 2,5Vt

Time: Spring:

F th 12-14 GEØ2

Ø mo 17-19

GEØ2

Exam: May 16

Exam.support: B1

Exercises: O

Grade: TE

**Objectives:** Processes determining reservoir rock quality like porosity, permeability, pressure and kerogenity.

**Prerequisites:** BSc.

**Contents:** Physical and chemical changes in deep buried sediments. Main emphasis is put on processes leading to preservation and destruction of porosity, and formation of secondary porosity in potential reservoir rocks for hydrocarbons. Silicates. Carbonates. Interpretation of "Cases".

**Teaching methods:** Lectures and exercises.

**Course material:** Articles and compendium.

**Type of examination:** Written.

### MSG0590 PETROLEUM GEOLOGY

#### Petroleum Geology Petroleumsgeologi

Lecturer: Førsteamanuensis Sverre Ola Johnsen

Weekly hours: Autumn: 3F + 2Ø + 7S = 2,5Vt

Time: Autumn: As agreed

Exam: Dec 4

Exam.support: B1

Exercises: O

Grade: TE

**Objectives:** The course gives geological knowledge of a variety of basin types of different ages, development stages and petroleum potential.

**Prerequisites:** BSc.

**Contents:** Plate tectonics of basin classification and formation. Rift, passive margin and foreland-type basins with examples from Northwest Europe, Canada and the Middel East. The geological development of other hydrocarbon provinces in the world.

**Teaching methods:** Lectures, exercises and seminars. Video films will be used in some parts of the course. Given as self study course combined with exercises for master students.

**Course material:** Selected articles and books.

**Type of examination:** Written.

**SIG4017      ENG ENVIR GEOPHYS**  
**Engineering and Environmental Geophysics**  
**Ingeniør- og miljøgeofysikk**

Lecturer: Professor Ole Bernt Lile

Weekly hours: Autumn: 2F + 2Ø + 8S = 2,5Vt

Time: Not given for Master of Science in 2000/2001

Exam: -                                      Exam.support: B1                      Exercises: O                      Grade: TEØ

**Objectives:** Understanding how geophysical methods can contribute to mapping the earth for various purposes e.g. engineering geology, hydrogeology, soil mechanics and environmental engineering.

**Prerequisites:** Subject SIG4002 Applied geophysics part, or equivalent.

**Contents:** Electrical methods. Resistivity (RP). Profiling. Vertical electrical sounding (VES). Electromagnetic methods (VLF) Groundprobing radar (GPR). Refraction seismics. Reflection seismics. Nuclear/Proton magnetic resonance (NMR/PMR).

**Teaching methods:** Project work. Interpretation. Measurements and demonstrations in field. Lectures. The project work has 60% weight of the final grade

**Course material:** Textbook. Technical Reports. Lecture notes.

**Type of examination:** Written + exercises.

**SIG4024      SEISMIC INTERPRET**  
**Seismic Interpretation**  
**Seismisk tolkning**

Lecturer: Førsteamanuensis Egil Tjøland, Professor II Ståle Johansen

Coord.: Førsteamanuensis Egil Tjøland

Weekly hours: Autumn: 2F + 3Ø + 7S = 2,5Vt

Time: Autumn:

F th 08-10 P1

Ø mo 11-14 P1

Exam: Dec 8                                      Exam.support: B1                      Exercises: O                      Grade: TEØ

**Objectives:** The course gives knowledge of advanced interpretation and modelling of reflection seismic data by use of computers.

**Prerequisites:** None.

**Contents:** Interpretation of two-dimensional and three-dimensional seismic data on a graphic workstation. Seismic time maps. Depth conversion of seismic time maps (both from stacked and time-migrated seismic sections). Post-stack inversion of seismic data. Three-dimensional seismic modelling using dynamic ray theory. Design of seismic surveys using seismic modelling.

**Teaching methods:** Lectures and exercises on workstation.

**Course material:** Course notes.

**Type of examination:** Written + exercises.

**SIG4035      RESERVOIR FLUIDS**  
**Reservoir Fluids and Flow**  
**Reservoarfluider og strømming**

Lecturer: Professor Curtis H. Whitson

Weekly hours: Autumn: 4F + 6Ø + 2S = 2,5Vt

Time: Not given for Master of Science in 2000/2001

Exam: -                                      Exam.support: B2                      Exercises: O                      Grade: TEØ

**Objectives:** Reservoir fluid's physical behaviour during well flow.

**Prerequisites:** None.

**Contents:** Hydrocarbon phase behaviour; PVT-lab.analysis; PVT-data in reservoir estimation; steady state conditions; radial flow; transient flow.

**Teaching methods:** Lectures and exercises. Exercises account for 50% of final grade.

**Course material:** Parts of Phase Behaviour SPE-monograph (Whitson and Brule). Handout notes and articles.

**Type of examination:** Written + exercises.

**SIG4038 RESERVOIR REC TECHN**  
**Reservoir Recovery Techniques**  
**Reservoarutvinningsteknikk**

Lecturer: Professor Jon Kleppe

Weekly hours: Autumn: 4F + 4Ø + 4S = 2,5Vt

Time: Autumn:

F tu 10-12 P1

Ø mo 17-18 P1

th 12-14 P1

3 hours as agreed

Exam: Nov 29

Exam.support: A1

Exercises: O

Grade: TEØ

**Objectives:** The course gives thorough knowledge of physical properties, principles and methods regarding recovery of oil and gas from reservoirs.

**Prerequisites:** None.

**Contents:** The course deals with internal and external energy sources, and the effects of such energies on the recovery of oil and gas from various types of petroleum reservoirs. Subjects covered are: Oil, gas and gas condensate fluid systems; single porosity and dual porosity reservoirs; microscopic and macroscopic displacement efficiencies; internal drive mechanisms; injection of water and gas; material balance equations; fluid flow equations; well patterns; introduction to improved recovery methods.

**Teaching methods:** Lectures and obligatory exercises. Exercises account for 25 % of final grade.

**Course material:** To be decided.

**Type of examination:** Written + exercises.

**SIG4042 RESERVOIR SIMULATION**  
**Reservoir Simulation**  
**Reservoarsimulering**

Lecturer: Professor Jon Kleppe

Weekly hours: Spring: 4F + 4Ø + 4S = 2,5Vt

Time: Spring:

F mo 10-12 P1

Ø fr 12-13 P1

tu 10-12 P1

3 hours as agreed

Exam: May 16

Exam.support: A1

Exercises: O

Grade: TEØ

**Objectives:** The course provides fundamental knowledge of mathematical simulation of the fluid flow in petroleum reservoirs.

**Prerequisites:** Course SIG4038 Reservoir Recovery Techniques.

**Contents:** The course develops the partial differential equations required for single-phase and multi-phase fluid flow in porous media, and numerical methods for solving the equations using finite difference methods. Subjects covered are: Summary of rock and fluid properties; development of PDEs; numerical solution of non-linear and linear systems of equations; reservoir simulation model types.

**Teaching methods:** Lectures and Fortran programming exercises. Lectures and obligatory exercises. Exercises account for 25 % of final grade.

**Course material:** Lecture notes.

**Type of examination:** Written + exercises.

**SIG4047 RESERVOIR SEISMICS**  
**Reservoir Seismics**  
**Reservoarseismikk**

Lecturer: Professor Bjørn Ursin

Weekly hours: Spring: 4F + 1Ø + 7S = 2,5Vt

Time: Spring:

F tu 10-12 P2

Ø mo 08-09 P1

fr 10-12 P2

Exam: May 26

Exam.support: B1

Exercises: O

Grade: TE

**Objectives:** Understanding seismic methods used in reservoir geology and in reservoir engineering.

**Prerequisites:** SIG4024 Seismic Interpretation.

**Contents:** Relation between reservoir parameters and seismic parameters. Seismic amplitude variations as a function of source - receiver distance (AVO). High resolution seismics. Examples of interpretation. Inversion of zero-offset. Well data vs. seismic data. Reservoir monitoring. Ocean bottom seismics.

**Teaching methods:** Lectures and exercises.

**Course material:** Compendium and articles from journals.

**Type of examination:** Written.

#### SIG4052 FORMATION EVAL 1

##### Formation Evaluation 1, Well Data Acquisition and Interpretation

##### Formasjonsevaluering 1, innsamling og tolking av brønndata

Lecturer: Amanuensis Helge Langeland

Professor Ole Bernt Lile

Coord.: Amanuensis Helge Langeland

Weekly hours: Autumn: 4F + 2Ø + 6S = 2,5Vt

Time: Autumn:

F we 10-12 P1

Ø tu 17-18 P1

th 14-16 P2

1 hour as agreed

Exam: Dec 18

Exam.support: B1

Exercises: O

Grade: TE

**Objectives:** Give a deeper understanding of data from boreholes, measurement methods used in boreholes, the information potential of these data and use in integrated evaluation of reservoirs.

**Prerequisites:** BSc.

**Contents:** The course focuses on selected topics from well data acquisition methods and the interpretation of these data, extending the concepts taught in the basic course in well logging. Basic petrophysical relations and points of view. Radiometric methods in open and cased boreholes: Spectrometry - natural and induced, neutron lifetime logging (saturation behind casing). Electrical and acoustic imaging the borehole wall. Data quality control and editing of data. Measurements while drilling, MWD. Logging and log interpretation in horizontal wells. Coring and core analyses - sources of errors in such data. Nuclear magnetic resonance measurements. Water saturation models in shaly formations. Computerized well data interpretation. The students are going to write and present a report on a topic based on studies of literature or data. There may be changes to some of the topics.

**Teaching methods:** Lectures, obligatory exercises, well data analysis software laboratory, semester project work.

**Course material:** To be announced at start of course.

**Type of examination:** Written.

#### SIG4054 FORMATION EVAL 2

##### Formation Evaluation 2 - Formation Mechanics and Rock Physics

##### Formasjonsevaluering 2 - Formasjonsmekanikk og bergartsfysikk

Lecturer: Professor Rune M. Holt

Weekly hours: Spring: 3F + 3Ø + 6S = 2,5Vt

Time: Spring:

F tu 08-10 P2

Ø fr 08-10 P2

th 11-12 P1

1 hour as agreed

Exam: May 12

Exam.support: B2

Exercises: O

Grade: TEØ

**Objectives:** The course will give a deeper understanding of the physical principles behind borehole and laboratory measurement methods and their use in formation evaluation.

**Prerequisites:** None

**Contents:** Acoustic wave propagation in rocks: The wave equation. P- and S-waves. Experimental observations and rock physics models, attenuation, anisotropy. Acoustic logging: Full waveform analysis, multipole sources. Fracture detection. Geosteering applications. Evaluation of rock mechanical parameters, stress determination. permeability evaluation from logs. Microscopic analysis of fluid flow, the Kozeny-carman equation. Nuclear magnetic resonance in core analysis, image analysis and well logging (NMR;NML) Mud logging.

**Teaching methods:** Lectures, exercises and laboratory exercises. The students write and present a report based on a literature study or data analysis.

**Course material:** Lecture notes.

**Type of examination:** Written + exercises.

**SIG4060 SEISMIC DATA**  
**Seismic Data Acquisition and Processing**  
**Seismisk datainnsamling og prosessering**

Lecturer: Professor Martin Landrø

Weekly hours: Autumn: 3F + 2Ø + 7S = 2,5Vt

Time: Not given for Master of Science in 2000/2001

Exam: - Exam.support: B1 Exercises: O Grade: TEØ

**Objectives:** The course gives an introduction to the acquisition and processing of data in reflection seismics.

**Prerequisites:** SIG4047 Reservoir Seismics.

**Contents:** Seismic data acquisition. Energy sources, sensors and recording instruments. Seismic arrays. Spatial sampling. Seismic modelling and data processing. Data formats and plotting. Deconvolution. Velocity analysis and stack. travel time computations. Two-dimensional filters. Dip move-out. Wave equation migration. Three-dimensional seismic methods. Processing of vertical seismic profiles. Seismic inversion. Amplitude versus offset.

**Teaching methods:** Lectures and exercises.

**Course material:** Lecture notes. O. Yilmaz: Seismic data processing, SEG, Tulsa.

**Type of examination:** Written + exercises.

**SIG4063 GRAVIMETR MAGNETOMET**  
**Gravimetry and Magnetometry**  
**Gravimetri og magnetometri**

Lecturer: Professor Il Odleiv Olesen

Weekly hours: Spring: 4F + 1Ø + 7S = 2,5Vt

Time: Spring:

F mo 10-12 P2

Ø tu 15-16 P2

fr 12-14 P2

Exam: May 7 Exam.support: B1 Exercises: O Grade: TE

**Objectives:** Giving the students knowledge of modern processing techniques of gravity and magnetometric data.

**Prerequisites:** Course MSG4120 Fundamentals of Petroleum Geoscience.

**Contents:** Potential field theory. Measurements and corrections. Filtering methods in space domain and frequency domain.

**Teaching methods:** Lectures and exercises.

**Course material:** Introduction to Geophysical Prospecting. Lecture notes.

**Type of examination:** Written.

**SIG4067 INT MULTI-LAT WELLS**  
**Intelligent Multi-lateral Wells**  
**Smarte grenbrønner, innføring**

Lecturer: Førsteamanuensis Hans J. Herfjord

Weekly hours: Autumn: 3F + 2Ø + 7S = 2,5Vt

Time: Not given for Master of Science in 2000/2001

Exam: - Exam.support: B3 Exercises: O Grade: TE

**Objectives:** Introduction to drilling, completion and intervention of multi-lateral wells.

**Prerequisites:** Course MSG4130 Fundamentals of Petroleum Engineering.

**Contents:** Planning; converting existing wells; inflow models; casing window; strength requirements; sandscreen; zonal isolation; intervention through coiled tubing and cable; junctions; downhole instruments.

**Teaching methods:** Lectures and exercises.

**Course material:** Compendium.

**Type of examination:** Written.

**SIG4077 HIGH DEV DRILLING**  
**High Deviation Drilling**  
**Høyavviksboring**

Lecturer: Professor Arild Rødland

Weekly hours: Autumn: 4F + 1Ø + 7S = 2,5Vt

Time: Autumn:

F mo 09-11 P2  
 tu 15-17 P1

Ø th 16-17 P1

Exam: Dec 2

Exam.support: B1

Exercises: O

Grade: TEØ

**Objectives:** The course gives an introduction to high deviation and horizontal drilling, methods and equipment, identifies parameters and conditions which are of importance to such drilling and provides insight into calculations and planning procedures for the boreholes.

**Prerequisites:** BSc.

**Contents:** Deviation drilling, history and background. Basic equipment and methodology for drilling of deviated boreholes, axial movement, rotation and pumping, also basic methodology for borehole integrity maintenance, mud and casing programs. Hole direction management and control. Calculation of borehole patterns, for achieving accuracy. Drillstring in tension and compression, buckling and buckling criteria. Use of drillbit thrusters. Slimhole drilling and -strings. Coiled tubing drilling.

**Teaching methods:** Lectures and voluntary exercises. Exercises account for 50% of final grade.

**Course material:** Dedicated compendium. Additional textbooks will be identified during the course.

**Type of examination:** Written + exercises.

**SIG4080 PRESSURE CONTROL**  
**Pressure Control**  
**Trykkkontroll**

Lecturer: Førsteamanuensis Pål Skalle

Weekly hours: Spring: 4F + 1Ø + 7S = 2,5Vt

Time: Spring:

F mo 08-10 P2  
 th 12-14 P1

Ø tu 12-13 P2

Exam: May 19

Exam.support: B1

Exercises: O

Grade: TEØ

**Objectives:** Enable the student to handle gas influx to the well.

**Prerequisites:** BSc.

**Contents:** How to detect high pressure zones during drilling, including standard and advanced  $d_c$ -method; reasons why mud volume is varying; pressure control equipment; close-in procedures; killing procedures; pressure control simulation, including effect of solubility and gas rise velocity.

**Teaching methods:** Lectures and problem based learning.

**Course material:** ADE SPE book and compendium.

**Type of examination:** Written + exercises.

**SIG4083 FRACTURED RESERVOIRS**  
**Fractured Reservoirs**  
**Oppsprukne reservoirer**

Lecturer: Professor Ole Torsæter

Weekly hours: Spring: 3F + 2Ø + 7S = 2,5Vt

Time: Spring:

F tu 14-15 P1  
 th 13-15 P2

Ø fr 13-15 P1

Exam: May 26

Exam.support: B1

Exercises: O

Grade: TE

**Objectives:** The course gives thorough knowledge of methods for analysis of flow in fractured reservoirs.

**Prerequisites:** Knowledge of basic principles of reservoir engineering.

**Contents:** Classification of and concepts for fractured reservoirs. Modelling. Geological reasons for fracturing. Detection, evaluation and characterization of fracture systems. One phase flow: Well tests, storage effects, type curves. Drive mechanisms: capillary forces, gravity, viscous forces, diffusion. Production models: Water drive - and gas cap drive - models, modified material balance models and numerical simulation models.

**Teaching methods:** Lectures and exercises.

**Course material:** T.D. van Golf Racht: Fundamentals of fractured reservoir engineering, Elsevier 1982, Papers and lecture notes.

**Type of examination:** Written.

**SIG4087 WELL TECHNOLOGY**  
**Well Technology**  
**Brønnteknologi**

Lecturer: Professor Michael Golan

Weekly hours: Spring: 3F + 2Ø + 7S = 2,5Vt

Time: Spring:

F mo 12-14 P1

Ø tu 15-17 P1

th 14-15 P1

Exam: May 7

Exam.support: B3

Exercises: O

Grade: TEØ

**Objectives:** To extend and deepen the knowledge of the mechanics, hydraulics, performance and design of oil and gas wells.

**Prerequisites:** BSc.

**Contents:** Well architecture and layout of production and injection wells. Well hardware and equipment engineering. Well completion operations and processes. A few selected topics from among the following: Formation damage, stimulation, subsea completions, sand control, production logging, horizontal well production, modelling of multi-phase flow in wells.

**Teaching methods:** Lectures and exercises. Exercises account for 20% of final grade.

**Course material:** To be announced by the teacher before the course starts.

**Type of examination:** Written + exercises.

**MSG4110 MATH/COMPUTER METHOD**  
**Applied Mathematics and Computer Methods in Petroleum**  
**Anvendt matematikk og datateknikk i petroleumsfag**

Lecturer: Professor Jon Kleppe

Weekly hours: Autumn: 2F + 8Ø + 2S = 2,5Vt

Time: Autumn: As agreed

Exam: -

Exam.support: -

Exercises: O

Grade: TØ

**Objectives:** Review of important mathematical concepts and develop skills in numerical techniques and computer applications used for solving petroleum related technical problems.

**Prerequisites:** None.

**Contents:** The course covers methods for curve fitting, numerical differentiation, integration, interpolation, solution of equations, solution of systems of equations, statistical methods, numerical solution of differential equations etc. With applications to typical problems in petroleum engineering and geoscience. Emphasis is put on individual programming and use of software packages on the department computers.

**Teaching methods:** Lectures and Fortran programming exercises.

**Course material:** W.H. Preuss and S.A. Teukolsky: Numerical Recipes in Fortran (2nd edition), Cambridge University Press, Cambridge, 1992. Fortran textbook to be announced.

**Type of examination:** Exercises.

**MSG4120 FUND PET GEO**  
**Fundamentals of Petroleum Geoscience**  
**Innføring i petroleumsgEOFag**

Lecturer: Førsteamanuensis Egil Tjøland

Weekly hours: Autumn: 4F + 2Ø + 6S = 2,5Vt

Time: Autumn: As agreed

Exam: Not decided

Exam.support: B1

Exercises: O

Grade: TE

**Objectives:** Refresh basic concepts and strengthen the background in petroleum geoscience.

**Prerequisites:** BSc.

**Contents:** Formation evaluation: Introduction to well data evaluation; The borehole environment; Log measurements: Resistivity, caliper, gamma ray, porosity, acoustic travel time; Archie's equations; Lithology, shaliness; interpretation of log data and core data. Seismic: Seismic wave types; seismic velocity; seismic data acquisition; layer properties; convolutional model; seismic resolution; migration. Reservoir geology: Introduction to the petroleum geology of the North Sea.

**Teaching methods:** Lectures and mandatory exercises.

**Course material:** Compendium, K.W. Glennie: Introduction to the petroleum of the North Sea.

**Type of examination:** Written.

**MSG4130 FUND PET ENG**

**Fundamentals of Petroleum Engineering**

**Innføring i petroleumsteknologi**

Lecturer: Førsteamanuensis Pål Skalle

Weekly hours: Autumn: 4F + 2Ø + 6S = 2,5Vt

Time: Autumn: As agreed

Exam: Not decided      Exam.support: B1      Exercises: O      Grade: TE

**Objectives:** Refresh basic concepts and strengthen the background in petroleum engineering.

**Prerequisites:** BSc.

**Contents:** Formation evaluation: Introduction to well data evaluation; The borehole environment; Log measurements: Resistivity, caliper, gamma ray, porosity, acoustic travel time; Archie's equations; Lithology, shaliness; interpretation of log data and core data. Drilling: Onshore and offshore drilling; drilling fluids; well control; wellbore stability. Production: Reservoir fluids; reservoir vs. separator conditions; phase behaviour and phase separation; thermodynamics. Reservoir: Porosity; saturation; capillary pressure; wettability; assessment recovery factor; primary and improved oil recovery; well test analysis.

**Teaching methods:** Lectures and mandatory exercises.

**Course material:** Compendium.

**Type of examination:** Written.

**MSG4140 PETROLEUM ECONOMICS**

**Petroleum Economics**

**Petroleumsøkonomi**

Lecturer: Førsteamanuensis Pål Skalle

Weekly hours: Spring: 3F + 2Ø + 7S = 2,5Vt

Time: Spring: As agreed

Exam: Not decided      Exam.support: B1      Exercises: O      Grade: TE

**Objectives:** Enhance understanding of the principal economic framework within petroleum sector.

**Prerequisites:** BSc.

**Contents:** Oil price model; An introduction to the economic theory of exhaustible resources. Capital budgeting techniques and decision analysis: The main methods of evaluation of investment projects - including the effects of taxes and price variations, cost of capital and the main principles in economic risk analysis.

**Teaching methods:** Lectures and exercises.

**Course material:** Detailed information will be given at the beginning of the course.

**Type of examination:** Written.

## FACULTY OF MARINE TECHNOLOGY

### MSG4110 MATH/COMPUTER METHOD Applied Mathematics and Computer Methods in Petroleum Anvendt matematikk og datateknikk i petroleumsfag

Lecturer: Professor Jon Kleppe

Weekly hours: Autumn: 2F + 8Ø + 2S = 2,5Vt

Time: Autumn 2001

Exam: - Exam.support: - Exercises: O Grade: TØ

**Objectives:** Review of important mathematical concepts and develop skills in numerical techniques and computer applications used for solving petroleum related technical problems.

**Prerequisites:** None.

**Contents:** The course covers methods for curve fitting, numerical differentiation, integration, interpolation, solution of equations, solution of systems of equations, statistical methods, numerical solution of differential equations etc. With applications to typical problems in petroleum engineering and geoscience. Emphasis is put on individual programming and use of software packages on the department computers.

**Teaching methods:** Lectures and Fortran programming exercises.

**Course material:** W.H. Preuss and S.A. Teukolsky: Numerical Recipes in Fortran (2nd edition), Cambridge University Press, Cambridge, 1992. Fortran textbook to be announced.

**Type of examination:** Exercises.

### SIN1040 ELEM METHODS STRUCT Finite Element Methods in Structural Analysis Elementmetoden anvendt i konstruksjonsanalyse

Lecturer: Professor Torgeir Moan

Weekly hours: Autumn: 3F + 4Ø + 5S = 2,5Vt

Time: Not decided

Exam: Dec 2001 Exam.support: B1 Exercises: O Grade: TE

**Objectives:** The objectives of the course is to provide an introduction in the theoretical basis of the finite element method and how the method can be used to model and analyse marine structures and how computational results can be evaluated.

**Prerequisites:** Subject MSN1080 Marine Structures, BC and MSN1570 Marine Hydrodynamics, BC or similar.

**Contents:** Energy principles and their application in the derivation of stiffness and load properties of elements. Beam, membrane and plate elements as well as superelement and substructure techniques are covered. The application to typical components in marine structures and numerical problems associated with practical use of the method is discussed. Exercises covering theoretical issues as well as the practical use of computer programs are given.

**Teaching methods:** Lectures and compulsory exercises.

**Course material:** Various textbooks in English (further information in the first lecture).

**Type of examination:** Written.

### SIN1045 FAT FRACT COLL STRUC Fatigue Fracture and Collaps of Marine Structures Utmatting og sammenbrudd av marine konstruksjoner

Lecturer: Professor Stig Berge

Weekly hours: Spring: 3F + 3Ø + 6S = 2,5Vt

Time: Not decided

Exam: May/June 2002 Exam.support: B2 Exercises: O Grade: TEØ

**Objectives:** Give an understanding of the physical principles and basic theory of fatigue, fracture, buckling and plastic collapse of structures. Provide methods for analysis and design of marine structures to prevent such failures.

**Prerequisites:** Basic knowledge in Mechanics (Statics and Strength of Materials), Materials Technology and Structural Analysis on BSc/BEng-level or similar.

**Contents:** Fatigue and Fracture: Applied linear-elastic and elastic-plastic fracture mechanics, materials characterisation by  $K_{IC}$  and CTOD. Defect assessment methods. Fatigue of structures, cumulative damage, fracture mechanics analysis of fatigue, residual life analysis. Stress corrosion cracking, corrosion fatigue, fatigue design of marine structures. Methods for inspection planning, quality control, and maintenance of structures. Case studies. Collapse: Design principles, limit state of ultimate collapse, codes and guidance notes. Yield hinge theory and

mechanism analysis of beams and frames. Buckling of beam-columns and frames. Buckling of stiffened plates under uni- and multiaxial stress states.

**Teaching methods:** Lectures, compulsory exercises, laboratory demonstrations.

**Course material:** Compendia, lecture notes and T.H. Sørenseide: Ultimate Load Analysis of Marine Structures, Tapir, 1981.

**Type of examination:** Written.

**SIN1046 OFFSHORE STRUCTURES**  
**Design of Offshore Structures**  
**Havkonstruksjoner**

Lecturer: Professor Torgeir Moan

Weekly hours: Spring: 3F + 3Ø + 6S = 2,5Vt

Time: Not decided

Exam: May/June 2002      Exam.support: B2      Exercises: O      Grade: TEØ

**Objectives:** The objectives of the course are to give students instruction in the conceptual design of structures used in exploiting hydrocarbons and other resources offshore; as well as to determine scantlings and inspection plans for such structures.

**Prerequisites:** Subject MSN1080 Marine Structures, BC or equivalent.

**Contents:** Overview of structural concepts. Serviceability and safety requirements, especially accidental collapse limit state. Fabrication and installation requirements. Inspection planning. Review of loads, load effects and (system) strength analysis and dimensioning. Load carrying behaviour of alternative structural layouts. Use of steel, aluminium and other materials. Selection of system layout (hull, positioning and riser system). Service vessels.

**Teaching methods:** Lectures, exercises. Some of the exercises count 40% in the grading.

**Course material:** Lecture notes, papers.

**Type of examination:** Written + exercises.

**MSN1080 MARINE STRUCT BC**  
**Marine Structures, Basic Course**  
**Marine konstruksjoner, grunnkurs**

Lecturer: Professor Bernt Leira

Weekly hours: Summer: 3F + 4Ø + 5S = 2,5Vt

Time: Not decided

Exam: August 2001      Exam.support: B1      Exercises: O      Grade: TE

**Objectives:** The course gives the students the basic knowledge in marine structures which is necessary for studies in the MSc programme in marine technology.

**Prerequisites:** Basic knowledge in statics and strength of materials at BSc/BEng-level or similar.

**Contents:** The precourse deals with structural design and methods of analysis for ships and other types of marine structures. The following main topics are covered: Stress analysis of plates. Buckling of beams and plates. Stochastic analysis. Design and analysis of ships, semisubmersibles and compliant platforms. Design philosophy and criteria. Rules and regulations.

**Teaching methods:** Lectures and compulsory exercises.

**Course material:** Lecture notes.

**Type of examination:** Written.

**MSN1082 MARINE DYN BC**  
**Marine Dynamics, Basic Course**  
**Marin dynamikk, grunnkurs**

Lecturer: Professor Carl Martin Larsen

Weekly hours: Summer: 3F + 4Ø + 5S = 2,5Vt

Time: Not decided

Exam: August 2001      Exam.support: B1      Exercises: O      Grade: TE

**Objectives:** The principles and methods relevant to dynamic response of marine structures will be explained.

**Prerequisites:** Basic knowledge in dynamics at BSc/BEng-level or similar.

**Contents:** One degree of freedom systems and modelling of continuous systems using generalised co-ordinates. Eigenfrequency-calculation of beams using the differential equation energy method. Calculation of forced response in time and frequency domain modal superposition. Response in ship-hull and motion of typical floating structures e.g. floaters, and tension leg platforms. Irregular waves and wave spectra, short-time and long-time statistics of waves. Transfer functions and response statistics. Separation of vortices. Anchor lines.

**Teaching methods:** Lectures and exercises.

**Course material:** Lecture notes.

**Type of examination:** Written.

**MSN1089      MARIN STRUCT PROJECT**  
**Marine Structures, Project**  
**Marin konstruksjonsteknikk, prosjekt**

Lecturer: N.N.

Weekly hours: Spring: 12Ø = 2,5Vt

Time: As agreed

Exam: -                                      Exam.support: -                                      Exercises: O                                      Grade: TØ

**Objectives:** Introductory and preparatory studies for thesis work within the area of marine structures.

**Prerequisites:** Various courses within the area of marine structures and marine hydrodynamics, dependent of the topic of the thesis.

**Contents:** Literature search, study of relevant literature references, reporting of a state-of-art pre-study including a work plan for the thesis work.

**Teaching methods:** Supervised project.

**Course material:** -

**Type of examination:** Exercises (Pre-project report).

**SIN1540      SEA LOADS**  
**Sea Loads**  
**Sjøbelastninger**

Lecturer: Professor Odd Faltinsen

Weekly hours: Autumn: 3F + 4Ø + 5S = 2,5Vt

Time: Not decided

Exam: Dec 2001                                      Exam.support: B1                                      Exercises: O                                      Grade: TE

**Objectives:** To generate physical understanding and to make use of simple methods for an early design stage, for marine operation planning or for checking practical computer results or model experiments.

**Prerequisites:** MSN1570 Marine hydrodynamics, BC or similar.

**Contents:** Motions, accelerations and wave loads on high-speed vessels. Mean and slowly varying motions of moored structures in waves, wind and current. Slamming.

**Teaching methods:** Lectures and compulsory exercises.

**Course material:** O.M.Faltinsen: Sea Loads on Ships and Offshore Structures, Cambridge University Press, 1990.

**Type of examination:** Written.

**SIN1545      NAVAL HYDRODYNAMICS**  
**Naval Hydrodynamics**  
**Skipshydrodynamikk**

Lecturer: Professor Knut Minsaas

Weekly hours: Spring: 3F + 6Ø + 3S = 2,5Vt

Time: Not decided

Exam: May/June 2002                                      Exam.support: B1                                      Exercises: O                                      Grade: TEØ

**Objectives:** To make the students familiar with procedures for calculations of resistance, propulsion and evaluation of manoeuvring and steering ability of high speed craft and conventional ships. To make the students familiar with selection and design of proper propulsion and manoeuvring systems.

**Prerequisites:** Subject MSN1570 Marine hydrodynamics, BC or corresponding knowledge.

**Contents:** Application of lifting line and lifting surface theory in the design of propulsors, rudders, foils etc.

Application of theory and experimental methods in calculation of resistance and in calculation of hydrodynamical characteristics of waterjets, tunnel thrusters and rotatable thrusters. Propeller induced vibration and noise. Influence of fouling, wind and waves on resistance and propulsion. Horizontal stability and maneuverability characteristics of conventional ships.

**Teaching methods:** Lectures and compulsory exercises. Some of the exercises count 33% in the grading.

**Course material:** Knut Minsaas: Compendium - Marine technology 1 & Marine Technology 3.

**Type of examination:** Written + exercises.

**SIN1546 MARINE OPERATIONS****Marine Operations  
Marine operasjoner**

Lecturer: Professor Il Finn Gunnar Nielsen

Weekly hours: Spring: 3F + 3Ø + 6S = 2,5Vt

Time: Not decided

Exam: May/June 2002 Exam.support: B1 Exercises: O Grade: TE

**Objectives:** Provide insight into how marine operations are executed and how motions, loads and regularity of operations can be calculated. Emphasis is given to description of how waves and current influence the operations.

**Prerequisites:** MSN1080 Marine Structures, BC and SIN1548 Stochastic Theory of Sealoads or similar.

**Contents:** Marine- and subsea operations related to installation and operation of offshore oil and gas fields are described. Among others, issues related to towing of structures, lifting operations, launching, pipe laying, subsea operations, oil recovery and regularity will be discussed. Main focus is on dynamic and hydrodynamic problems. Methods for estimating loads and responses in waves and current are discussed.

**Teaching methods:** Lectures and exercises.

**Course material:** Lecture notes: including T.E. Berg's lecture notes .

**Type of examination:** Written.

**SIN1548 STOCH THEORY SEALOAD  
Stochastic Theory of Sealoads  
Sjøbelastningsstatistikk**

Lecturer: Professor Dag Myrhaug

Weekly hours: Autumn: 3F + 3Ø + 6S = 2,5Vt

Time: Not decided

Exam: Dec 2001 Exam.support: B1 Exercises: O Grade: TE

**Objectives:** The principles and methods which are used to describe stochastic processes will be explained. The emphasis will be on the applications to sealoads and motions of marine systems, and to make the students able to use such principles and methods.

**Prerequisites:** Basic knowledge in statistics on BSc/BEng-level. MSN1570 Marine Hydrodynamics, BC and MSN1082 Marine Dynamics, BC.

**Contents:** Transformation of random variables. Monte Carlo simulation. Probability distributions for response. Parameter-estimation. Extreme-value statistics. Stochastic processes. Auto- and cross-correlation functions. Spectra and cross-spectra. Differentiation of stochastic processes. Excitation-response of stochastic processes. Equivalent linearization. Response-statistics.

**Teaching methods:** Lectures and exercises.

**Course material:** D.E. Newland: An introduction to random vibrations, spectral and wavelet analysis, 3rd edition, 1993. D. Myrhaug: Lecture notes. Moan et al.: Statistical analysis of uncertainty, Lecture notes.

**Type of examination:** Written.

**MSN1570 MARINE HYDRODYN BC  
Marine Hydrodynamics, Basic Course  
Marin hydrodynamikk, grunnkurs**

Lecturer: Professor Odd Faltinsen

Weekly hours: Summer: 4F + 4Ø + 4S = 2,5Vt

Time: Not decided

Exam: August 2001 Exam.support: B1 Exercises: O Grade: TE

**Objectives:** Give the basic knowledge in marine hydrodynamics and ocean environment which is necessary for studies in the MSc programme in marine technology.

**Prerequisites:** Basic knowledge in fluid mechanics on BSc/BEng-level or similar.

**Contents:** Review of important parts of fluid dynamics. Introduction to marine hydrodynamics. Potential flow. Linear waves. Wave statistics. Wave induced forces on fixed and floating bodies. Motion of floating bodies.

**Teaching methods:** Lectures and compulsory exercises.

**Course material:** Lecture notes.

**Type of examination:** Written.

**MSN1579    MARINE HYDRO PROJECT**  
**Marine Hydrodynamics, Project**  
**Marin hydrodynamikk, prosjekt**

Lecturer: Professor Odd M. Faltinsen

Weekly hours: Autumn: 12Øs = 2,5Vt

Time: As agreed

Exam: -                                      Exam.support: -                                      Exercises: O                                      Grade: TØ

**Objectives:** Introductory and preparatory studies for thesis work within the area of marine hydrodynamics.

**Prerequisites:** Various courses within the area of marine hydrodynamics, dependent on the topic of the thesis.

**Contents:** Studying necessary literature references and working out a plan of progress for the thesis work.

**Teaching methods:** Supervised project.

**Course material:** -

**Type of examination:** Exercises.