PROPOSTA DE MÀSTERS PRESENTATS A LA 3a CONVOCATÒRIA ERASMUS-MUNDUS COASTAL AND MARINE ENGINEERING AND MANAGEMENT

Acord núm. 168/2005 pel qual es ratifica la proposta de Master Coastal and Marine Engineering and Management

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Comissionat de l'Espai Europeu d'Educació Superior
Juny 2005

Directorate-General for Education and Culture

ERASMUS MUNDUS

CoMEM Erasmus Mundus M.Sc.

Coastal and Marine Engineering and Management

Laboratori d'Enginyeria Marítima
UNIVERSITAT POLITÈCNICA DE CATALUNYA

University of Southampton

TU Delft

NTNU
Norwegian University of Science and Technology

City University London

6/14/2005

Erasmus-Mundus MSc Course CoMEM - Coastal and Marine Engineering and Management

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Education and Culture

Erasmus Mundus

Reserved for the Commission

Number	Date of Postmark

ERASMUS MUNDUS PROGRAMME

Application Form for Action 1:

ERASMUS MUNDUS MASTERS COURSES

You are applying for:

☒ An Erasmus Mundus Masters Course without a preparatory year

☐ An Erasmus Mundus Masters Course including a preparatory year

CLOSING DATE FOR SUBMISSION:

31 MAY 2005
(as per postmark)

Important instructions and information regarding the application and selection procedure

- Before completing the form, please read the relevant sections in the *Erasmus Mundus Call for Proposals EAC/04/05* and the *Administrative and Financial Handbook for Erasmus Mundus Projects*. Further information can be found on the Erasmus Mundus website: http://europa.eu.int/comm/education/programmes/mundus/index_en.html .

- Please note that even if you apply for an Erasmus Mundus Masters Course including a preparatory year, your application – if successful - would be selected for five years. You are therefore required to answer all questions under Section 2 of the application form.

- Your proposal will be assessed on the basis of the elements included in this application only. You can include web site references in your application, but the assessment of your proposal will not be based on additional technical information found on a web site and not contained within the application.

- Applicants should use as application language the operational language of communication between the institutions involved in the Masters Course.

- The application must be typewritten or word-processed using a computer, character size 11 pt minimum.

- The original of the application must bear the original signature of the legal representative of the co-ordinating institution and the original stamp of this institution.

- The application must be accompanied by copies of letters from the appropriate authorities of each institution participating in the Masters Course, confirming their agreement with the application as submitted.

- Applications must be sent by post **and** e-mail by the closing date. The paper copy is authentic. Applications sent by e-mail only or sent by fax will not be accepted. Annexes which are not available electronically need not be sent by e-mail.

- The signed original of the application and 2 copies thereof must be sent in the same envelope **by 31 May 2005 (as per postmark)** to:

  European Commission
  Directorate-General for Education and Culture
  Directorate B – Unit B/6
  Bureau: B -- 7 06/32
  B-1049 Brussels
  E-Mail: EAC-Erasmus-Mundus@cec.eu.int
  Fax: (+32) (2) 296.32.33

  Because of the tight timing for the assessment of applications, you are requested to send your application **by rapid mail so that it reaches the Commission no later than 7 June 2005**.

- A paper copy **and** an electronic copy of the original application must be sent by 31 May 2005 to the appropriate National Structure in each of the countries which are participating in the Masters Course. The list of National Structures appears in the *Erasmus Mundus Call for Proposals EAC/04/05* and on the website indicated above.

- All applications will receive an acknowledgement slip.

- Applications will be judged against the eligibility, selection and award criteria set out in the *Erasmus Mundus Call for Proposals EAC/04/05.*

- Applicants will be notified about the outcome of the selection in writing in September 2005. A copy of the notification letter will be sent to the National Structures concerned.

- In accordance with standard Commission practice, the information provided in your application may be used for the purposes of evaluating the Erasmus Mundus programme. The relevant data protection regulations will be respected.

- Any questions relating to this proposal should be addressed to the address indicated above.

SECTION 1 - IDENTIFICATION

1. Title of the Masters Course

Please use a maximum of 12 words; start with an acronym or abbreviation, if applicable.

CoMEM Erasmus Mundus MSc- Coastal and Marine Engineering and Management

If your title is not in English, French or German, please provide a translation into any of the three languages.

2. Summary description of the Masters Course (maximum 500 words)

Please identify clearly the following aspects of your Masters Course:

- Objectives of the Masters Course, qualifications obtained, duration, language(s) of instruction, size of student population, professor / student ratio;
- Summary of study programme;
- List of higher education institutions involved in the Masters consortium[1], including locations and mobility arrangements;
- Precise degree awarded (by which institutions and recognised in which countries);
- Admission criteria.

If your application is successful, this summary will be used as the official description of the Masters Course. It will be part of your grant agreement and published on the internet. You are therefore kindly requested to formulate it very carefully and to provide this summary in English, French or German.

The focus of the 'Erasmus Mundus MSc - Coastal and Marine Engineering and Management,' is to educate the participants from a coastal and marine engineering foundation in the technical, managerial and financial skills that are required to address coastal and marine management challenges.

Objectives

To provide

- familiarity with key issues concerning sustainable, environmentally friendly, legally and economically acceptable solutions to problems in Coastal and Marine Engineering;
- understanding of the relevant ethical and integral issues;
- specific specialisation within the overall programme, including the dissertation;
- research skills for further study (e.g., doctorates, specialised topics required by industry and continuous professional development;)
- a European perspective on Coastal and Marine Engineering and Management, by learning in two or three European countries;
- a coherent and integrated global perspective on coastal and marine issues and problems;
- significant employment opportunities that encompass the private and public sectors.

The Master's course is a two year 120 ECTS programme and the language of instruction is English.The consortium offers a unique curriculum combining coastal and marine courses in a combination not found in single EU member states. Professor / CoMEM student ratio is estimated at 1 : 2.

The consortium has a well established research and educational background including numerical simulations, physical

[1] The consortium is the group of higher education institutions involved in the Masters Course.

model testing and field techniques. This expertise, together with access to extensive data sets and long standing links with private firms, public administrations and other research/education institutes will also be offered to the students.

Entry will normally require a bachelor's degree in Civil Engineering or a related discipline. Successful students will be awarded a multiple or double (for those students who only stay at two of the participating Universities) degree. This degree from the institutions where they have studied will become a joint Master's degree when the national legislations allow it.The degree will include a Diploma Supplement describing the itinerary and expertise achieved. The study plan comprises four semesters. Semesters 1 and 2 will be spent at Trondheim and Delft, respectively, establishing a common foundation. Semester 3 will allow specialisation in any of the five participating Universities, followed by semester 4 where the Master Thesis will be completed.

The two main specialization areas offered by the program are:

i) engineering and environment, and

ii) management and environment.

List of participating institutions

Delft University of Technology, Faculty of Civil Engineering and Geosciences, Department of Hydraulic Engineering, Delft, The Netherlands

Norwegian University of Science and Technology, Faculty of Engineering Science and Technology, Department of Civil and Transport Engineering, Trondheim, Norway

Universitat Politècnica de Catalunya, Department of Hydraulic, Maritime and Environmental Engineering, Barcelona, Spain

University of Southampton, School of Civil Engineering and the Environment and the School of Ocean and Earth Science, Southampton, United kingdom

City University, School of Engineering and Mathematical Sciences, London, United Kingdom

The partners in the proposed consortium have international reputations and world wide connections. There have been past and on-going research and teaching projects between partners and exchanges of academic staff and students at Master and PhD levels (eg. the 6th FP - IP called Floodsite, where some of the partners are involved in joint research). There are also contacts and projects between partners and institutions from some of the areas targeted in the call (illustrated by the list of agreements from Trondheim with collaborating universities and institutions). The partners have also established an individual and in some cases bilateral links in international Master activities and exchanges (eg. the International Master on ICZM for Latin America). The links include ERASMUS - SOCRATES students exchanges.

3. Languages

Language in which you would like the grant agreement to be issued and correspondence with the Commission to be conducted.

To facilitate co-operation with your partners, you are advised to enter the language most commonly used for communication within the consortium.

1st preference	2nd preference
☐ German ☒ English ☐ French	☐ German ☒ English ☐ French

4. Financial support from the European Community

Please note that according to the new financial regulation applicable to the general budget of the European Communities, one project may not receive more than one grant from the budget of the European Communities. In other words, if you are to be selected to receive an Erasmus Mundus grant for a given Masters Course, you must not receive a grant from another Community programme for the same Masters Course and funding period.

Is this Masters Course, or any aspect thereof or any larger project to which it may belong, currently being supported under another European Community programme?

☒ No

☐ Yes. *Please specify the programme(s), date(s), type(s) of activity and, if possible, agreement number(s):*

Is this Masters Course, or any aspect thereof or any larger project to which it may belong, currently the subject of any other application for support from the European Community?

☒ No

☐ Yes. *Please specify the programme(s) and provide the amount(s) requested:*

5. Previous applications for Erasmus Mundus Masters Courses

Please provide the following information for statistical purposes.

Are you resubmitting an application which has not been selected under previous Erasmus Mundus calls for proposals?

☒ No

☐ Yes. It was submitted under the first call for proposals (deadline 31 May 2004). Its reference number was: A1&2- -2004

☐ Yes. It was submitted under the second call for proposals (deadline 31 October 2004). Its reference number was: A1- -2005

If yes, has the composition of the consortium changed? ☐ Yes ☐ No. Possible comments:

6. Co-ordinating institution of the Masters consortium

The co-ordinating institution is also the applicant institution. To fill in this part, please use country codes and region codes indicated in Annex 1.

6.1 Legal Representative

This is the person legally authorised to sign the application and the grant agreement on behalf of the co-ordinating institution.

Full legal name of the institution in the national language	Technische Universiteit Delft		
Acronym of the institution, if applicable			
Full name of the institution in English (formal or informal translation)	Delft University of Technology		
Country code	NL	Region code	NL33
Type of institution	University	Erasmus University Charter N°	28883
Website	http://www.tudelft.nl		
Legal representative of the institution: Family name First name	Krul Johan	Title (e.g. Prof., Dr., etc.)	Mr.
Department / Unit	Administrative & Legal Affairs		
Official function within the institution	Director of Corporate & Legal Affairs	Sex	☐ F (female) ☒ M (male)
Legal address of the institution: Street & Street Number Post Code & Town Country	Julianalaan 134 2628 BL Delft the Netherlands		
Phone (including country and area code)	+31 / 15 / 2783454		
Fax (including country and area code)	+31 / 15 / 2783110		
E-mail	t.twickler@tudelft.nl		
Is the institution able to recover VAT?	No		

6.2 Co-ordinator

This is the manager of the Masters Course. All correspondence relating to the Masters Course will be addressed to this person.

Family name First name	Stive Marcel	Title (e.g. Prof., Dr., etc.)	Prof
Institution (only if different from point 6.1 above) / Department	Department of Hydraulic Engineering		
Official function within the institution	Professor in Coastal Engineering	Sex	☐ F (female) ☒ M (male)
Correspondence address (only if different from point 6.1 above): Street & Street Number Post Code & Town Country	Stevinweg 1 2628 CN Delft the Netherlands		
Phone (including country and area code)	+31 / 15 / 2783348		
Fax (including country and area code)	+31 / 15 / 2785124		
E-mail	m.j.f.stive@citg.tudelft.nl		

6.3 Person in charge of finance

Family name First name	Jager Jelle	Title (e.g. Prof., Dr., etc.)	ir.
Department / Unit	Faculty of Civil Engineering and Geosciences		
Official function within the institution	Head Finance	Sex	☐ F (female) ☒ M (male)
Correspondence address (only if different from point 6.1 above): Street & Street Number Post Code & Town Country	Stevinweg 1 2628 CN Delft the Netherlands		
Phone (including country and area code)	+31 / 15 / 2783316		
Fax (including country and area code)	+31 / 15 / 2787092		
E-mail	b.t.dehaas@citg.tudelft.nl		

6.4 Financial identification

Please complete and sign the form in Annex 2 and attach it to your application.

7. Partner institutions of the Masters consortium

- To fill in this part, please use the country codes and region codes indicated in Annex 1.
- The minimum number of partners required is two.
- Add numbers and copies of this page, if necessary.

Partner institution No 1

Full legal name of the institution in the national language	Norges Teknisk-Naturvitenskapelige Universitet				
Acronym of the institution, if applicable	NTNU	Erasmus University Charter N°	29704-IC-1-2002-1-NO		
Full name of the institution in English (formal or informal translation)	Norwegian University of Science and Technology				
Type of institution	University	Country code	NO	Region code	NO06
Department / Unit	Department of Civil and Transport Engineering				
Contact person	Family Name: Bratteland Function: Professor First Name: Eivind Male X Female ☐				
Address: Street & Street Number Post Code & Town Country	Høgskoleringen 7a, Gløshaugen NO 7491, Trondheim Norway				
Phone (including country and area code)	+ 47 / 73594626				
Fax (including country and area code)	+ 47 / 73597021				
E-mail	Eivind.bratteland @ntnu.no				
Website	http:// www.ntnu.no				
Is the institution able to recover VAT?	No				

Partner institution No 2

Full legal name of the institution in the national language	Universitat Politecnica de Catalunya				
Acronym of the institution, if applicable	UPC	Erasmus University Charter N°	28604		
Full name of the institution in English (formal or informal translation)	Technical University of Catalonia				
Type of institution	University	Country code	ES	Region code	ES51
Department / Unit	Department Hydraulic, Maritime and Environmental Engineering				
Contact person	Family Name: Sanchez-Arcilla Function: Professor First Name: Agustin Male X Female ☐				
Address: Street & Street Number Post Code & Town Country	Jordi Girona, 1-3, Campus Nord, Edif. D1 08034 Barcelona Spain				
Phone (including country and area code)	+ 34 / 93 / 4016468				
Fax (including country and area code)	+ 34 / 93 / 4011861				
E-mail	agustin.arcilla@upc.edu				
Website	http:// www.upc.edu/lim				
Is the institution able to recover VAT?	No				

Partner institution No 3

Full legal name of the institution in the national language	City University London				
Acronym of the institution, if applicable		Erasmus University Charter N°	27924-ic-1-2002-1-UK		
Full name of the institution in English (formal or informal translation)					
Type of institution	University	Country code	UK	Region code	UKI1
Department / Unit	School of Engineering and Mathematical Sciences				
Contact person	Family Name: Boswell First Name: Laurie	Function: Professor of Civil Engineering Male X Female ☐			
Address: Street & Street Number Post Code & Town Country	Northampton Square London EC1V OHB United Kingdom				
Phone (including country and area code)	+ 44 / 20 / 7040118				
Fax (including country and area code)	+ 44 / 20 / 7040119				
E-mail	L.F.Boswell@city.ac.uk				
Website	http:// www.city.ac.uk/engineering				
Is the institution able to recover VAT?	No				

Partner institution No 4

Full legal name of the institution in the national language	University of Southampton				
Acronym of the institution, if applicable		Erasmus University Charter N°	210380-IC-1-2002-1 UK		
Full name of the institution in English (formal or informal translation)					
Type of institution	University	Country code	UK	Region code	UKJ3
Department / Unit	School of Civil Engineering and the Environment and the School of Ocean and Earth Science				
Contact person	Family Name: Nicholls First Name: Robert	Function: Professor Male X Female ☐			
Address: Street & Street Number Post Code & Town Country	Highfield Southampton S017 1BJ United Kingdom				
Phone (including country and area code)	+ 44 / 23 / 80594139				
Fax (including country and area code)	+ 44 / 23 / 80677519				
E-mail	r.j.nicholls@soton.ac.uk				
Website	http:// www.civil.soton.ac.uk				
Is the institution able to recover VAT?	No				

SECTION 2 - DESCRIPTION OF THE ERASMUS MUNDUS MASTERS COURSE

- Please describe the following aspects of your Masters Course, using the same order and numbering as given in the list of questions.
- You are invited to read the relevant chapters of the *Erasmus Mundus Call for Proposals EAC/04/05* carefully, before filling in this section.
- Please enclose supporting documents only where these have a direct and material bearing on your application.
- Please respect the maximum length of text indicated, excluding supporting documents.

1. GENERAL INFORMATION ON THE MASTERS COURSE

1.1 General discipline

☐ Agricultural sciences

☐ Architecture, urban and regional planning

☐ Art and design

☐ Business studies, management sciences

☐ Communication and information sciences

☐ Education, teacher training

☒ Engineering, technology

☐ Geography, geology

☐ Humanities

☐ Languages and philological sciences

☐ Law

☐ Mathematics, informatics

☐ Medical sciences

☐ Natural sciences

☐ Social sciences

☐ Other:

Specific discipline (if further specification is useful): Civil Engineering

1.2 Duration and ECTS credits

The full-degree programme covers:

☐ one year (60 ECTS credits)[2]

☐ one year and months (ECTS credits)

☒ two years (120 ECTS credits)[2]

1.3 **Student population and number of staff** involved in the Masters Course: 30 to 50 CoMEM students and 20 staff

1.4 Final degree delivered

☐ joint

☐ double

☒ multiple

[2] If your Masters Course carries more than the standard credits, please indicate how many and provide further details under point 2.2.

2. DETAILED DESCRIPTION OF THE MASTERS COURSE (max. 15 pages excluding annexes e.g. CVs, etc.)

Study programme and recognition

2.1 Describe the objectives of the Masters Course. Describe how the Masters Course contributes towards university excellence and European competitiveness.

Introduction

Managing coastal and marine areas is a major challenge reflecting growing and competing human demands, as well as new threats such as accelerated sea-level rise and climate change. However, successful management is an essential element of sustainable development. Rising to this challenge, Europe is embarking on a systematic approach to Coastal and Marine Management, which is supported by EU and national legislation and policies. The integrated approaches for habitat protection, water quality and pollution control are examples. There are initiatives to establish a marine strategy within Europe to improve European competitiveness. In this respect, transport economics, construction, environment, economic development and employment are some important subjects. Significant technical, financial and management issues are central to the establishment of a thriving coastal and marine economy in harmony with the environment. Although the European perspective is important, these problems are global and this broader perspective also needs to be addressed.

The Erasmus Mundus MSc that is proposed by the consortium is designed to train coastal engineers within a broad curriculum that will allow them to contribute to improving coastal and marine management. The MSc will provide a broad European education that is valid across the world. This includes the essential elements in Coastal and Marine Engineering and Management, which represent the geographical diversity of north to south coastal and marine systems, taught within a sustainability framework that stresses ethical and long-term issues and responsibilities. The five universities comprising the consortium have long-lasting relationships both on a personal basis (teaching staff involved) and on an institutional basis (in terms of research and education).

The proposed educational program combines the teaching background of participating institutions, which is based on the advanced research there performed. It also includes an integral educational component founded on enhanced ethical development and multifaceted social capabilities.

Core Objectives

1. To enable students to acquire a fundamental knowledge on the most advanced tools and techniques available for Coastal and Marine Engineering and Management;
2. To familiarise students with the key issues that provide sustainable, environmentally friendly, legally and economically acceptable solutions to problems in Coastal and Marine Engineering and Management;
3. To develop specialisms in specific fields offered within the overall programme by a member of the consortium;
4. To develop the student's research skills to allow them to prepare for further study (e.g., doctorates, specialised consultancy research), and encourage them to develop as independent lifelong learners within a rapidly evolving field (e.g., enthusiastic participants in continuous professional development);
5. To provide students with a comprehensive EU perspective on Coastal and Marine Engineering and Management, by learning and living in two or three contrasting European countries (different physical, economic and social settings);
6. To use the European context to develop a coherent and integrated approach applicable to a more global perspective on coastal and marine problems and their solution;
7. To prepare students for employment for a wide range of career opportunities across the coastal and marine fields that encompass the public and private sectors;
8. To develop the ethical and integral dimensions of the student's education to ensure that they understand their social, ethical and professional responsibilities.

Additional objectives

1. To contribute to increasing the diversity within higher education, by continuing to recruit high quality entrants irrespective of national, social or cultural background (as required for a truly integrated approach to understand and manage coastal and marine systems);
2. To understand the general objectives of the United Nations, the IMO and other international and national agencies who determine the coastal and marine policy and legal frameworks.

All partners of the consortium are universities offering top quality higher education in Engineering and Management. They also feature a strong environmental approach with emphasis on the ethical dimension and issue of sustainability. The consortium has taken the best from each partner to offer a distinctive Erasmus Mundus MSc in Coastal and Marine Engineering and Management. The high academic profile of the Master's programme with a variety of integrated courses, which reflect the strength of each partner, provides a distinctiveness that makes the programme unique within Europe and the rest of the world. The opportunity to study in two, three or four (according to the five main itineraries established in the Master Program) different European countries will make this course distinctive and particularly attractive to students from outside Europe. The programme has been designed to address contemporary numerical, laboratory and field techniques for the coastal system. This will also include the unique laboratories available within the consortium or closely associated to its partners. As a result it is expected that the Erasmus Mundus MSc will support the competitiveness of Europe as an educational medium in the coastal and marine fields.

2.2 Describe the structure and the content of the study programme in detail indicating the value of each part of the programme in ECTS credits. Describe the role of each institution within the consortium in course delivery indicating which institution delivers which part of the programme.

Introduction

The consortium has designed a two-year MSc study program using strengths of existing MSc education programmes at five universities along a European North-South axis and East-West axis. The diversity and the complementarities of these existing programmes will ensure that different subject paths can be followed. **The individual universities alone cannot offer these paths.** This is a unique feature and establishes the relevance of the Erasmus Mundus MSc on EU and global levels.

The involved universities and the responsible departments are:

- Delft University of Technology, Faculty of Civil Engineering and Geosciences, Department of Hydraulic Engineering, Delft, The Netherlands
- Norwegian University of Science and Technology, Faculty of Engineering Science and Technology, Department of Civil and Transport Engineering, Trondheim, Norway
- Universitat Politècnica de Catalunya, Department of Hydraulic, Maritime and Environmental Engineering, Barcelona, Spain
- University of Southampton, School of Civil Engineering and the Environment, and School of Ocean and Earth Science, Southampton, United Kingdom
- City University, School of Engineering and Mathematical Sciences, London, United Kingdom

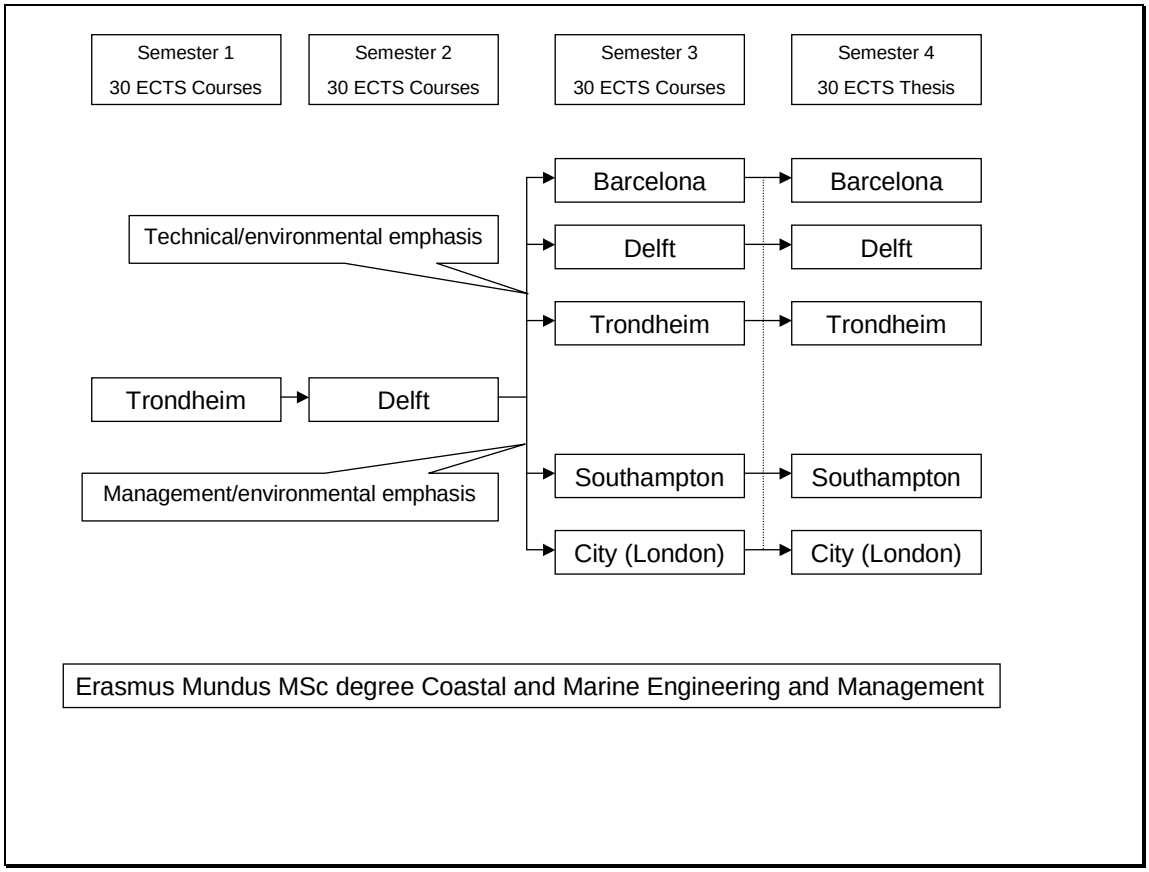
Detailed outline of education:

Concerning educational content the consortium offers a strong coastal focus with either engineering/environment or management/environment emphasis (see Scheme 1). While the first year (two semesters of each 30 ECTS course and project work) is general to all students, five main routes are offered in the second year, comprising a finalizing year at one of the five universities. However, an alternative route in the last semester of the finalizing year can be chosen, but this is exception rather than rule.

Hence, the study plan comprises four semesters. Semesters 1 and 2 will be spent at Trondheim and Delft, respectively, establishing a common foundation. As semester 1 ends in December and semester 2 starts end of January, this time slot will be used to move to Delft and organize the "winterschool" (a social and informative event) with participation of all core teaching staff of the consortium. Semester 3 will allow specialisation in any of the five participating Universities, followed by semester 4 where the Master Thesis will be completed.

One practical rationale behind the above scheme is that:

- Trondheim and Delft have a Bologna scheme of 2-year international MSc into place;
- Barcelona, Southampton and City (London) have a 1-year MSc into place, offering a programme, which is very equivalent to the second year of the 2-year MSc.



Scheme 1 CoMEM itineraries

Course contents

A detailed outline of the program is given in Appendices 1 and 2. A global (non-exhaustive) outline is as follows:

Semester 1
Country and place: Norway, Trondheim
University: Norwegian University of Science and Technology
Start date: mid august
End date: Christmas
Programme: compulsory and optional courses (ECTS: 30)
Topics: Compulsory: Marine physical environment, Geotechnical engineering - calculation methods, and Spreading of pollution
Optional: Dynamic response to irregular loadings and Transport systems

Winter-school between semester 1 and 2:
Country and place: Netherlands, Delft
University: all consortium partners
Date: third week of January
Program: information and social programme (ECTS: 0)
Topics: discussions and information about the educational programme, field and laboratory visits

Semester 2
Country and place: Netherlands, Delft
University: Delft University of Technology
Start date: mid january
End date: end of june
Program: project and compulsory and optional courses (ECTS: 30)
Topics: Compulsory: multidisciplinary project, philosophy and ethics, probabilistic design, bed, bank and shore protection
Optional: ports and waterways, computational modelling, structural dynamics, offshore soil mechanics and geology

Semester 3 -	Barcelona
University:	Technical University of Catalunya
Start date:	September
End date:	January
Program:	compulsory and optional courses and minor thesis (ECTS: 30)
Topics:	Compulsory: marine climate, coastal protection, numerical and hydraulic modelling Optional: coastal morphodynamics, impacts, conflicts and risks, minor theses

Semester 3 –	Trondheim
University:	Norwegian University of Science and Technology
Start date:	Mid- August
End date:	Christmas
Programme:	A compulsory specialization project (minor thesis) and normally three selected specialization subjects. In addition one non-technical subject of 7.5 ECTS must be chosen (totalling ECTS: 30).
Topics:	The alternative specialization areas are: Coastal engineering, port engineering, marine civil engineering, arctic offshore engineering and marine geotechnics.

Semester 3 -	Delft
University:	Delft University of Technology
Start date:	September
End date:	January
Program:	compulsory and optional courses (ECTS: 30)
Topics:	Compulsory: coastal morphology, tidal inlets and basins, wind waves, ICZM Optional: turbulence, flood defences, computational hydraulics, foundation engineering

Semester 3 –	Southampton
University:	University of Southampton
Start date:	October
End Date:	January
Programme:	A compulsory set of four modules covering coastal engineering and the environment (ECTS: 30).
Topics:	Coastal and Maritime Engineering, Geographic Information Systems, Environmental Audit and Risk Assessment, and Applied Sediment Dynamics

Semester 3 -	London
University:	City University
Start date:	October
End date:	January
Programme:	A choice of four modules to be selected from a set of five (ECTS: 30).
Topics:	The topics covered by the modules include Management, Economics and Finance, Law and Insurance and Business.

Specific educational contexts

Delft

The proposed programme will be integrated in the existing international master programme at Delft University of Technology in Civil Engineering, specialisation Hydraulic Engineering. This course started in the academic year 2003-2004, and is fully integrated with international and Dutch students. The selected courses include course offers from our Department of Hydraulic Engineering, from other parts of the study programme in Civil Engineering as well as from other study programmes and faculties, including IHE-UNESCO. Our department has a hydraulic laboratory with state-of-the-art equipment (e.g. second-order wave generation and active reflection compensation) and instrumentation (e.g. PIV). The facilities are used both by MSc and PhD students. Our department develops the international standard nearshore wave propagation model SWAN. Through cooperation with the research institute Delft Hydraulics, we have access to and can make use of advanced hydraulic and morphodynamic software. We have also very good relationship and cooperation with governmental organisations such as Rijkswaterstaat, consultants such as DHV and Royal Haskoning, and industry, such as Van Oord and BosKalis, with foreign universities through exchange of students and research cooperation etc. Two professors working part-time with us are coming from respectively a larger, specialised engineering company and from Delft Hydraulics.

Trondheim

The Erasmus MUNDUS programme will be integrated in the existing international master programme at NTNU in Coastal and Marine Civil Engineering. This course started in 2003, and is fully integrated with international and Norwegian students. Courses here include course offers from our Division of Marine Civil Engineering, from other parts of the study programme in Civil and Environmental Engineering as well as from other study programmes and faculties. In addition to the basic parts given in this proposal for semester 1, one of our main specialisation is directed towards arctic offshore engineering, preparing graduates for the extensive coming activities in the northern-most areas as the Barents Sea. Through cooperation with the research organisation SINTEF, we have access to, and can make use of extensive laboratory facilities related to testing of various port and coastal conditions. We have also very good relationship and cooperation with industry, through an Industrial Network, with individual companies as STATOIL, with foreign universities through exchange of students and research cooperation etc. Two adjunct professors working part-time with us are coming from respectively a larger, specialised engineering company and from STATOIL.

Barcelona

The proposed ERASMUS Mundus programme will be coherently integrated into the 2 "Coastal/marine" masters, which now exist at UPC. The Harbour Engineering and Management Master was officially approved in 1997 and has been running since then with students from throughout Spain and Latin America. The International Master on Integrated Coastal/Estuarine Engineering and Management was officially approved in 2002 and has been running since then with students from various countries, particularly South and Central America. The selected courses are in the hands of professors from UPC with some extra classes by experts from other research institutions in Spain. The UPC professors belong to the Hydraulic, Maritime and Environmental Engineering Department. It is a Department with worldwide contacts in its field and with recognized numerical, experimental and lab expertise. The operational wave, current and sewage discharge forecasting for the Catalan coast is in the hands of the Department. The hydraulic wave flume (third in the EU) is also part of the experimental facilities, which also include various other flumes and basins. The Department is responsible as well for managing the observational network XIOM collecting wave and meteo data on-line along the Catalan coast.
The Department is also responsible for a PhD program in Marine Sciences where all the Catalan research centres dealing with the sea participate. This programme includes physical, chemical, geological, biological, engineering and "integrated" itineraries. It is one of the most recognized PhD programs in Spain in this field, with long standing links with many other Spanish research and administration groups. The group has also a well-defined background in international postgraduate courses, mainly with Latin America and other EU Universities. The co-operation with institutions from the southern Mediterranean coast is also starting to develop.

Southampton

The Erasmus MUNDUS programme will be integrated with the existing master programme in Environmental Coastal Engineering (to be replaced with Integrated Coastal Engineering). This course started in 1998, and is unique in the UK in being jointly offered by the School of Civil Engineering and the Environment and the School of Ocean and Earth Science, which is located within the National Oceanographic Centre (NOC). Hence, there is an emphasis on coastal oceanography in addition to coastal engineering, and a strong environmental focus, which reflects the interests of both Schools. A range of British, EU and international students take it. Dissertations are based in coastal industry or government sponsors and this has lead to very high employment rates for graduates. Coastal research and education is being brought together within the new university-wide Centre for Coastal Processes, Engineering and Management, strengthening the environment within which the Erasmus Mundus programme will be offered. Close links to the Channel Coastal Observatory (who monitor changes on the south coast of England and are located in NOC) provides extensive real world and practical input to the programme.

City University

The proposed programme will be integrated into the existing Master's degree in Marine Operations and Management, which is available at City University. This is a unique international programme, which has been developed in cooperation with industry and commerce, to fulfil the requirements of the many sectors of, and occupations in coastal and marine engineering and management. The course offers prospective students the opportunity for professional development relating to technical, financial and management issues and those of a more economic and strategic nature. It is generally recognised that London is the global centre for the organisation and management of marine activities and the existing Master's programme benefits from the input of external specialist who are involved in the delivery of the course. The modules that are being offered to the Erasmus Mundus MSc are compatible with and will enhance the technical nature of the courses being proposed by other members of the consortium.

2.3 Describe the acquired competencies and the learning outcomes of the Masters Course.

Knowledge and understanding

The students will build besides some general skills (ethics, philosophy, probabilistic approach, multidisciplinary work) primarily specific marine and coastal engineering skills in their first common year, and then will be able to specialise and further develop those skills in the broad areas of technical-environment education, or management-environment education, which each partner offering specific pathways.

Delft: environmental fluid mechanics, coastal, estuarine, port and oceanographic engineering with a meso-tidal and medium to high-wave energy emphasis, integrated coastal zone management

Trondheim: marine physical environment, coastal, port and marine engineering with a tidal and high-wave energy emphasis (applied to rocky coast conditions), marine geotechnics, arctic offshore engineering

Barcelona: coastal engineering and oceanography with a Mediterranean "emphasis" (micro tidal conditions, torrential climatic conditions, intense tourist development)

Southampton: environmental coastal engineering, including coastal oceanography with an emphasis on new approaches to shoreline (flood and erosion) management, including beaches, cliffs, and estuaries

City, London: maritime environmental management, maritime operations, maritime law and insurance, maritime technology, finance, accounting and economics.

Intellectual skills

Upon completion of the programme a student will be able to:
a) Innovate, model and analyse complex coastal and marine engineering systems, processes and products using scientific principles and recognise the limitations and ethical aspects of such analysis;
b) Demonstrate innovation in the design of new marine systems or coastal processes;
c) Understand the capabilities of computer based and experimental methods for problem solving and be able to assess the limitations of particular cases;
d) Integrate knowledge of mathematics, science, information technology, design, business context and engineering practice to solve a wide range of problems in the subject applying understanding to novel and challenging solutions;
e) Evaluate technical and financial risks, through an understanding of the basis of such risks;
f) Have an extensive knowledge and understanding of management and business practices and their limitations.

Discipline-specific skills

Upon completion of the scheme a student will be able to:
a) Use appropriate mathematical and computational techniques (supplemented by hydraulic models if required) for simulating and analysing coastal and marine specific problems;
b) Design sustainable coastal or marine systems, components or processes, with technical analysis and critical evaluation of results;
c) Use learning resources effectively for independent research;
d) Conduct independent analysis of the economic, technical and managerial factors influencing the decision making process surrounding a coastal or marine problem;

Transferable skills

Upon completion of the scheme a student will be able to:
a) Communicate confidently and effectively in oral and written forms with the aid of standard information technology systems;
b) Manage their time and resources;
c) Work effectively as an individual or as a member or leader of a group;
d) Employ a systematic approach to gathering, analysing and communicating knowledge;
e) Undertake lifelong learning, particularly for continuing professional development
f) Generate new ideas and develop and evaluate a range of new solutions
g) Acquire a EU dimension in approach, scope and education (including additional linguistic capabilities).

2.4 List the partner institutions awarding the final degree and describe the title and the type of the final degree awarded by filling in the table below. Add further rows to the table, if necessary. Describe the role of each partner institution in the degree-awarding arrangements. Indicate if all successful students (European and third-country) receive the same final degree.

The type of degree awarded follows national rules. The Consortium aims at joint degrees, but this is at present not possible in all countries represented by the Consortium. A double or multiple degree is applicable at all Consortium partner institutions and will be issued by the first, the second and the last institution where students study if it is not possible to offer a joint degree at the time of graduation.

Name of institution	Title of degree awarded for this Masters Course by this institution	Type of degree awarded	Date and reference of formal approval of degree (Provide details of approval procedures under point 2.5)
Delft University of Technology	Master of Science Civil Engineering	☐ double X multiple ☐ joint	Approved: 1 September 2002 Reference: Centraal register Hoger Onderwijs (CROHO)
Norwegian University of Technology and Science	Master of Science in Civil and Environmental Engineering	☐ double X multiple ☐ joint	Approved: 2005\ Reference: Act relating to Universities and University Colleges. Norwegian Ministry of Education and Research
Universitat Politècnica de Catalunya	Master Port Engineering and management and International Master Coastal and Marine Management	☐ double X multiple ☐ joint	Approved: 1997, 2002 resp Reference: UPC Board of Governors
University of Southampton	Master of Science Environmental Coastal Engineering	☐ double X multiple ☐ joint	Approved: February 2001 Reference: ASQC
City University	Master of Science Marine Operations and Management	☐ double X multiple ☐ joint	Approved: March 2003 Reference: Senate Minutes

2.5 Describe the policy and the legal procedures within the Masters consortium for the recognition of programme components and the programme as a whole. Provide details of legal approval procedures for those partner institutions, which deliver the joint, double, or multiple degrees. Provide proof that the degree is officially recognised by the countries concerned.[3]

All components of the course have been accredited according to the rules in the particular country. The Examination and Selection Board of CoMEM (in short CoMEM-Board) approves the components and is also responsible for the rules and regulations of the exams and application of those. The CoMEM-Board consists of the responsible co-ordinating professors and meets at least twice a year to follow up on the procedures and rules related to the integrated Master program. The academic procedures as examination rules at each institution are followed. Because all modules are mutually recognized by the consortium partners and based on one common design, all partners certify the course as a whole. This implies that double or multiple degrees can be awarded. Copies of official statements are added to the proposals in Annex 3. The application is subject to changes under the present National Laws and Regulations regarding Higher Education.

2.6 Indicate if the Masters consortium uses the Diploma Supplement.

Diplomas will be accompanied by a common CoMEM diploma supplement. Besides the usual information on the holder of the qualification, etc. this supplement includes the following information:

- Description of the course as a whole;

[3] You are advised to check with your Erasmus Mundus National Structure whether they can provide a model for the proof you have to submit in your national context.

- Final competences of the course;
- Modules taken with the number of credits and the grading according to the ECTS.

2.7 Indicate if the Masters Course has been newly created or if it has already existed.

The Masters Course is composed of modules (courses, project and thesis work) derived from existing programs in place with the consortium partners.

Teaching staff

2.8 Describe the professional and academic experience of the teaching staff who will deliver the core parts of the study programme. Enclose summary CVs of a maximum of 2 pages for each of the persons concerned in an annex.[4]

All responsible professors are fulltime professors with multi-year experience. They have support of colleague professors, associate and assistant professors. A selection of the core staff's cv's is given in Appendix 3.

Delft University of Technology, Delft:

Course director:	Professor Marcel Stive
Local co-ordinator:	Associate professor Paul Visser
Key academic personnel:	3 full time professors,
	1 parttime professor
	4 associate professors

Norwegian University of Science and Technology, Trondheim:

Local co-ordinator:	Professor Eivind Bratteland
Key academic personnel:	4 full time professors,
	1 associate professor
	2 adjunct professors

Technical University of Catalunya, Barcelona

Local co-ordinator:	Professor Agustin Sanchez-Arcilla
Key academic personnel:	3 full time professors
	2 associate professors
	2 adjunct professors

University of Southampton, Southampton

Local co-ordinator:	Professor Robert Nicholls
Key academic personnel:	Professor Carl Amos
	Professor John Chaplin
	Professor Trevor Tanton
	Professor Michael Collins
	Professor Andrew Bradbury
	Dr Gerald Mueller
	GIS Lecturer

City University, London

Local co-ordinator:	Professor Laurie Boswell
Key academic personnel:	Professor C. Arcoumanis,
	Dr N. Sinclair Brown
	Captain S. Culshaw
	Professor J. Carlton

2.9 Describe the availability and presence of teaching staff for enrolled students.

Availability and presence of core staff is fulltime.

[4] If you apply for an Erasmus Mundus Masters Course including a preparatory year, you may not be in a position to provide this information fully.

Admission, application, selection, examination criteria

2.10 *Describe the common admission criteria, application procedure, selection process and examination criteria for students within the Masters consortium. Indicate all admission conditions for students, including any additional ECTS requirements or qualifications needed following the first degree.*

2.10.1 Admission process

Admission is granted to graduated students with a Bachelor degree in Civil Engineering or equivalent degree. The students should have a thorough general knowledge about the fundamentals in Civil Engineering. The CoMEM-Board reviews the criteria at least annually.

The admission policy is intended to ensure equal opportunity of access to higher education for qualified European and third country students. In general students are assessed individually on the basis of their previous academic record and a letter of motivation.

The programme will strive for a balanced selection of students from different parts of the world. Also students from the "Asian windows" countries will be included. It is the aim to include a limited number of students with a few years of working experience. This is expected to give an added value to the programme.

Applicants are required to demonstrate their proficiency in English in case they do not originate from an English speaking country or a country where English can be considered to be the second language, by submitting the results of a recognized language proficiency test, such as the TOEFL (minimum score: 550 or 213 on a computer-based TOEFL test) or an equivalent test. CoMEM Board can waive such a test if other adequate documentation of proficiency in English is submitted.

A common fee of 8,000 Euro per year for third country students will be charged to cover the tuition fee and administrative costs for the universities which host the student and deliver the degree.

The tuition fee for EU-students is 4,000 Euro per year. Differences between this fee and the nationally legislated fees may be waived or subsidized.

2.10.2 Application procedure

The application deadline for non-EU students who wish to participate in this Erasmus Mundus master course is January 15. (Note: if application numbers are large a two-step procedure will be introduced with a pre-application as the first step). An application form for students should be completed and required documents attached: legalized copies of diplomas and transcripts in duplicate, a certificate attesting English proficiency and a letter of motivation. Applicants must in the application process prioritise which specialisation they would like to study.

Applications have to be sent to:

Course Director Erasmus Mundus Coastal and Marine Engineering and Management Course
Prof. M.J.F. Stive
Delft University of Technology
Faculty of Civil Engineering and Geosciences
Section of Hydraulic Engineering
Stevinweg 1
2628 CN Delft
The Netherlands
Tel.: +31 15 278 5487
Fax.: +31 15 278 5124
E-mail: m.j.f.stive@citg.tudelft.nl

2.10.3 Selection process

The Office of the Course director checks all applications in terms of formal compliance with the admission requirements (TOEFL test, diploma's etc.).

The CoMEM-Board will carry out the selection process. The Board consists of five professors of the universities in this consortium. The course director is the chairperson of the Board. The Board meets in January to select the EU

and non-EU students who will participate in the course. Third country scholar applications are also reviewed by the Selection Board on basis of quality in research and teaching.

Selection criteria are:
- First degree (B.Sc. or equivalent) in civil engineering (or comparable field)
- Grades obtained
- English language skills
- Further quality of the candidate (CV, internships, extra curricular activities, working experience, etc.)
- Letter of motivation
- References

The decision who to select will be taken before the end of February. In case of disagreement or doubt, the decision whether to accept a student or not is taken by the chairman of the CoMEM-Board.

25 non-EU students are accepted and 25 students are put on a reserve list. Also 3 (first year) and 4 (later years) scholars are accepted and 3 resp. 4 are put on a reserve list.

The CoMEM registration office informs the applicants if they have been accepted for the Course and if they have been awarded a scholarship before the first of March. Upon acceptance the students register in the course database trough the website.

2.11 Indicate if students have to pay tuition fees. If so, give the amount of the fee for third-country and European students. Indicate when and where the students have to pay these fees and how the fees are distributed between the members of the consortium.

The selected students will receive the Erasmus Mundus scholarship funds (total 21,000 Euro) from the CoMEM registration office of the co-ordinating university. The initial amount of 5,000 Euro is paid to the student immediately upon arrival of the student in Trondheim. This amount is earmarked for fees, travel expenses, relocation costs, etc. On request an advance, to cover the travelling costs to Europe, will be transferred in August to the students' bank account in his/her home country. The 10 monthly instalments of 1,600 Euro will be paid by the co-ordinating university to the student in the beginning of each month. The students pay the tuition fee of 16,000 Euro and 8,000 Euro respectively in four instalments to the CoMEM consortium through the co-ordinating university within one month after the start of the semester.

Mobility arrangements

2.12 Describe the mechanisms of student and scholar mobility between the institutions of the Masters consortium. Indicate all mobility combinations, the duration of mobility periods and the number of ECTS credits acquired during mobility.

All students spend the first semester at NTNU (Trondheim) and the second semester at DUT (Delft). The third and fourth semester are spent at one of the CoMEM universities of their choice. All universities visited will issue the degrees. The Scheme of itineraries (see under section 2.2) shows the schedule of mobility.

Third-country students and scholars[5]

2.13 Describe the mechanisms within the Masters consortium to reach out to potentially interested third-country students and scholars.

The institutions of the consortium will be using the following means to promote the CoMEM program:

- Through a common website, describing all details of the course and its specialisations, admission criteria etc.;
- Through targeting existing students and alumni in each partner institution;
- Through announcements in the Coastal and Marine Engineering literature;

[5] If you apply for an Erasmus Mundus Masters Course including a preparatory year, you may not be in a position to provide this information fully.

- Through producing recruitment literature, such as leaflets, brochures and flyers to be handed out at conferences, international seminars and other international meetings of academics and students in relevant disciplines;
- Through the use of each partners' national and international network (see Appendix 4);
- Through promotion at International Overseas Recruitment Fairs.

2.14 With reference to question 2.10, describe if special conditions apply to third-country students. Also, describe the application and selection process for third-country scholars.

No special conditions apply to third-country students or scholars, except for the tuition fees as indicated in 2.10. Also selection criteria are the same for third-country students and EU students. The procedures will be followed as described in section 2.10.

2.15 Describe how third-country students and scholars will be distributed within the Masters consortium.

In principle a rather large number of students can be absorbed (say 50 - 75 students per year). Therefore a total of 25 non-EU students should not give any problems. Distribution within the consortium is based on the preference of the students regarding the specialisation. Up to a certain level an even distribution is aimed for during the selection procedure.

2.16.1 Describe the services provided by the Masters consortium to welcome and host third-country students and scholars (international office, housing facilities, coaching and counselling, welfare services, language courses, activities aiming at social integration, services for students with a family or special needs, other support measures, etc.).

The coordinating institution of the Consortium will co-ordinate and apply for scholarships for the Consortium. The coordinating institution will administer and pay the scholarships to students and scholars, and proceed evaluations from the third country students and scholars."

All participating universities run international programmes for many years. Each has an Office for International Relations with a longstanding experience in welcoming students and scholars within various EU and non-EU programmes. Proven mechanisms and personal coaching are in place for housing, counselling, social integration, language support, etc. All information for students is available on the websites of the respective universities (addresses are provided in section 1). As an example, Trondheim where the students will initially arrive, offers the following services:

- Easy on-line registration procedures
- Language courses in Norwegian
- Accommodation guarantee
- Buddy program
- International Student Union/Erasmus student network – social program
- Welcome program
- Social secretaries
- Fully equipped International House which takes care of the MUNDUS students

The welcome programme (see appendix 5 for more details) includes an orientation week to familiarise the students with the national and local conditions, including:

- Introduction to Norwegian culture, "living" and economics
- Assistance in formalities related to police and other public authorities
- Assistance in getting settled in the accommodation arena
- Guided tours of museums and city walk
- Orientation on student facilities and the campus
- Information on various international student organisations at NTNU
- Introduction on available sporting facilities
- Boat trip on the Trondheim fjord, including visit to a former fishing village
- Welcoming party

2.17 Describe the financial management and payment mechanisms of scholarships for third-country students and scholars within the Masters consortium.

The funds received from the European commission by the co-ordinating university are deposited into the official account of TU Delft (see annex 2). Students and scholars will be paid from this account, according to the guidelines from the Erasmus Mundus administrative and financial handbook.

The partner universities agreed that the third country students have to pay a standard tuition fee of 8.000 Euro's/year to the co-ordinating university. This levelled amount covers a/o the local enrolment fees at the different partner universities, according to the national regulations.

The flat fee of 15,000 Euro will be used for the organization and travel costs of the two annual meetings in January (fixed) and a co-ordinating meeting (not fixed). The individual institutions fund all components of the course and the modules.

Language policy

2.18 Describe the language policy applied within the Masters consortium, including language(s) of instruction, language(s) of examinations, and language-learning support offered.

The English language is being used for instruction and the relevant lecture notes, material, etc. during the joint curricula. Also the tests and examinations, either oral or written, are taken in English. Thus good English skills are a pre-requisite. For the other European native languages courses will be available to provide some basic knowledge of the local language.

Quality assurance and evaluation

2.19 Describe how the quality of the Masters Course as well as ECTS mechanisms (including the "grading scale") or other mechanisms based on ECTS are assured. Explain if quality assurance is carried out internally by the Masters consortium or by an external body. Any processes and procedures developed in response to specific needs of the study programme should be detailed.

CoMEM is based on existing Master of Science programs. On top of the existing quality assurance and evaluation procedures at the partner universities CoMEM intends to put the following measures in place:

- Full integration and use of ECTS (grading, workload and credit points, transcript of records, etc.)
- A set of Education & Examination regulations.
- A CoMEM Examination Board (one professor of each partner university), which monitors twice a year:
  - Quality of the program
  - Certificates and diplomas
  - Establishment of pre-requisites
  - Proper use of ECTS
  - Use of a diploma supplement
  - Use of as a high-level learning and communication platform (the Dutch national standard open platform BlackBoard will be considered; it is generally available through internet login)
  - Centralised evaluation procedure at the end of the course
  - Visitation commission (members from academia and industry)

2.20 Describe the evaluation and quality assessment mechanisms within the Masters consortium. Indicate if third-country students and scholars will be invited to assess the Masters Course at the end of their stay.

Further to 2.19 the quality of the CoMEM will be guaranteed by the following internal mechanisms, present already for several years at most of the consortium partners.

2.20.1 Course Evaluations

The participants, including students from third-countries, evaluate all courses of the CoMEM. The student's opinion about the course (contents, teacher, presentation, etc.) is monitored via the Sensor software (developed by TU Delft) At the end of each module the student completes the questionnaire through BlackBoard. The results from these evaluations are distributed among the course management, local Directors of Education and the teachers of the courses. The local Director of Education will follow up on the results if needed. Improvements fall under his/her responsibility. The local co-ordinator of the university where they are at that moment interviews students who leave the course prematurely. The university where the last semester is spent has an exit interview with the student.

The last day of the joined courses the staffs of the universities involved review the summary of the "Sensor" valuations with the students. The results are distributed among the teachers of that particular course and improvements are required to be made during the next year.

At the end of the second year, all graduates are being interviewed (the exit interview).

2.20.2 Quality assessment

A visitation commission, consisting of 5 members monitors the quality of the CoMEM course. The members of the commission consist of 3 academic staff of universities who are not involved in the course and 2 representatives of an External Advisory Board.

The course is monitored by a set of learning outcomes (Section 2.3).

Co-operation aspects

2.21 Describe the co-operation mechanisms within the Masters consortium.

To maintain a truly integrated Masters Course co-operation is vital. Research cooperation between the universities exists for many years at various levels. The mechanism to ensure this cooperation on the educational level is as follows:

- The CoMEM-Board handles the admission and selection procedures. The board meets in January for student selection and at a second (not-fixed in time) to evaluate the selected students of the current year.
- During the meetings the Board also evaluates the educational quality and, if necessary, adjusts the content of the course. The Board will continue to fine-tune the contents of the course throughout the year, in close collaboration with the core course teachers and other teaching staff.
- The international offices of the various universities that take care of the students' housing, visa, etc. are in close contact to allow maximum mobility of students in between the universities.
- The present state of co-operation is based on Socrates exchange agreements between the partner universities.
- Letters of endorsement of the authorities of the partner universities (commitment to multiple degrees, etc.)

2.22 Describe briefly the administrative staffing and the funding of the Masters consortium.

The CoMEM programme is co-ordinated by TU Delft. The Course Director is a full time staff member at TU Delft. Funding of the additional administrative staffing of the program is carried partly by industry contributions and partly by the participating universities from the tuition fee. The responsible staffs of the participating universities are mentioned in the partner information pages in section one of this application.

Preparatory year

2.23 In case your Masters consortium applies for a Course including a preparatory year describe the reasons why. Describe the activities you will carry out during the preparatory year, in particular indicate if the Masters Course will run during the preparatory year.

The consortium does not apply for a preparatory year.

Other aspects

2.24 Explain to which extent the Masters Course is linked to research activities.

All staff involved with the modules is closely involved in research activities. The CoMEM course is linked with the research by thesis projects of the students during the second year. Indications of the research activities of the partner universities are in Appendices 3 and 5. All the universities of the consortium are amongst the leading European universities playing a valued role in research.

2.25 Explain in how far the Masters Course has a distinctive European added value.

The CoMEM program has a strong "European dimension" because its methodology, aims, effects and prospects do not only apply to a specific country or region, but it points at its relevance for the EU as a whole. The CoMEM course is truly European in scope, since it directly involves education and research groups from five universities in three different EU countries in addition to Norway as part of the European Economic Area. In addition it indirectly, through Socrates student and staff exchange, links with programs in most of the other EU countries. The addition of third country students and scholars further increases the European added value, as it puts forward the image of the CoMEM program.

The CoMEM course has many established contacts with universities and industry outside the EU. These links are very important as the coastal and marine sector has a distinct international character and it will allow the European consultants and industry to stay competitive. The CoMEM network is an excellent way to educate the upcoming European managers in the related fields.

2.26 Describe any aspect of the Masters Course which offers potential examples of good practice and which could be disseminated more widely.

The concept of the COMEM course could very easily be applied to other disciplines. Universities with an interest in combining and integrating their specialities in education into a broader and more extensive offer could make use of the experiences gained from the CoMEM programme.

The close co-operation with the government, consultants and industry is another good example, which can be disseminated more widely. The integrated use of e-techniques for the administrative and educational matters (registration, virtual learning platform, evaluation) is a good example of how to run complicated courses in an efficient way.

2.27 Describe any other aspect of the Masters Course which is not covered by the previous questions and which can be of relevance for the assessment of your application.

All partners of this Erasmus Mundus Consortium bilaterally have strategic partners at universities in third countries. The consortium intends to strengthen the strategic relationships by seeking multilateral partnerships and thereby strengthening and harmonising European relations with third countries with a focus on SE Asia.

SECTION 3 - GRANT REQUESTED

- Please read the relevant section of the *Erasmus Mundus Call for Proposals EAC/04/05* and the *Administrative and Financial Handbook for Erasmus Mundus Projects.*

- The requested grant of 15,000 € refers to the first year of the five-year period for which an Erasmus Mundus Masters Course will be selected. This amount applies to Erasmus Mundus Masters Courses with or without a preparatory year.

Total grant requested by the Consortium for the academic year 2006/2007	**15,000 €**

SECTION 4 - DECLARATION

To be completed by the legal representative of the co-ordinating institution indicated under Section 1, point 6.1 above.

I, the undersigned, certify that the information contained in this application is correct to the best of my knowledge.

If my institution is private in nature, I declare on my honour that it has the financial and operational capacity to carry out the proposed Masters Course.

I declare on my honour that neither I nor my institution is in any of the situations listed under point 12 of the *Erasmus Mundus Call for Proposals EAC/04/05.*

I am aware that the Erasmus Mundus Masters consortium which submits this application commits itself to participate in Action 1 and Action 2 (scholarships) of the Erasmus Mundus programme for a period of five years, if my application is successful.

I am aware that penalties may be applied in the case of a false declaration.

In the event that my application is successful, I authorise the Commission to publish on its internet site or in any other appropriate medium:

- The name and address of the beneficiary of the Erasmus Mundus grant;
- The subject of the grant;
- The amount awarded to the approved Masters Course.

Place: Delft

Date: 27/05/05 (day/month/year)

Signature:

Stamp of the co-ordinating institution:

Name and position in capitals: MR. J. KEUL SECRETARY GENERAL

Checklist

The application is completed in full. All questions have been answered.	☒
Each page has been numbered.	☒
The application has been typewritten or word–processed.	☒
The original application has been signed by the legal representative of the co-ordinating institution and stamped.	☒
Copies of letters from the appropriate authorities of each institution participating in the Masters Course, confirming their agreement with the application as submitted are attached.	☒
Proof of the official recognition of the degree(s) is attached.	☒
The financial identification form has been filled in and duly signed in original (see Annex 2).	☒
The original application and 2 copies thereof are being sent to the address indicated on page 2 of the application form by rapid post and e-mail, in the same envelope and before the closing date.	☒
Paper and electronic copies of this application are being sent to the National Structures in the countries of each of the participating institutions before the closing date.	☒

ANNEXES

ANNEXES

Annex 1: Letters of endorsement of consortium partners

Date 27 MEI 2005 51108
Contact person drs. M.G.M. Vintges
Telephone/fax +31 (0)15 86325/+31 (0)15 87749
E-mail m.g.m.vintges@tudelft.nl
Subject Endorsement of the Erasmus Mundus Master "Coastal and Marine Engineering and Management" application

TU Delft
Delft University of Technology

University Corporate Office

Visiting address
Julianalaan 134
2628 BL Delft
Postal address
P.O. Box 5
2600 AA Delft
The Netherlands

www.tudelft.nl

To whom it may concern

The undersigned, representing the Board of Delft University of Technology, certifies that the information in this application is complete and correct to the best of our knowledge. All Erasmus Mundus activities will be implemented on the basis of written agreements with the relevant authorities of the partner institutions.

Delft University of Technology is committed to research and education in the Civil Engineering fields of Coastal and Marine Engineering and Management. As the leading partner in this proposal we consider a European master's programme in these themes to be an important development, not just for the consortium universities but also for research and education in these fields in Europe.

The proposed partners represent Europe's leading institutions in research and education, and Delft University has close ties with all of them. As such the consortium is particularly strong and attractive to third countries students.

Delft University of Technology will do the utmost to respect and observe the Erasmus Mundus Master obligations and make this particular programme a success.

Yours sincerely,

p/o

ir. G.J. van Luijk
President

Enclosure(s) 1

NTNU
Norwegian University of
Science and Technology

Director

To whom it may concern

Our consultant
Wolfgang Laschet
Telephone no. +47 73 59 52 40
Email wolfgang.laschet@adm.ntnu.no

Dated:	Our ref.: 2005/2714	Your letter dated:	Your ref.:
23.05.2005			

Erasmus Mundus application

The Norwegian University of Science and Technology (NTNU) hereby confirms that it fully supports the application for a European Master in Coastal and Marine Engineering and Management. NTNU also guarantees that it will provide full institutional support for the European Master in Coastal and Marine Engineering and Management, if it is implemented.
Coordinator at our institution is: Professor Eivind Bratteland.

Per Ivar Maudal
University Director

NTNU
Norwegian University of Science and Technology

Faculty of Engineering Science and Technology
Department of Civil and Transport Engineering

To whom it may concern

Our consultant:
Standard
Telephone no.: +47 73594706
E-mail: asbjorn.hovd@ntnu.no

Dated:	Our ref.:	Your letter dated:	Your ref.:
2005-05-24	EB		

Statement

The Department of Civil and Transport Engineering as well as the Faculty of Engineering Science and Technology are both supporting and endorsing the application for the Erasmus Mundus Master Course in *Coastal and Marine Engineering and Management.*

This Master programme is considered an important and integrated part of our international activities with significant future possibilities for collaboration and development of joint activities between the partner European universities.

The main contribution from NTNU will be based on and linked to the already existing International Master of Science programme in *Coastal and Marine Civil Engineering.*

Division of Marine Civil Engineering will be carrying out the majority of the project, however, in close and active cooperation with other Departments and Faculties.
Local co-ordinator is Prof. Eivind Bratteland.

Torbjørn Digernes, Dean
Faculty of Engineering Science and Technology

Asbjørn Hovd, Head of Department
Department of Civil and Transport Engineering

Servei de Relacions Institucionals i Internacionals
UNIVERSITAT POLITÈCNICA DE CATALUNYA

Edifici BO
Torre Girona
C/. Jordi Girona, 31
08034 Barcelona
Tel. 93 401 74 52
Fax 93 401 74 73

LETTER OF ENDORSEMENT

Erasmus Mundus Project

Barcelona, 19th May 2005

The undersigned, Vice-Rector Juan Jesús PÉREZ, the legal representative of the Universitat Politècnica de Catalunya in Barcelona (Spain) declares here the willingness of the **Universitat Politècnica de Catalunya** (UPC) to take active part in the Erasmus Mundus proposal:

"CoMEM Erasmus Mundus Msc -Coastal and Marine Engineering and Management"

We agree with the content of the project and the collaboration with all the other partners involved in this project.

In the context of higher education system, our main contribution is teaching, tutorial and master project direction activities within the knowledge area of coastal and marine engineering and management. It also includes coordination with other university programmes and support of the foreseen exchanges.

Our participation in the project will be carried out by the department of Hydraulic, Maritime and Environmental Engineering, and specifically by Prof. Agustin Sanchez-Arcilla who will also act as co-ordinator person at the UPC.

Contact at the UPC

Prof. Agustin Sanchez-Arcilla
UPC
Dept. Hydraulic, Maritime and Environmental Eng. (Civil Engineering High School)
Campus Nord - Edif. D1
Jordi Girona, 1-3
08034 Barcelona
SPAIN
Tel. +34 93-4016468
Fax. +34 93-4011861
e-mail: agustin.arcilla@upc.edu

SIGNATURE:

UNIVERSITAT POLITÈCNICA DE CATALUNYA

Juan Jesús PÉREZ
Vice-Rector of Doctorate, Research and International Relations

University of Southampton

Deputy Vice-Chancellor
Professor Caroline Thomas

University of Southampton
Highfield Southampton
SO17 1BJ United Kingdom

Tel +44 (0)23 8059 2517
Fax +44 (0)23 8059 5409
Email cat@soton.ac.uk

26 May 2005

CONFIRMATION OF AGREEMENT FOR ERASMUS MUNDUS MASTERS COURSE APPLICATION - Coastal and Marine Engineering and Management

I, PROFESSOR CAROLINE THOMAS, Deputy Vice Chancellor of the University of Southampton confirm on behalf of the University of Southampton that

1. The University of Southampton will take an active part in the Erasmus Mundus Masters Course: "Coastal and Marine Engineering and Management".

2. The University of Southampton agrees with the content of the application as submitted and agrees to collaborate with the other partners named in the application.

3. The main contribution of the University of Southampton will be providing a strong coastal focus with an emphasis on management and environmental matters.

4. Participation in the project will be carried out by the School of Civil Engineering and the Environment and the School of Ocean and Earth Science and specifically by Professor Robert Nicholls who will act as co-ordinator at the University of Southampton.

5. I am duly authorised by the University of Southampton to give this confirmation on its behalf.

SIGNED at the
UNIVERSITY OF SOUTHAMPTON
this 26 day of May 2005

PROFESSOR CAROLINE THOMAS
DEPUTY VICE-CHANCELLOR

City University London

School of Engineering and Mathematical Sciences

Professor C Arcoumanis FREng
PhD DIC DSc(Eng) FIMechE FSAE

Dean

Northampton Square
London EC1V 0HB
T +44 (0)20 7040 0113
F +44 (0)20 7040 8101
c.arcoumanis@city.ac.uk

www.city.ac.uk

24 May 2005

To whom it may concern

City University, London, hereby confirms its agreement with the application for the Erasmus Mundus Programme for the Erasmus Mundus MSc - Coastal and Marine Engineering and Management (COMEM), as submitted.

Yours sincerely

Prof C Arcoumanis
Dean, School of Engineering & Mathematical Sciences

City University London
School of Engineering
and Mathematical Sciences

Annex 2: Financial identification

FINANCIELE IDENTIFICATIEGEGEVENS

NEDERLAND

REKENINGHOUDER

NAAM	Delft University of Technology
	Faculty of Civil Engineering and Geosciences
ADRES	Stevinweg 1
GEMEENTE/STAD	Delft
POSTCODE	2628 CN
LAND	Netherlands
BTW-NUMMER	NL 0 0 0 1 5 6 9 5 6 6 9 B 0 1
CONTACTPERSOON	M.R. van Zelst
TELEFOON	+31 15 2786463
TELEFAX	+31 15 2789414
E - MAIL	M.R.vanZelst@tudelft.nl

BANK

BANKNAAM	ABN-AMRO
ADRES	Coolsingel 119
GEMEENTE/STAD	Rotterdam
POSTCODE	3012 AG
REKENINGNUMMER	543084841
	SWIFT ABNANL2A
IBAN (verplicht)	NL43ABNA0543084841

OPMERKINGEN

BANKSTEMPEL + HANDTEKENING VERTEGENWOORDIGER VAN DE BANK (Beide verplicht)

ABN AMRO Bank N.V.
Corporate Clients Unit
Regio Rotterdam
GF 1152
Postbus 949
3000 DD ROTTERDAM

DATUM+ HANDTEKENING REKENINGHOUDER :
(Verplicht)

TECHNISCHE UNIVERSITEIT DELFT
20 mei 2005
1842

Annex 3: Reference documents of formal approval of degree

Date 27 May 2005
Our reference WAT 05.039
Your reference
Contact person Prof. M.J.F. Stive
Telephone/fax +31 (0)15 27 85487/+31 (0)15 27 85124
E-mail m.j.f.stive@citg.tudelft.nl
Subject Proof of accreditation M.Sc. Civil Engineering, Delft

Delft University of Technology

Faculty of Civil Engineering and Geosciences
Section of Hydraulic Engineering

Visiting address
Stevinweg 1
2628 CN Delft
Postal address
P.O. Box 5048
2600 GA Delft
The Netherlands

www.hydraulicengineering.tudelft.nl

To whom it may concern

Dear Sir / Madam,

Please find enclosed a transcript of the so-called CROHO register, listing all MSc programs at Delft University of Technology accredited and approved by law.

The MSc Hydraulic Engineering is highlighted. The original and official document can be accessed via the following website: http://www.ibgroep.nl.

On behalf of Delft University of Technology,

Prof. M.J.F. Stive
Chair of Coastal Engineering
Scientific Director of Water Research Centre Delft

TU Delft

Opleidingscode	Opleidingsnaam	Vorm	Studielast	Propedeutisch examen	Eisen te verrichten werkzaamheden	Inschrijven met deficiënties mogelijk	Beroepsvereisten	Gemeente	Geaccre
21PF	***Technische Universiteit Delft***								
ONDERDEEL : TECHNIEK									
66956	M Aerospace Engineering	VOLTIJD	120	nvt	nee	ja	nee	DELFT	31-12-2007
60360	M Applied Earth Sciences	VOLTIJD	120	nvt	nee	ja	nee	DELFT	31-12-2007
60348	M Applied Mathematics	VOLTIJD	120	nvt	nee	ja	nee	DELFT	31-12-2007
60436	M Applied Physics	VOLTIJD	120	nvt	nee	ja	nee	DELFT	31-12-2007
60349	M Architecture, Urbanism and Building Sciences	VOLTIJD	120	nvt	nee	ja	ja	DELFT	31-12-2007
60350	M Biochemical Engineering	VOLTIJD	120	nvt	nee	ja	nee	DELFT	31-12-2007
66226	M Biomedical Engineering	VOLTIJD	120	nvt	nee	ja	nee	DELFT	31-12-2007
60339	M Chemical and Biochemical Engineering	VOLTIJD	120	nvt	nee	ja	nee	DELFT	31-12-2007
60437	M Chemical Engineering	VOLTIJD	120	nvt	nee	ja	nee	DELFT	31-12-2007
60352	M Civil Engineering	VOLTIJD	120	nvt	nee	ja	nee	DELFT	31-12-2007
60351	M Computer Engineering	VOLTIJD	120	nvt	nee	ja	nee	DELFT	31-12-2007
60300	M Computer Science	VOLTIJD	120	nvt	nee	ja	nee	DELFT	31-12-2007
60355	M Design for Interaction	VOLTIJD	120	nvt	nee	ja	nee	DELFT	31-12-2007
60353	M Electrical Engineering	VOLTIJD	120	nvt	nee	ja	nee	DELFT	31-12-2007
60179	M Engineering & Policy Analysis	VOLTIJD	120	nvt	nee	ja	nee	DELFT	31-12-2007
60179	M Engineering & Policy Analysis	DEELTIJD	120	nvt	nee	nvt	nee	DELFT	31-12-2007
66954	M Geodetic Engineering	VOLTIJD	120	nvt	nee	ja	nee	DELFT	31-12-2007
66955	M Industrial Design Engineering	VOLTIJD	120	nvt	nee	ja	nee	DELFT	31-12-2007
60354	M Integrated Product Design	VOLTIJD	120	nvt	nee	ja	nee	DELFT	31-12-2007
66286	M Life Science & Technology	VOLTIJD	120	nvt	nee	nee	nee	DELFT	31-12-2007
66995	M Management of Technology	VOLTIJD	120	nvt	nee	ja	nee	DELFT	31-12-2007
66957	M Marine Technology	VOLTIJD	120	nvt	nee	ja	nee	DELFT	31-12-2007
66958	M Materials Science & Engineering	VOLTIJD	120	nvt	nee	ja	nee	DELFT	31-12-2007
60439	M Mechanical Engineering	VOLTIJD	120	nvt	nee	ja	nee	DELFT	31-12-2007
60357	M Media & Knowledge Engineering	VOLTIJD	120	nvt	nee	ja	nee	DELFT	31-12-2007
60618	M Nanoscience	VOLTIJD	120	nvt	nee	ja	nee	DELFT	31-12-2007
60178	M Offshore Engineering	VOLTIJD	120	nvt	nee	ja	nee	DELFT	31-7-2007
60356	M Strategic Product Design	VOLTIJD	120	nvt	nee	ja	nee	DELFT	31-12-2007
60359	M Systems and Control	VOLTIJD	120	nvt	nee	ja	nee	DELFT	31-12-2007
60358	M Systems Engineering, Policy Analysis and Management	VOLTIJD	120	nvt	nee	ja	nee	DELFT	31-12-2007
60358	M Systems Engineering, Policy Analysis and Management	DEELTIJD	120	nvt	nee	ja	nee	DELFT	31-12-2007
60361	M Transport, Infrastructure & Logistics	VOLTIJD	120	nvt	nee	ja	nee	DELFT	31-12-2007

25 May, 2005

Statement concerning national recognition of degrees

The Norwegian Centre for International Cooperation in Higher Education, which is a public agency under the auspices of the Norwegian Ministry of Education and Research and Erasmus Mundus National Structure, hereby confirms that according to the Norwegian act relating to universities and university colleges, an accredited university may establish courses and study programmes at all levels without prior assessment of the Ministry. Thus, the universities are autonomous in deciding what programmes to establish and are themselves responsible for the quality assurance procedures.

The degree proposed by the Norwegian University of Science and Technology for an Erasmus Mundus application is thus recognized nationally.

Sincerely,

Vidar Pedersen /s/
Advisor

NORWEGIAN CENTRE FOR INTERNATIONAL COOPERATION IN HIGHER EDUCATION
PHONE +47 55 30 88 00 FAX: +47 55 30 88 01/02 E-MAIL SIU@SIU.NO
POSTAL ADDRESS: P.O. BOX 7600, NO-5020 BERGEN, NORWAY OFFICE ADDRESS: VASKERELVEN 39 WEB: WWW.SIU.NO

Servei de Relacions Institucionals i Internacionals
UNIVERSITAT POLITÈCNICA DE CATALUNYA

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Torre Girona
C/. Jordi Girona, 31
08034 Barcelona
Tel. 93 401 74 52
Fax 93 401 74 73

PROOF OF RECOGNITION
"CoMEM Erasmus Mundus Msc -Coastal
and Marine Engineering and Management"

Barcelona, 23rd May, 2005

The undersigned, Vice-Rector Juan Jesús PÉREZ, the legal representative of the Universitat Politènica de Catalunya (UPC) in Barcelona (Spain), declares that **"CoMEM Erasmus Mundus Msc -Coastal and Marine Engineering and Management"** is composed at UPC by the Master programmes:

- Master in Port Engineering and Management, that was approved by Board of Governors of the UPC in 1997 and is official since then;
- International Master in Management in Coastal and Estuarial Zones, that was approved by Board of Governors of the UPC in 2002 and is official since then.

Under the Spanish current legislation, UPC is a self-governing body legally responsible for the Master degrees that it offers.

SIGNATURE:

UNIVERSITAT POLITÈCNICA DE CATALUNYA

Juan Jesús PÉREZ
Vice-Rector of Doctorate, Research and International Relations
Universitat Politècnica de Catalunya

Preamble

1. Title: **MSc course in Environmental Coastal Engineering**

A Full Time/Modular programme leading to MSc with exit points at Postgraduate Certificate and Postgraduate Diploma.

The programme will be delivered by the Department of Civil and Environmental Engineering in the Faculty of Engineering and Applied Science and The School of Ocean and Earth Science on the Faculty of Science

2. Rationale:

This is an existing programme which has been revised to fit within the National Qualifications Framework and with current agreed University and Faculty structures. It also takes into account the Faculty agreed strategy (approved by ASQC in February 2001) of reducing the overall number of programmes, while providing increased flexibility, and harmonising rules and structures across the Faculty. The programme has been in existence in roughly the present form for four years, and has an average intake of about eight students. The Department has significant research strengths in this area (5* in the 2001 RAE) and was awarded 21/24 in the QAA subject review.

The Department has a target size of 40 FTE students on its taught Masters programmes. The places on this programme contribute to this target. The target market for this programme will be engineers and scientists with suitable qualifications and experience wishing to work in coastal engineering.

3. Process of Creation:

This Programme Specification and Preamble were drafted by Dr Paul Tosswell, one of the two Course Directors, revised after extensive consultation within the Department of Civil and Environmental Engineering and with the Faculty of Engineering and Applied Science. They were finalised by the Course Directors, approved by the Departmental Postgraduate Masters Programmes Coordination Committee on 16 April 2002 and by the Faculty Courses Sub-Committee on 23 April 2002. Extracts from the minutes of these committees are attached as Annexe 1.

4. External Adviser:

External advice is supplied by a range of organisations associated with the Coastal Engineering field. The course is adapted to suit the requirements of the employment market. All the advising organisations offer research projects and many employ previous graduates.

In addition many also contribute to the taught part of the course. The External Adviser's report has not yet been received but will be forwarded to Faculty and University Committees together with the Departmental response.

5. Admissions:

We will offer a place to any applicant who can show evidence of ability and background adequate to undertake the course.

Applicants are expected to have at least an upper second class honours degree in a relevant engineering or scientific discipline. In addition evidence of numeracy will be required. Applicants with other, equivalent, qualifications or appropriate experience are considered on an individual basis.

6. Details of Structure:

The programme follows the standard Faculty structure for Postgraduate taught programmes.

All the taught modules in the programme already exist, and have been approved by Faculty. Module specifications for these are attached as Annexe 3. They have received the approval of the Faculty Academic Policy and Quality Committee.

Significant features of the programme are:

- The individual research project, linked to a practical 'real world' research interest, often conducted within an appropriate organisation.
- Preparatory teaching on research skills and dissertation presentation, for the individual research project;
- The Design Exercise (CE608), which is a major piece of groupwork bringing together many of the taught subjects into a practical design.
- The programme includes a several field trips to view coastal engineering in action.

7. Learning, Teaching and Assessment Methods:

Modules within the programme make use of a range of learning teaching and assessment methods based around lectures, supervised coursework, and private research and study. As well as summative coursework assignments, many modules will also make use of formative coursework in the form of essays and design tasks, etc. These will be reviewed and support, explanatory notes and formative feedback will be provided.

Students generally undertake research placements in an organisation working in coastal engineering.

Group and team working are a key component of the programme. Some coursework is carried out in groups and the learning results are presented to the class. The Design Exercise involves group coordination and collaboration, and exploration of individual strengths and weaknesses.

Some components of the modules are taught by experienced engineers and scientists from a number of organisations, under close supervision by the Course Director and departmental colleagues. This brings up-to-date learning into the course, alongside the ongoing research activities of departmental academic staff.

As with all programmes in the Department, student learning is also supported by our printed handouts, course handbooks, module and departmental web pages, the use of numerous relevant web pages, practical sessions, etc.

Key skills are developed explicitly in many of the modules and, particularly, in the individual research project. In particular, individual research, team working, time management, critical analysis and decision-making, presentation skills, information handling and project planning are developed in the individual and group project work. The course handbook provides a mapping between individual modules and the key skills developed in them.

Summative assessment for the taught part of the programme is by a combination of coursework (in the form of essays, design assignments, reports, oral presentations etc) along with unseen 1.5-2.0 hour examinations, as defined in the programme specification. An element of peer assessment, moderated by the lecturer, is used in some group work. The mix has been developed over a number of years as appropriately addressing the learning outcomes expected from an engineering Master's degree. Individual research projects are assessed by a written dissertation in a standard form.

The progression rules for the programme are the Faculty standard rules for postgraduate taught programmes which are summarised in Appendix 2 of the programme specification. Further detail of how these are specifically applied appears in the body of the programme specification.

Formative feedback to students on their progress is provided by small group supervisions and by formal written feedback on the summative coursework assignments, peer assessments and feedback on group performance in the summative examinations.

8. Accreditation: Not applicable

9. Learning Outcomes and Benchmarks:

The learning outcomes for the various exit awards are given in detail in the programme specification, and are informed by the QAA's National Qualifications Framework for Masters level.

10. Intermediate Exit Awards:

Students completing any module qualify for a Certificate of Continuous Professional Development (which is not an award of the University). Students unable or not wishing to complete the MSc may leave with a Postgraduate Certificate (60 credits) or Postgraduate Diploma (120 credits).

The criteria for these awards are detailed in Appendix 2 of the programme specification. The learning outcomes are at the appropriate level as defined in the National Qualifications Framework, applied to the learning outcomes of the programme as specified in the programme specification.

Audit Trail for Faculty and Departmental/School Approval Processes for Programme Specifications

Faculty Approval Processes - MSc Environmental Coastal Engineering

Courses Sub-Committee 23 April 2002

3 MRes/MSc Programmes

3.1 MRes Coastal Engineering for Climate Change
3.2 MSc Engineering for Development
3.3 MSc Environmental Coastal Engineering
3.4 MSc Transportation Planning and Engineering

Received: copies of preambles and programme specifications.

It was reported that there had been a series of departmental meetings with MSc Co-ordinators to try to achieve uniformity and that ISVR colleagues had also read the documentation. It was noted that some amendments were required and that these would be passed back to the co-ordinator for each programme. It was noted that there was a problem with formatting with the MRes programme specification. It was pointed out that this course had started in 2000 and that some mention of how it was progressing might be useful. This proposal also gives detail about progression requirements where it should just refer to Appendix 2.

Resolved: Dr Moy to inform Dr Hounsell. Agreed Chair's action when amendments have been made.

Courses Sub-Committee 12 December 2001

2.1.2 MSc Environmental Coastal Engineering

Received: the programme specification describing the existing programme.

There were similar comments about regulations and some clarification was required about the mode of study. It was pointed out that the first sentence in Section 11 needed to be reworded.

Resolved: to approve the programme specification subject to Chair's action before forwarding to the Quality Unit.

Departmental/School Approval Processes – MSc Environmental Coastal Engineering

Postgraduate Masters Programmes Co-ordination Committee 16 November 2001

Discussed: Requirements for revised programme specifications.

Resolved: To produce a revised programme specification. with overall co-ordination by Dr. Hounsell, for consideration at the next Faculty Courses sub-committee meeting.

Postgraduate Masters Programmes Co-ordination Committee 16 April 2002

Discussed: Requirements for further revisions to programme specification and poduction of the preamble.

Resolved: To submit the revised programme specification and preamble for consideration at the next Faculty Courses sub-committee.

City University London

Academic Development and Services

Eamon G Martin
Academic Registrar

Northampton Square
London EC1V 0HB
T +44 (0)20 7040 5060
D +44 (0)20 7040 .....
F +44 (0)20 7040 8886
e.g.martin@city.ac.uk

www.city.ac.uk

26 May 2005

Professor L Boswell
School of Engineering and Mathematical Sciences

Dear Laurie

MSc in Maritime Operations and Management

This letter is to confirm that the above programme was approved under the University's Stage 2 approval and CAPS Project (Credit, Assessment and Programme Specifications) in March 2003 for commencement in September 2003. This approval was ratified by the Quality and Standards Committee of Senate.

Yours sincerely

Gill

Gill Barker (Mrs)
Assistant Registrar - Partnerships
Direct tel: 020 7040 3137
E-mail: g.barker@city.ac.uk

List of codes to be used in the application

You will find here the codes you will have to use when filling in the application, i.e.:

- Country codes
- Region codes (NUTS)

Country codes			
BE	Belgium	HU	Hungary
CZ	Czech Republic	MT	Malta
DK	Denmark	NL	The Netherlands
DE	Germany	AT	Austria
EE	Estonia	PL	Poland
ES	Spain	PT	Portugal
FR	France	SI	Slovenia
GR	Greece	SK	Slovak Republic
IE	Ireland	FI	Finland
IT	Italy	SE	Sweden
CY	Cyprus	UK	United Kingdom
LV	Latvia	IS	Iceland
LT	Lithuania	LI	Liechtenstein
LU	Luxembourg	NO	Norway

REGION CODES (NUTS)

BE	BELGIUM

BE1	BRUXELLES CAP. BRUSSEL HOF

BE21	ANTWERPEN
BE22	LIMBURG
BE23	OOST-VLAANDEREN
BE24	VLAAMS BRABANT
BE25	WEST VLAANDEREN

BE31	BRABANT WALLON
BE32	HAINAUT
BE33	LIEGE
BE34	LUXEMBOURG
BE35	NAMUR

DK	DANMARK

DK001	Københavns og Frederiksberg Kommuner

DK002	KØBENHAVNS AMT

DK003	FREDERIKSBORG AMT

DK004	ROSKILDE AMT

DK005	VESTSJÆLLANDS AMT

DK006	STORSTRØMS AMT

DK007	BORNHOLMS AMT

DK008	FYNS AMT

DK009	SØNDERJYLLANDS AMT

DK00A	RIBE AMT

DK00B	VEJLE AMT

DK00C	RINGKØBING AMT

DK00D	ÅRHUS AMT

DK00E	VIBORG AMT

DK00F	NORDJYLLANDS AMT

DE	DEUTSCHLAND

BADEN WÜRTTEMBERG	
DE11	STUTTGART
DE12	KARLSRUHE
DE13	FREIBURG
DE14	TÜBINGEN

BAYERN	
DE21	OBERBAYERN
DE22	NIEDERBAYERN
DE23	OBERPFALZ
DE24	OBERFRANKEN
DE25	MITTELFRANKEN
DE26	UNTERFRANKEN
DE27	SCHWABEN

DE3	BERLIN

DE4	BRANDENBURG

DE5	BREMEN

DE6	HAMBURG

NIEDERSACHSEN	
DE91	BRAUNSCHWEIG
DE92	HANNOVER
DE93	LÜNEBURG
DE94	WESER-EMS

NORDRHEIN-WESTFALEN	
DEA1	DÜSSELDORF
DEA2	KÖLN
DEA3	MÜNSTER
DEA4	DETMOLD
DEA5	ARNSBERG

RHEINLAND-PFALZ	
DEB1	KOBLENZ
DEB2	TRIER
DEB3	RHEINHESSEN - PFALZ

DEC	SAARLAND

SACHSEN	
DED1	CHEMNITZ
DED2	DRESDEN
DED3	LEIPZIG

HESSEN	
DE71	DARMSTADT
DE72	GIESSEN
DE73	KASSEL

DE8	MECKLENBURG-VORPOMMERN

SACHSEN-ANHALT	
DEE1	DESSAU
DEE2	HALLE
DEE3	MAGDEBURG

DEF	SCHLESWIG-HOLSTEIN

DEG	THÜRINGEN

GR	**ELLADA**

VOREIA ELLADA	
GR11	ANATOLIKI MAKEDONIA, THRAKI
GR12	KENTRIKI MAKEDONIA
GR13	DYTIKI MAKEDONIA
GR14	THESSALIA

KENTRIKI ELLADA	
GR21	IPEIROS
GR22	IONIA NISIA
GR23	DYTIKI ELLADA

GR3	ATTIKI

NISIA AIGAIOU, KRITI	
GR41	VOREIO AIGAIO
GR42	NOTIO AIGAIO
GR43	KRITI

GR24	STEREA ELLADA
GR25	PELOPONNISSOS

ES	**ESPAÑA**

NOROESTE	
ES11	GALICIA
ES12	ASTURIAS
ES13	CANTABRIA

NORESTE	
ES21	PAÍS VASCO
ES22	NAVARRA
ES23	LA RIOJA
ES24	ARAGÓN

ES3	COMUNIDAD DE MADRID

ES7	CANARIAS

ESTE	
ES51	CATALUÑA
ES52	COMUNIDAD VALENCIANA
ES53	ISLAS BALEARES

SUR	
ES61	ANDALUCIA
ES62	MURCIA
ES63	CEUTA Y MELILLA

CENTRO	
ES41	CASTILLA-LEÓN
ES42	CASTILLA- LA MANCHA
ES43	EXTREMADURA

FR	**FRANCE**

FR1	ILE DE FRANCE

BASSIN PARISIEN	
FR21	CHAMPAGNE – ARDENNE
FR22	PICARDIE
FR23	HAUTE NORMANDIE
FR24	CENTRE
FR25	BASSE NORMANDIE
FR26	BOURGOGNE

FR3	NORD - PAS DE CALAIS

EST	
FR41	LORRAINE
FR42	ALSACE
FR43	FRANCHE-COMTE

SUD-OUEST	
FR61	AQUITAINE
FR62	MIDI-PYRENEES
FR63	LIMOUSIN

CENTRE-EST	
FR71	RHÔNE-ALPES
FR72	AUVERGNE

MEDITERRANNEE	
FR81	LANGUEDOC-ROUSSILLON
FR82	PROVENCE-ALPES-CÔTES D'AZUR
FR83	CORSE

OUEST	
FR51	PAYS DE LOIRE
FR52	BRETAGNE
FR53	POITOU-CHARENTE

DEPARTEMENTS D'OUTRE-MER	
FR91	GUADELOUPE
FR92	MARTINIQUE
FR93	GUYANE
FR94	REUNION

IE	**IRELAND**

IE011	BORDER
IE021	DUBLIN
IE022	MID-EAST
IE012	MIDLAND
IE023	MID-WEST
IE024	SOUTH-EAST (IRL)
IE025	SOUTH-WEST (IRL)
IE013	WEST

IT	**ITALIA**

NORD OVEST	
IT11	PIEMONTE
IT12	VALLE D'AOSTA
IT13	LIGURIA

IT2	LOMBARDIA

NORD EST	
IT31	TRENTINO-ALTO ADIGE
IT32	VENETO
IT33	FRIULI-VENEZIA GIULIA

IT4	EMILIA-ROMAGNA

CENTRO	
IT51	TOSCANA
IT52	UMBRIA
IT53	MARCHE

IT6	LAZIO

ABRUZZO-MOLISE	
IT71	ABRUZZO
IT72	MOLISE

IT8	CAMPANIA

SUD	
IT91	PUGLIA
IT92	BASILICATA
IT93	CALABRIA

ITA	SICILIA
ITB	SARDEGNA

LU	**LUXEMBOURG (Grand Duché)**

NL	**NEDERLAND**

NOORD-NEDERLAND	
NL11	GRONINGEN
NL12	FRIESLAND
NL13	DRENTHE

OOST-NEDERLAND	
NL21	OVERIJSSEL
NL22	GELDERLAND
NL23	FLEVOLAND

WEST-NEDERLAND	
NL31	UTRECHT
NL32	NOORD-HOLLAND
NL33	ZUID-HOLLAND
NL34	ZEELAND

ZUID-NEDERLAND	
NL41	NOORD-BRABANT
NL42	LIMBURG (NL)

AT	**ÖSTERREICH**

OSTÖSTERREICH	
AT11	BURGENLAND
AT12	NIEDERÖSTERREICH
AT13	WIEN

WESTÖSTERREICH	
AT31	OBERÖSTERREICH
AT32	SALZBURG
AT33	TIROL
AT34	VORARLBERG

SÜDÖSTERREICH	
AT21	KÄRNTEN
AT22	STEIERMARK

PT	**PORTUGAL**

CONTINENTE	
PT11	NORTE
PT12	CENTRO
PT13	LISBOA E VALE DO TEJO
PT14	ALENTEJO
PT15	ALGARVE

PT2	AÇORES

PT3	MADEIRA

FI	**SUOMI / FINLAND**

MANNER-SUOMI	
FI12	ETELÄ-SUOMI
FI13	ITÄ-SUOMI
FI14	VÄLI-SUOMI

FI15	POHJOIS-SUOMI
FI16	UUSIMAA (SUURALUE)

FI2	ÅLAND

SE	**SVERIGE**

SE01	STOCKHOLM

SE02	ÖSTRA MELLANSVERIGE

SE04	SYDSVERIGE

SE0A	VÄSTSVERIGE

SE06	NORRA MELLANSVERIGE

SE07	MELLERSTA NORRLAND

SE08	ÖVRE NORRLAND

SE09	SMÅLAND MED ÖARNA

UK	**UNITED KINGDOM**

NORTH EAST	
UKC1	TEES VALLEY AND DURHAM
UKC2	NORTHUMBERLAND, TYNE AND WEAR

YORKSHIRE AND THE HUMBER	
UKE1	EAST RIDING AND NORTH LINCOLNSHIRE
UKE2	NORTH YORKSHIRE
UKE3	SOUTH YORKSHIRE
UKE4	WEST YORKSHIRE

EAST MIDLANDS	
UKF1	DERBYSHIRE, NOTTINGHAMSHIRE
UKF2	LEICESTERSHIRE, RUTLAND, NORTHAMPTONSHIRE
UKF3	LINCOLNSHIRE

EASTERN	
UKH1	EAST ANGLIA
UKH2	BEDFORDSHIRE AND HERTFORDSHIRE
UKH3	ESSEX

SOUTH WEST(UK)	
UKK1	GLOUCESTERSHIRE, WILTSHIRE AND NORTH SOMERSET
UKK2	DORSET, SOMERSET
UKK3	CORNWALL AND ISLES OF SCILLY
UKK4	DEVON

WEST MIDLANDS	
UKG1	HEREFORD & WORCESTERSHIRE, WARWICKSHIRE
UKG2	SHROPSHIRE, STAFFORDSHIRE
UKG3	WEST MIDLANDS

NORTH WEST (UK)	
UKD1	CUMBRIA
UKD2	CHESHIRE
UKD3	GREATER MANCHESTER
UKD4	LANCASHIRE
UKD5	MERSEYSIDE

LONDON	
UKI1	INNER LONDON
UKI2	OUTER LONDON

WALES	
UKL1	WEST WALES AND THE VALLEYS
UKL2	EAST WALES

SOUTH EAST (UK)	
UKJ1	BERKSHIRE,BUCKINGHAMSHIRE,OXFORDSHIRE
UKJ2	SURREY, EAST AND WEST SUSSEX
UKJ3	HAMPSHIRE, ISLE OF WIGHT
UK55	GREATER LONDON
UKJ4	KENT

SCOTLAND	
UKM1	NORTH EASTERN SCOTLAND
UKM2	EASTERN SCOTLAND
UKM3	SOUTH WESTERN SCOTLAND
UKM4	HIGHLANDS AND ISLANDS

UKN	NORTHERN IRELAND

IS	**ISLAND**

LI	**LIECHTENSTEIN**

NO	**NORGE**

NO01	OSLO OG AKERSHUS
NO02	HEDMARK OG OPPLAND
NO03	SØR-ØSTLANDET
NO04	AGDER OG ROGALAND

NO05	VESTLANDET
NO06	TRØNDELAG
NO07	NORD-NORGE

CZ	**ČESKÁ REPUBLIKA**

CZ01	PRAHA
CZ02	STŘEDNI ČECHY
CZ05	SEVEROVÝCHOD
CZ06	JIHOVÝCHOD

CZ03	JIHOZÁPAD
CZ04	SEVEROZÁPAD
CZ07	STŘEDNI MORAVA
CZ08	OSTRAVSKO

EE	**EESTI**

CY	**KYPROS**

LV	**LATVIJA**

LT	**LIETUVA**

HU	**MAGYARORSZÁG**

HU01	KÖZÉP-MAGYARORSZÁ
HU02	KÖZÉP-DUNÁNTÚL

HU05	ÉSZAK-MAGYARORSZÁG
HU06	ÉSZAK-ALFÖLD

HU03	NYUGAT- DUNÁNTÚL
HU04	DÉL- DUNÁNTÚL

HU07	DÉL-ALFÖLD

MT	**MALTA**

PL	**POLSKA**

PL01	DOLNOŚLASKIE
PL02	KUJAWASKO-POMORSKIE
PL03	LUBELSKIE
PL04	LUBUSKIE
PL05	ŁÓDZKIE
PL06	MAŁOPOLSKIE
PL07	MAZOWIECKIE
PL08	OPOLSKIE

PL09	PODKARPACKIE
PL0A	PODLASKIE
PL0B	POMORSKIE
PL0C	ŚLASKIE
PL0D	ŚWIETOKRZYSKIE
PL0E	WARMIŃSKO-MAZURSKIE
PL0F	WIELKOPOLSKIE
PL0G	ZACHODNIOPOMORSKIE

SI	**SLOVENIJA**

SK	SLOVENSKÁ REPUBLIKA

SK01	BRATISLAVSKÝ KRAJ
SK21	TRNAVSKÝ KRAJ
SK22	TRENČIANSKY KRAJ
SK23	NITRIANSKY KRAJ

SK31	ŽILINSKÝ KRAJ
SK32	BANSKOBYSTRICKÝ KRAJ
SK41	PREŠOVSKÝ KRAJ
SK42	KOŠICKÝ KRAJ

APPENDIX 1 LIST OF COURSES PER INSTITUTE

Course contents (C=Compulsory, O=Optional)

SEMESTER 1 (Trondheim)			
TOPIC	*CODE*	*ECTS*	*C/O*
Marine physical environment	*TBA4265*	*7.5*	*C*
Geotechnical eng. Calculation methods	*TBA5100*	*7.5*	*C*
Spreading of pollution	*TGB4235*	*7.5*	*C*
Dynamic response to irregular loadings [1]	*TBA4275*	*7.5*	*O*
Transport systems [1]	*TBA4305*	*7.5*	*O*
Total credits, semester 1.		*30*	

[1] *Select one of the optional courses*

SEMESTER 2 (Delft)			
TOPIC	*CODE*	*ECTS*	
MSc multidisciplinary project	*CT4061*	*11*	*C*
Philosophy and ethics for civil engineers	*WM0312CT*	*4*	*C*
Probabilistic design	*CT4130*	*4*	*C*
Bed, bank and shore protection	*CT4310*	*4*	*C*
Ports and waterways 1	*CT4330*	*4*	*O*
Computational modelling of flow and transport	*CT4340*	*4*	*O*
Structural dynamics	*CT4140*	*4*	*O*
Offshore soil mechanics	*OT4624*	*3*	*O*
Geology for civil engineers	*TA4730CT*	*3*	*O*

SEMESTER 3 (Barcelona)			
TOPIC	*CODE*	*ECTS*	
Marine climate and hydrodynamics	*C.04.170.00*	*7*	*C*
Coastal protection. Hard and soft works	*C.04.176.00*	*7*	*C*
Numerical and hydraulic modelling	*20057*	*4.5*	*C*
Coastal and estuarine morphodynamics	*C.04.182.00*	*4.5*	*O*
Impacts, conflicts and risks	*C.04.179.00*	*7*	*O*
Specialization project (minor thesis)	*C.04.183.00*	*11.5*	*O*

SEMESTER 3 (Delft)			
TOPIC	*CODE*	*ECTS*	
Coastal morphology and coastal protection	*CT5309*	*4*	*C*
Wind waves	*CT5316*	*3*	*C*
Coastal inlets and tidal basins	*CT5303*	*3*	*C*
Integrated coastal zone management	*CT5307*	*3*	*C*
Turbulence in hydraulics	*CT5312*	*3*	*O*
Flood defences	*CT5314*	*3*	*O*
Computational hydraulics	*CT5315*	*3*	*O*
Ports and waterways 2	*CT5306*	*4*	*O*
Foundation engineering and underground construction	*CT5330*	*4*	*O*
Breakwaters and closure dams	*CT5308*	*4*	*O*

Field work hydraulic engineering	*CT5318*	*3*	*O*

SEMESTER 3 (Trondheim)			
TOPIC	*CODE*	*ECTS*	
Specialization project (minor MSc thesis) Selected within one of the following areas: *1. Coastal engineering* *2. Port engineering* *3. Marine civil engineering* *4. Arctic offshore engineering* *5. Marine geotechnics*	*TBA5700*	*11.25*	*C*
Coastal engineering II [1]		*3.75*	*C/O*
Marine geotechnics [1]		*3.75*	*C/O*
Port engineering [1]		*3.75*	*C/O*
Flow induced vibrations [1]		*3.75*	*C/O*
Structures in ice-infested waters [1]		*3.75*	*C/O*
Safety and reliability [1]		*3.75*	*O*
If available and applicable, study at UNIS, Svalbard in Arctic Offshore Eng. might be applied for [2]		*7.5*	*O*
Geography, health and development. Other non-technical subjects can be chosen. [3]	*GEOG3506*	*7.5*	*C/O*
Total credits, semester 3.		*30*	

[1] *Select three specialization courses, totalling 11.25 ECTS. Depending on choice of specialization, various courses will be compulsory. Other specialization courses could be selected if approved by professor in charge.*

[2] *For this option, one additional subject must be chosen.*

[3] *One non-technical subject of 7.5 ECTS must be chosen. The given course is an example. Other courses might be selected if available, and provided approval by professor in charge.*

SEMESTER 3 (Southampton)			
TOPIC	*CODE*	*ECTS*	
Environmental Audit and Risk Assessment	*CENV6087*	*7.5*	*C*
Maritime and Coastal Engineering	*CENV6084*	*7.5*	*C*
Applied Sediment Dynamics	*SOES6011*	*7.5*	*C*
Geographic Information Systems for Coastal Engineering	*GEOG6012*	*7.5*	*C*

SEMESTER 3 (City)			
TOPIC	*CODE*	*ECTS*	
Maritime operations	*EPM 782*	*7.5*	*C*
Maritime law and insurance	*EPM 784*	*7.5*	*C*
Maritime technology	*EPM 783*	*7.5*	*O*
Finance, accounting and economics	*EPM 785*	*7.5*	*O*
Management studies- Human resources, crisis and risk	*EPM 786*	*7.5*	*O*

Appendix 2 – Course syllabi

Trondheim syllabi

TBA4265 MARINE PHYS ENV
Marine Physical Environment
Marint fysisk miljø

Lecturer:	Professor Sveinung Løset, Associate professor Øivind Arntsen	
Coordinator:	Professor Sveinung Løset	
Weekly hours:	Autumn: 3F + 2Ø + 7S = 7.5 ECTS	
Examination:	Before Christmas	Examination support: C
	Exercises: Compulsory	Grade: Letter grade

Learning outcomes: Knowledge and skills dealing with action and action effects from environmental processes as wind, currents, waves and ice in a marine environment.
Recommended previous knowledge: BSc in Civil Engineering or similar. Basic course in Fluid Mechanics.
Academic content: Marine physical processes. Description of waves, currents, wind and formation and mechanics of ice. Resulting consequences for marine activities. Fundamentals of statistical methods used in physical marine environment and an introduction to spreading processes. Special note: For students from developing countries, the ice topics are replaced by topics of particular interest for these students.
Teaching methods and activities: Lectures and exercises.
Course material: Information at the start of the semester. Textbook and lecture notes.
Evaluation form: Written 100%.

TBA5100 GEOTECH CALC METH
Geotechnical Engineering, Calculation Methods
Geoteknikk, beregningsmetoder

Lecturer:	Associate professor Arnfinn Emdal	
Weekly hours:	Autumn: 3F + 2Ø + 7S = 7.5 ECTS	
Examination:	Before Christmas	Examination support: D
	Exercises: Compulsory	Grade: Letter grade

Learning outcomes: The course is designed to develop basic skill in geotechnical design methods for slope stability, earth pressure, bearing capacity of foundations and piles as well as assessments of settlements and displacements.
Recommended previous knowledge: BSc degree in Civil Engineering or equivalent. Basic courses in geology and geotechnics.
Academic content: Relevant stress fields based on the theory of plasticity, basic elements and combinations. Principles and recipes for performing short-hand calculations of settlements, slope stability, earth pressure and bearing capacity of foundations and piles. The course aims at creating basic understanding through classical analytic tools and hand calculations as well as demonstrations of real design cases.
Teaching methods and activities: Lectures, calculation and laboratory exercises and a minor project work.
Course material: Information at the start of the semester, lecture notes.
Evaluation form: Written 100%.

TGB4235 SPREADING POLLUTION
Spreading of Pollution
Spredning av forurensning
Lecturer: Professor Sveinung Løset, Accosiate professor Øivind Arntsen
Coordinator: Professor Sveinung Løset
Weekly hours: Autumn: 3F + 2Ø + 7S = 7.5 ECTS
Examination: Before Christmas — Examination support: C
Exercises: Compulsory — Grade: Letter grade
Learning outcomes: The course aims to give students an introduction to mechanisms for dispersion and transport of pollution in various recipients (water, soil and air).
Recommended previous knowledge: Elementary knowledge in hydro-dynamics and hydro-geology.
Academic content: Ocean dispersion: Tidal currents, air driven currents, coastal currents. An overview ofprinciples for calculation of currents in oceans and coastal waters. Dispersion in the atmosphere: Geostrophic wind, vertical wind profile, topographic influence. Mixed processes: Spreading by shear, turbulent diffusion, density driven diffusion (in plumes). Statistical methods and modeling. Degradation processes (oil): Evaporation, emulsion formation, dispersion, solubility in water, biological and photo-chemical degradation. Airborne dust: Spreading and retention times.
Teaching methods and activities: Lectures/colloquiums, exercises and laboratory demonstrations.
Course material: Lecture notes and selected papers. To be announced at start of course.
Evaluation form: Written 100%.

TBA4275 DYNAMIC RESPONSE
Dynamic Response to Irregular Loadings
Dynamisk respons på uregelmessige laster
Lecturers: Professor Geir Moe, Associate professor Øivind Arntsen
Coordinator: Professor Geir Moe
Weekly hours: Autumn: 3F + 2Ø + 7S = 7.5 ECTS
Time: Spring:
Examination: Before Christmas — Examination support: D
Exercises: None — Grade: Letter grade
Learning outcomes: To familiarize the students with state-of-the-art methods to describe the environmental loads and responses to these, displacements of structures.
Recommended previous knowledge: TBA4265 Marine physical environment (in parallel) and some knowledge of structural dynamics.
Academic content: Environmental loadings (wind, waves, earthquakes) will be modeled as irregular time series, and considered as input to a system the produces environmental forces as output, and then in the next step the environmental forces will be considered as input and structural displacements may be found as output. This is done by means of transfer functions, which determine variance spectra of the output. Vital quantities such as the average numbers of peaks on various levels, average frequencies and expected extremes will be estimated from these spectra .
Teaching methods and activities: Lectures and exercises.
Course material: Textbook, lecture notes and selected papers.
Evaluation form: Written 100%.

TBA4305 TRANSPORT SYSTEMS
Transport Systems
Transportsystemet
Lecturer: Professor Tore Øivin Sager
Weekly hours: Autumn: 3F + 3Ø + 6S = 7.5 ECTS
Examination: Before Christmas — Examination support: C
Exercises: Compulsory — Grade: Letter grade
Learning outcomes: To provide knowledge and understanding of the freight transport systems and developments and the related logistics in the integrated transport chain.
Recommended previous knowledge: None. The course is taught in English. Exercises and the final test can be answered in Norwegian.
Academic content: Infrastructure and markets for all freight transport modes are characterized from the perspectives of logistics and transport economics. Key elements are market development, transport policy,
competitive interfaces, organization, and the needs and strategies of the actors responsible for commercial transport functions. Terminals and special features of road, rail, sea, and air transport systems as part of the general logistics and supply chain are considered. Cost-benefit analysis and other methods of transport economics are introduced.
Teaching methods and activities: Lectures, seminars, and exercises.
Course material: Textbook, lecture notes, and selected papers.
Evaluation form: Written 100%.

TBA5700 COASTAL/MAR ENG SPEC
Coastal and Marine Civil Engineering, Specialization
Marin byggteknikk, fordypning

Lecturer: Programme staff and external supervisors
Coordinator: Professor Eivind Bratteland
Weekly hours: Autumn: 36S = 22.5 ECTS
Examination: Before Christmas — Examination support: D
Exercises: None — Grade: Letter grade based on project work and oral examination

Learning outcomes: The specialization will give the student an in-depth theoretical knowledge and competence within a selected course area of the field. It will improve the student ability to do independent engineering/research work, and provide training in planning of projects, systematic processing of information and report writing.
Recommended previous knowledge: Passed examinations in the required basic courses necessary for the chosen specialization courses.
Academic content: The specialization in Coastal and Marine Civil Engineering is divided into 5 course areas:

1. Coastal Engineering
2. Port Engineering
3. Marine Civil Engineering
4. Arctic Offshore Engineering
5. Marine Geotechnics

The specialization consists of a project equivalent to 11.25 ECTS and normally three selected specialization
courses listed below summing up to 11.25 ECTS. For each course area one of the specialization courses is compulsory. The specialization courses are:

- Coastal Engineering II (3,75 ECTS, compulsory for Coastal Engineering, (Professor Øivind A. Arntsen)
- Port Engineering (3,75 ECTS, compulsory for Port Engineering, (Professor Eivind Bratteland)
- Flow-Induced Vibrations (3,75 ECTS, compulsory for Marine Civil Engineering, (Professor Geir Moe)
- Marine Geotechnics (3,75 ECTS, compulsory for Marine Geotechnics, (Professor Lars Grande)
- Safety and Reliability (3,75 ECTS, (Professor Arvid Næss)

For Arctic offshore engineering there are two options:

1. Study at NTNU with the following course as compulsory:
   Structures in Ice-Infested Waters (3,75 ECTS, (Professor Sveinung Løset)
2. Study at UNIS, Svalbard with the following course as compulsory:
   Arctic Offshore Engineering (7.5 ECTS, (Professor Sveinung Løset).

Apart form the compulsory course given, the specialization normally requires at least one of the other courses listed to be included. The Professor in charge of the project work will inform about this. If the Professor in charge approves it, the student could choose one course given by others. The project work should include problems related to research and development within the chosen course areas. Whenever possible the project should be linked to local problems and challenges and preferably have a local supervisor. The project may comprise theoretical, numerical, experimental or field studies. If possible, fieldwork should be included. The specialization project will normally be a starting point for the thesis work in the spring term. The student can work individually or in a team.
Teaching methods and activities: Supervised project work. Depending on the number of participants the
specialization courses may be lectured, given as seminars or taken as a self-study.
Course material: Lectures, selected texts from textbooks, papers etc.
Evaluation form: Project report and its oral presentation (50%) and oral examination in the specialization courses (50%).

GEOG 3506* Geography, Health and Development

Credits: 7.5 ECTS
Semester: Autumn
Lectures: 20 hours
Seminars: 8 hours
Compulsory: Assignment and presentation
Assessment: Written examination (4 hours)

The course will be given in English and is designed for 3 groups:
- Students on the MPhil in Social Change Programme (anticipated to be the largest group)
- Other (Norwegian) Geography Master´s students
- Master´s students studying Health in ISH who take this course as an elective (listed in the study plan as an optional course for this study).

The course provides a general introduction to geographical aspects in health, with two main focuses: Health status, disease/injury and risk/risk factors. The geography of different levels of health services, with emphasis on demand and use, offer and accessibility, development, and treatment (self treatment, care and cure)

Aim and description of the course:

The course has a development perspective with emphasis on the situation in developing countries. More general international development trends are also covered. In addition to a common core curriculum, in-depth courses (curriculum options) are available: one which focuses on developing countries and one which is on western countries (focusing on the situation in Norway). The course covers studies on approaches to quantitative and qualitative methods.

Case studies. Part of the course will be based on individual reading, which will provide a basis for carrying out the assignment. These projects will be presented in seminars. A seminar will also be held on researching health and health geography in libraries and databases (3 hours).

Assignment and presentation must be approved before the student is allowed to take the examination.

Delft Syllabi

CT4061 Civil engineering project education

ECTS credits: 11
schedule:

Msc-programme, semester 1.1, 1.2, 2.1 and 2.2

lecturer

tutors from all sections

contact for students

Ylva de Haan room: 5.53 ext: 84915

Summary

Solve an actual and recent civil engineering problem in a multidisciplinary team. Integrate several studies and designs into a coherent entity, based on knowledge, understanding and skills acquired in the preceding years. Attention will be on quality control and the evaluation of the design process. Knowledge and skills obtained during CT4061 will be used in this project. The course is divided into three phases: phase 1: inception plan; phase 2: preliminary design and studies; phase 3: process evaluation with respect to interdisciplinary aspects; final report.

Description

Phase 1: preliminary investigation (Problem exploration and treatment). By means of supplied and found information (project file, informers, literature) an inventory and analysis of the problem must be made. This results in a (substantive) problem formulation and an objective. Coupled to that, a treatment will be formulated. Which methods will be used, which contribution can different disciplines provide to the project, which steps have been passed through successively, which information is still necessary, where can that information be found? Finally the organization of the group must be fixed.

Phase 2: design. At this stage is alternatively worked for the complete problem and for sub-problems. The work exists for a part of research, for a another part of developing design alternatives or solution alternatives, and from developing the sub-problems. Ongoing, the consistency with the whole design must be monitored.

Phase 3: Round-off. In the round-off, the last hand is laid to the results of the project. First of all the handed in report is discussed with the speculator team, whereupon the definite version is made. The participants evaluate the project, both substantive and concerning the project process. Finally, the presentation is prepared and a summary for the presentation is established.

Goal

1. Design learning on a sub-sector of civil engineering in multidisciplinary link.
2. Integrated appliance of knowledge and skills from previous years.
3. Application of design knowledge and skills from the first, second and third year.
4. Learning to work by means of an interdisciplinary approach.
5. Learning to report, present and defending the end product.
6. Learning to apply elementary quality guarantee principles (e.g. MCE, SWOT) during the design process.
7. Evaluate learning of the interdisciplinary work process

CourseType

team work

Testing

Prerequisite

plan of work, rough design, specialistic design and final design

Permitted materials

Everything

Test type

written and oral presentation for assessment. Start and final presentation and a briefing halfway through

Materials

syllabus:

- Available at BookShop Civiele Techniek.

obligatory lecturenote(s)/textbook(s):

- Available at BookShop Civiele Techniek.

obligatory other materials:

- Available at the lecturer.

recommended lecturenote(s)/textbook(s):

- Available at BookShop Civiele Techniek.

WM0312CT

Philosophy, Technology Assessment and Ethics for CT

ECTS credits: 4
schedule:

MSc-programme, semester 2.2

lecturer

Dr. M. Brumsen

Dr.ir. K.F. Mulder

Summary

This course contributes abilities and knowledge of relevant backgrounds for recognizing, analysing and reasoning in a solution-oriented way about moral and societal problems that arise in the professional practice of engineers.

Description

Philosophy Module

- Introduction to and illustration of the course's aims: what is philosophy (methodology/ethics); illustration of the coherence of the three modules
- What is science, and what is technology? Brief overview of their history; positions on the influence of science and technology on society
- The fact/value distinction; logic and argumentation theory
- Analysis of the notion of causality in relation to: at the one hand, scientific explanations and responsibility of engineers at the other hand; notion of probability; statistics
- Methodology: foundations of scientific and technological knowledge; construction of models and their limitations; predictability of consequences

TA Module

- Why does technology fail? Technology Assessment as bridging the gap between society and the engineering community
- Introduction to TA-methods and traditional forecasting: extrapolations, expers interview and the 'common sense'-method, scenario's, scenario workshops

- Drivers of technological change, the relation between technological change and society
- Constructive Technology Assessment, participatory technology development
- Practice of TA; politics, steering technological innovation of Sustainable Development

Module Ethiek

- Introduction to moral dilemmas in engineering practice
- Analysis of moral dilemmas in engineering practice and their backgrounds; professional codes of practice and conflicting loyalties; legal rights and duties of engineers
- Ethics, i.e. the foundation of judgements about good and bad / responsible and irresponsible acts
- Responsibility of corporations and the law; ethical foundations of liability legislation; division of responsibility within organisations
- Collective decision-making / public choice and the role of the expert
- Integration of the above, and inventorisation of available solution strategies

Goal

Philosophy:

- Insight in the nature of philosophical and methodological problems
- Insight in the nature of scientific and technological knowledge (difference science-technology, science-pseudo-science)
- Knowledge of how scientific and technological knowledge are founded (truth/reliability; nature and limitations of models)
- Knowledge of positions on the interaction between science, technology and society
- Insight in the distinction between facts and values, which in practice are often intertwined
- Elementary knowledge of logic and argumentation theory

Technology Assessment:

- Ability to recognize patterns of interaction between technological and

societal change

- Ability to assess the value and limitations of TA-mehtods and -results
- Ability to apply some TA-methods to concrete situations

Ethics:

- Familiarity with and insight in problems of responsibility of engineers that arise in their professional practice
- Knowledge of and insight in the relevant background to these problems: ethics, law, public choice, functionering of organisations, historical development of all the foregoing
- Ability to reason conistenly and solution-oriented about moral problems in professional engineering practice, including insight in available solution strategies (both at individual and collective level)

CourseType

- lecture

Testing

Test type

written exam (open questions and multiple choice)

CT4130 Probabilistic Design

ECTS credits: 4
schedule:

MSc-programme, semester 1.1 and 1.2

lecturer

Prof.drs.ir. J.K. Vrijling

Prof.ir. A.C.W.M. Vrouwenvelder

tutor

Dr.ir. P.H.A.J.M. van Gelder

contact for students

Dr.ir. P.H.A.J.M. van Gelder room: 3.87 ext: 86544

appointments

secretariat of the section Waterbouwkunde room: 3.73 ext: 83345

Summary

Probabilistic design approaches of civil structures, consisting of concrete, steel, timber, ground, rock, asphalt, etc. Stochastic loads coming from traffic, floor, wind, waves, water levels, etc. Goal is the theoretical background of the reliability theorie, strongly applied to civil engineering applications.

Description

Objectives of probabilistic design of civil structures.
Probability Calculus; Steps in a Risk Analysis; Inventory of possible unwanted events, effects and consequences; Determining and evaluating the risk. Decision-making based on risk analysis; Decision-making under uncertainties; Probabilistic analysis of the decision problem; Frame of reference concerning safety; Current dutch safety standards; Generally applicable safety standards. Reliability of an element; Limit state functions, strength and load; Ultimate and serviceability limit states; Strength of concrete, steel, timber, soil, etc; Loads of traffic, wind, waves, water, earthquakes, precipitation, ice, etc; Time dependence.
Reliability calculation methods; Level III methods; Numerical integration; Monte carlo method; Level II methods; Non-linear limit state functions; Non-normally distributed variables; Dependent random variables; Comparison of different calculation methods.
Failure probability and life span; Deterioration processes; Risk calculation of systems with a variable rate of failure; Non availability; Markov processes; Load combinations.

Strength calculation with level I method; Linking the level I method to the failure probability calculation; Standardisation of álpha-values; Load combinations for level I strength calculations.
Reliability of systems; Probability of failure of the serial system; Probability of failure of the parallel system; FMEA (Failure Modes and Effects Analysis); FMECA (Failure Modes, Effects and Criticality Analysis); Event tree; Fault tree; Cause consequence chart; Reliability of correctable systems.
Scheduling the realisation of activities; Introduction to scheduling uncertainties; Influence of corrective measures on duration and costs; Maintenance; Introduction to maintenance strategies; Effect of maintenance on risk; Influence of inspections.
Application areas; Structural safety of buildings, dikes, offshore platforms, bridges, etc; Maintenance and management; Quality assurance; Safety management; Geostatistics; Reliability of software.

Goal

After the course, the student has to be able to do Level I, II and III calculations, risk-based optimisations and system probability calculations.

CourseType

- lecture

Testing

Prerequisite

Three questions during written examination.

Lecture notes on Probabilistic Design.

Permitted materials

No restrictions.

Test type

Written exam: three questions, they refer mainly to a different part of the course

Grading

calculation

one mark, based on written exam

Materials

obligatory lecturenote(s)/textbook(s):

- Probabilistic Design

  Available at BookShop Civiele Techniek.

recommended other materials:

- Tentamenbundel

  Available at BookShop Civiele Techniek.

CT4310 Bed, Bank and Shoreline Protection

ECTS credits: 4
schedule:
MSc-programme, semester 2.1

lecturer

ir. H.J. Verhagen

ir. J. Olthof

contact for students

ir. H.J. Verhagen room: 3.88 ext: 85067

appointments

ir. H.J. Verhagen room: 3.88 ext: 85067

Summary

Design of shoreline protection along rivers, canals and the sea; load on bed and shoreline by currents, wind waves and ship motion; stability of elements under current and wave conditions; stability of shore protection elements; design methods, construction methods.

Description

- Flow: recapitulation of basics from fluid mechanics (flow, turbulence), stability of individual grains (sand, but also rock) in different type of flow conditions (weirs, jets), scour and erosion.
- Porous Media: basic equation, pressures and velocities on the stability on the boundary layer; groundwater flow with impermeable and semi-impermeable structures; granular filters and geotextiles.
- Waves: recapitulation of the basics of waves, focus on wave forces on the land-water boundary, specific aspects of ship induced waves, stability of elements under wave action (loose rock, placed blocks, impermeable layers)
- Design: overview of the various types of protections, construction and maintenance; design requirements, deterministic and probabilistic design; case studies, examples
- Materials and environment: overview of materials to be used, interaction with the aquatic environment, role of the land-water boundary as part of the ecosystem; environmentally sound shoreline design.

Goal

After this course the student has to:
* be able to design individually a shoreline protection along a river, a canal or the sea
* understand the processes acting on the land-water boundary and be able to judge

which parameters are relevant for the design
* be able to determine the boundary conditions for the design of a shoreline protection, and their probability of occurrence
* understand the basics of stability in flow and wave conditions (understand the concepts of Shields, Izbash, Sleath, Iribarren, Van der Meer)
* be able to design intermediate layers between armour and susoil (filter design), both using a granular filter as well as a geotextile
* be able to design relevant details, like a toe protection
* be able to determine the method to construct the design (execution methods), especially how to place the rock and/or concrete element as well as the bed protection

CourseType

- lecture
- computer supported studying

Course Relations

- CT4310 uses CT2320
- CT4310 uses CT4300
- CT4310 uses CT4320

Testing

Test type

Oral exam

Grading

calculation

Based on oral examination

Materials

syllabus:

- Bed, Bank and Shorelineprotection; Course Information

  Available at the first lecture.

obligatory lecturenote(s)/textbook(s):

- Bed, Bank and Shoreline protection (G.J. Schiereck)

  Available at bookshop and VSSD.

obligatory other materials:

- Several handouts (indicated on Blackboard)

  Available at the first lecture.

recommended other materials:

- Manual on the Use of Rock

  Available at BookShop Civiele Techniek.

CT4330

Ports and Waterways 1

ECTS credits: 4
schedule:

MSc-programma, semester 1.2 and 2.1

lecturer

ir. R. Groenveld

Prof.ir. H. Ligteringen

contact for students

ir. R. Groenveld
room: 3.84 ext: 84740

appointments

ir. R. Groenveld
room: 3.84 ext: 84740

Summary

- sea ports and terminals
- queueing systems for ports and inland waterways
- inland navigation and waterways
- environmental aspects

Description

Seaports and Terminals:

- Maritime transport
  Specific data of merchant ships, commodity and vessel types, tramp and liner trade
- Port functions and organisation
  Functions, transport chain, organisation of seaports
- Port planning methodology

Types of planning, planning process, planning tasks, general observations

- Planning and design of the water areas
  Ship manoeuvring and hydrodynamic behaviour, approach channels, manoeuvring areas within the port, port basins and berth areas, morphological aspects

- Planning and design of port terminals
  Services provided, terminal components, types of terminals, terminal capacity (maximum or optimum) and terminal dimensions

- Container terminals
  Container transport, terminal operations and lay-out development

Queueing theory for ports and inland waterways:

- Port studies

- Aspects in port design
  Organisation, ship handling, cargo handling and inland transport

- Methods for solving capacity problems in ports
  empirical rules of thumb, queueing theory and simulation techniques

- Queueing theory
  Arrival process, service process, queue discipline

- Queueing systems
  M/M/1 -system, M/M/n-system, M/G/1 M/D/1 and N/Ek/1 systems, M/D/n and D/M/n systems

- Queueing systems with more general distributions of arrival and service time
  Approach to an Ek/Em/1 queue system and approach to an Ek/Em/n queue system

- Some applications

Inland waterways:

- Shipping on inland waterways
  Significance of inland navigation, classification of ships and waterways, ship characteristics, ship types

- Interaction between ship and waterway
  Primary water movement, secondary water movement, remaining hydraulic phenomena

- Navigation speed
  Ship's resistance, installed engine power, example speed-engine power

- Navigation
  Encounters, overtaking manoeuvres, navigation in bends, cross sections, stopping distance

- Design of inland waterway profiles
  Design vessels, traffic intensity, cross-section and design parameters and

cross-sections in bends

- Natural waterways
  Navigation on rivers, improvements, classification of rivers, ship dimensions, river ports and mooring places.

Integration of environmental issues in port planning and design

- Environmental aspects which affect port-layout
  Land use planning, visual amenity, dangerous goods, dredging and disposal of dredged material, prevention nuisance, contamination of soil and groundwater, reception of ballast water and waste and wetlands and nature areas

- Relevant aspects for environmental impact assessment
  Environmental impact assessment, pollution control, ecology and nature habitats, use of recourses, social and gender aspects and quality of life

Goal

1. The student has understanding of his own capacity and affinity in the field of ports and waterways.
2. The student has a broad overview of the field ports and waterways and recognises the interest of related sciences.
3. The student understands the functions of ports and waterways in the total transport chain with different transport modalities.
4. The student has knowledge of vessel types and demands with respect to port infrastructure.
5. The student has knowledge of relevant hydraulic aspects for the design of the wet infrastructures.
6. The student is capable to develop a design of the lay-out of a port and a container terminal.
7. The student is capable to apply the queueing theory in order to determine capacities of service systems in ports and waterways.
8. The student has knowledge of hydraulic phenomena in the interaction between ship and inland waterway.
9. The student is capable to estimate the required dimensions of an inland waterway.
10. The student understands the relevance of environmental issues in port planning and design.

CourseType

- lecture
- case study

Course Relations

- CT4330 uses CT2320
- CT4330 uses CT3330
- CT4330 uses CT3340
- CT4330 uses CT4300

Testing

Permitted materials

One A4 with notes

Test type

Written exam

Grading

Bonus

The case study can be rewarded with a bonus of 1, 0.5 or 0 points; rewarding of the bonus only counts when the mark of next examination is at least 5 (not rounded off).

calculation

Based on the written examination and bonus points.

Materials

syllabus:

-
  - Ports and terminals
  - Service systems in ports and inland waterways
  - Capacities of inland waterways
  - Integration of environmental issues in port planning and design

Available at BookShop Civiele Techniek.

CT4340 Computational modelling of flow and transport

ECTS credits: 4
schedule:

MSc-programme, semester 1.1 and 1.2

lecturer

Prof.dr.ir. G.S. Stelling

Dr. J.D. Pietrzak

contact for students

Dr. J.D. Pietrzak room: 2.97 ext: 85466

appointments

secretariat of the section Vloeistofmechanica room: 2.91 ext: 81953

Summary

Elementary notions of computational modelling of flow and transport.

Description

The following topics are dealt with during the course:

- Ordinary Differential Equations, Box models/Mass spring systems
- Numerical methods for ODE's, consistency, convergence, stability, stiffness
- Transport equations, advection and diffusion
  Numerical methods for transport equations, CFL condition, Von Neumann analysis, Numerical diffusion
- 1D shallow water equations, Preissmann scheme, Staggered grids, applications

CourseType

- lecture
- practical

Course Relations

- CT4340 uses WI1316CT
- CT4340 uses WI2253CT

Testing

Prerequisite

Succesful completion of three practicals

Test type

Written exam, open questions

Materials

syllabus:

- "Computational Modelling for Flow and Transport"

  Available at BookShop Civiele Techniek.

CT4140 Structural Dynamics

ECTS credits: 4
schedule:

MSc-programme, semester 2.1

lecturer

ir. J.M.J. Spijkers

A. Metrikine Ph.D, D.Sc.

contact for students

ir. J.M.J. Spijkers room: 5.25 ext: 84781

appointments

secretariat of the section
Constructie Mechanica room: 5.33
ext: 83332

Summary

Part 1:
STRUCTURAL VIBRATIONS. Analysis of continuous systems and systems with multiple degrees of freedom.

Part 2:
WAVE DYNAMICS. Tranverse and longitudinal waves in strings and rods and in piles respectively. Bendingwaves in railtracks.

Description

Part 1: Structural Vibrations
Systems with multiple degrees of freedom; Formulation of the system of equations of motion; Free vibration (Eigenvalue problem, natural frequencies, eigen vectors or principle modes); Orthogonality principles; Model Analysis; Initial conditions; Harmonic loadings (frequency respons function); Viscuous damped systems; Propotional damping; Rayleigh Quotient of discrete systems; Continuous systems (bending beam, shear beam, rod, torsional axle, tout string); Eigenvalue problem (natural frequencies, eigenfunctions or principle modes); Rayleigh Quotient of continuous systems.

Part 2: Wave Dynamics
Tranverse waves in a string (wave equation, excitation, reflections, non-reflective boundary element); The characteristic plane; Longitudinal waves in a thin rod (incident, reflected and transmidded waves, Impedance); Longitudinal waves in a pile continuously interacting with a soil (spring foundation, visco-elastic foundation); Harmonic waves (reflection); Bending waves in a railway track (governing equation, resonance).

Goal

The goal of this course is to give an insight into possible idealisations of dynamic loads and the subsequent behaviour, the available calculation methods and the decision criteria.

CourseType

- lecture

Course Relations

- CT4140 uses CT2022
- CT4140 uses CT3110

Testing

Permitted materials

Consulting any written text brought in by the students is permitted during the exam; although texting (as well as talking) by mobile phone is prohibited.

Test type

Written open book exam.

Grading

calculation

The final grade is 2/3 of part 1 grade (67%) plus 1/3 of the part 2 (33%) grade

Materials

obligatory lecturenote(s)/textbook(s):

- Part 1: Structural Vibrations
  Part 2: Wave Dynamics

  Available at BookShop Civiele Techniek.

obligatory other materials:

- Uitgewerkte tentamenopgaven A/B.

  Available at BookShop Civiele Techniek.

MSc Curriculum Course Description

OE4624 Offshore Soil Mechanics

2004-2005 academic year

1a. Course code: OE4624
1b. Earlier code (if any): OT4624
2. Course title: Offshore Soil Mechanics
NL: Offshore grondmechanica
3a. Current TU Delft credits: 2 ECTS equivalent: 3
(ECTS credits are used in the remainder of this document.)
3b. Total student-teacher contact hours: 20
3c. Student credit distribution:
Quarters: 2
Activities: Classes 1.5
Exercises 1.5
Totals: 3.0
3d. Staff credit distribution:
CE Geomechanics 3
4. Participation status:
Required for: Required for OE MSc participants including a major accent on Bottom Founded Structures.
Restricted elective for: --
Free elective for: Any other qualified MSc participant.
Although not required, this course can be handy for those including Subsea Engineering as well as Deep Sea Dredging or Marine Pipelines in their curricula.
5. Summary description:
Successful participants can design offshore foundations at a superior knowledge level. This course makes this possible by extending one's basic knowledge of soil mechanics to include a number of typical offshore applications. Topics include:
- Axially and laterally loaded piles: linear and nonlinear behavior and computations,
- Shallow spread footings for large structures: linear and nonlinear behavior and computations,
- Influences resulting from cyclic pore pressure in the sea bed.
- Field (at sea) and lab studies.

CT5309 Coastal Morphology and Coastal Protection

ECTS credits: 4
schedule:

MSc-programme, semester 1.1

lecturer

Dr.ir. J. van de Graaff

contact for students

Dr.ir. J. van de Graaff room: 3.77
ext: 84846

appointments

secretariat of the section
Waterbouwkunde room: 3.73 ext:
83345

Summary

Sediment transport by waves and currents; bottom shear stress; dune erosion; erosion of coasts; sedimentation of channels; coast line and morphological computations; coastal protection measures.

Description

Introduction:
Key topics of course; active players (national, international); The Netherlands in the past (7000BC) and now; sediment transport due to waves and currents key element in solution of most actual problems.
Sediment transport:
Initiation of motion; role of bottom shear stress; sediment transport due to waves and currents; approach of amongst others Bijker, Van Rijn and Ribberink. Distinction between longshore and cross-shore sediment transport. Sand and silt.
Calculation of longshore sediment transport:
Driving forces (amongst others radiation stress); bottom shear stress; current and sediment transport distribution perpendicular to the coast; CERC formula; other calculation methods; UNIBEST-LT.
Calculation of cross-shore sediment transport:
Dune erosion; equilibrium profiles (approach of Swart); UNIBEST-TC; Durosta.
Morphological development; coastline development:
Complex morphological computations (DELFT3D-MOR); Pelnard-Considère method; temporal and spatial scales; effects of building a port along a sandy coast; up-drift accretion and lee-side erosion.
Sedimentation of (navigation) channels:
Current perpendicular to channel axis; current approaching under an angle; changing sediment concentration verticals.
Coastal protection:
What is coastal erosion? Counter measures; artificial beach and shoreface

nourishments; groynes and row of piles; detached shore parallel offshore breakwaters (submerged/emerged); seawalls/revetments.
Coastal Zone Management:
Interrelationship of various aspects; legal means; formal institutes.
Coastal research:
Measuring methods; field observations; small scale physical research. Netherlands Center for Coastal Research; Delft Cluster; role of European Union.
Dutch hot items:
Coastal zone management; safety aspects; large land reclamation projects (Maasvlakte2; artificial islands); Technical Advisory Committee for Water Defences (TAW).

Goal

Achieve insight in the complexity of coastal engineering issues and problems. Achieve knowledge of the physical processes underlying coastal engineering issues. To be able to discern possible solutions of coastal engineering problems.

CourseType

Lectures with illustrations (video, numerical examples). Self-tuition.

Course Relations

- CT5309 uses CT4300
- CT5309 uses CT4320
- CT5309 uses CT5316
- CT5309 uses CT5317

Testing

Test type

Oral examination

Grading

calculation

One mark based on oral examination

Materials

obligatory lecturenote(s)/textbook(s):

- Lecture notes: "Coastal Morphology and Coastal Protection"

  Available at BookShop Civiele Techniek.

recommended other materials:

- Coastal Engineering Manual

  via Internet (pdf, downloadable)

recommended lecturenote(s)/textbook(s):

- TAW Leidraad "Zandige Kusten"

TAW Basisrapport "Zandige Kusten"

Available at BookShop Civiele Techniek.

CT5316 Wind waves

ECTS credits: 3
schedule:

MSc-programme, semester 1.2

lecturer

Dr.ir. L.H. Holthuijsen

contact for students

Dr.ir. L.H. Holthuijsen room: 3.63
ext: 84803

appointments

Dr.ir. L.H. Holthuijsen room: 3.63
ext: 84803

secretariat of the section
Vloeistofmechanica room: 2.91
ext: 81953

Summary

- observing and measuring wind waves, qualitative and quantitative description of wind waves, spectral characterisation
- growth curves, qualitative description of processes of wave growth and dissipation; spectral wave prediction models
- statistical description of wind waves, response spectra

Description

- Methods of observing and measuring waves at sea are explained with reference to various in-situ and remote sensing techniques. Waves are initially characterised with primary parameters such as the significant wave height. Waves are then characterised in more detail with the variance density spectrum (involving the Fourier transform).
- A simple method for wave prediction in idealised conditions is introduced, resulting in universal wave growth curves. Then, using the concept of the spectrum, the processes of generation by wind, non-linear wave-wave interactions and whitecapping are described. These processes are integrated with spectral wave propagation in numerical wave models.
- The short-term statistics of the waves (in particular the instantaneous values of the surface elevation and its extremes such as crest heights) is given, treating the sea surface elevation as stationary, Gaussian process. Sources for long-term statistics are given and two different approaches of

analysis are treated.

- The response of structures to the excitation of wind waves is defined in terms of spectral response functions of linear systems.

Goal

- To gain insight and knowledge of the phenomenon of wind waves and the qualitative and quantitative description of this phenomenon.
- To learn the basis of simple and advanced mathematical models to predict waves for given conditions of wind, bathymetry, coast lines etc.
- To understand technique to compute linear responses of structures to wind waves excitations.

CourseType

- lecture

Testing

Prerequisite

- Linear theory of surface gravity waves, basic statistics
- Partial differential equations

Test type

Oral exam

Grading

calculation

Oral exam

Materials

syllabus:

- Available at BookShop Civiele Techniek.

CT5303 Coastal inlets and tidal basins

ECTS credits: 3
schedule:
MSc-programme, semester 2.1

lecturer

Prof.dr.ir. M.J.F. Stive

Prof.dr.ir. H.J. de Vriend

Dr.ir. Z.B. Wang

contact for students

secretariat of the section Waterbouwkunde room: 3.73 ext: 83345

appointments

secretariat of the section Waterbouwkunde room: 3.73 ext: 83345

Summary

The course focuses on coastal inlets and tidal basins (estuaries, tidal rivers and lagoons), and aims to give insight in the phenomenological characteristics (geography, geology, morphology, sediment motion and hydrodynamics) and in the modelling of these characteristics (empirical, process-based and hierarchical model approaches).

Description

Phenomenology

- Global classification of estuaries and inlets
- Behaviour of elements of inlet and estuary systems (tidal marshes, channels and shoals, flood and ebb-tidal deltas, adjacent coastlines and barrier islands)
- Interaction morphology - vegetation
- Interaction morphology - benthos
- Scale classification in time and space

Empirical relations

- O'Brien : relation of cross-sectional channel area and tidal prism
- Gerritsen: relation of cross-sectional channel area and effective shear stress
- Relation of tidal flats versus total basin area
- Flats height
- Walton & Adams : relation Volume ebb-tidal delta and tidal prism
- Bilse : cross-sectional area ebb-tidal delta and tidal prism

Tidal propagation and tide-driven transport

- basic 1D - equations
- deformation and asymmetry
- net transport versus net flow
- pumping mode (short basins)
- resonance and damping (long basins)
- 3D-flow patterns (coriolis and relaxation-effects)

Channels and shoals

- mechanisms of sediment exchange
- hypsometry effects
- dynamics of channels and shoals
- response to human interventions

Box models

- principle behaviour orientated models
- qualitative descriptions of system behaviour
- box model of Di-Silvio's
- applied for hindcast long term developments of the Venetie estuary

- model of Van Dongeren
- applied for hindcast long term developments of the Friese Zeegat and Ditmarschen Bucht

1D - network models

- 1D-proces-base network models
- nodal-point relations for flow and sediment transport applied to the Westerschelde
- Estmorf model concept applied for Friese Zeegat
- linearization (Lorentz and morphology) applied for the western part of the Wadden Sea

Inlets : interation of sub-systems

- behaviour basin
- behaviour ebb-tidal delta
- behaviour adjacent coastline
- deformation and asymmetry
- behaviour of two coupled systems : scale interactions
- forcing
- behaviour of coupled systems : scale interactions

Estuaries : 2D- and 3D models

- flow- and transport patterns (instantaneous and residual)
-

ebb and flood dominance

- curved channels
- coriolis effect
- sill formation
- density driven currents
- silt (consolidation effects and behaviour of mud)

Inlets : 2D and 3D models

- effect of waves (e.g. propagation in the basin)
- effects of locally generated waves
- implications for wave module in numerical models
- flow- and transport patterns (instantaneous and residual)
- channel-shoal interactions
- channel migration
- grain size distribution

CourseType

- lecture

Testing

Permitted materials

Dictate and notes

Test type

Oral exam

Materials

syllabus:

- Available at the first lecture.

obligatory lecturenote(s)/textbook(s):

- CT5303 Coastal Inlets Tidal Basins

  Available at BookShop Civiele Techniek.

CT5307 Integrated Coastal Zone Management

ECTS credits: 3
schedule:

MSc-programme, semester 2.2

lecturer

Dr.ir. J. van de Graaff

ir. T.J. Zitman

ir. H.J. Verhagen

appointments

secretariat of the section

Summary

Various aspects relevant for the planning of the coastal zone. Natural system (biotic and abiotic); user functions with socio-economic relations. System analysis and policy analysis. Application in a practical setting (case study) with simulation game.

Description

The course responds to a number of higher level goals beyond the course itself, but to which the course contributes. These are associated with the introduction and implementation of ICZM and include, for example, the expressed need to examine key issues of decision making on urban and recreational development in vulnerable coastal section and integration of sectoral activities in coastal development. It also takes into account the policy objectives of sound Coastal Zone Policy, which emphasise local participation in decision making.

In sum, the course is part of a learning process which, by means of a structured programme, undertakes the formation of trained manpower capable of redressing identified problems and helping to build capable institutions, better able to manage and guide the development of the coastal zone.

The course consists of lectures, demonstrations and workshops. The guiding line through the whole course is the idea that a coastal zone should be regarded as an integrated system. This will be illustrated by using several case studies in several countries. One of these cases (the fictive estuary of “Pesisir Tropicana”) will be worked out in a workshop. In the case studies the coastal zone is regarded as a coastal land/water body in the sense that there are demands for various products and services that the Bay and its environs can supply – that is, it is a multiple-use resource. The regional economy of the area used in the exercise is similar to those in many coastal areas in the world, particularly in developing countries. There is a large urban complex, port facilities and industrial base, with a well developed service sector. Fishing is carried out in the coastal waters. In the hinterland, various types of primary production take place, including agriculture

and mining. Wage levels, existing pollution control and production technologies are typical of many developing countries. Special attention will be given to the Worldbank Guidelines for CZM plans.

Goal

The objectives of the course are to:

1. Develop an appreciation for and know-how of conceptualisation, policy design, methodology, tools and techniques for coastal zone management
2. Gain an understanding and operational grasp of the interdependence of managerial functions related to the improvement of coastal planning and management
3. Appreciate the need for integration of coastal zone development policies and their implementation
4. become familiar with the multi-disciplinary aspects of the CZM-approach and acquire the capabilities for guiding and supporting multi-disciplinary teams in complex situations

CourseType

Lectures, presentation of case studies, computer exercises and simulation game. Because Integrated Coastal Zone Management is mainly an attitude and less a skill, it has to be trained in a realistic setting. A fieldtrip to Zeeuws Vlaanderen and Belgium is part of the course.

Testing

Prerequisite

Sufficient participation in the workshop

Test type

- Oral evaluation in a small group after finalising the course and workshop.
- Exam: contents of the syllabus, results of the Pesisir Tropicana Case Study and Simulation Game

Grading

calculation

Based on oral evaluation

Materials

syllabus:

- Available at the Blackboard website.

obligatory lecturenote(s)/textbook(s):

- Available at the first lecture.

recommended other materials:

- Software (Cress, Jesew, Cosmo, etc)

  Available at the first lecture.

CT5312 Turbulence in hydraulics

ECTS credits: 3
schedule:

MSc-programme, semester 2.2

lecturer

Dr.ir. W.S.J. Uijttewaal

tutor

Dr.ir. W.S.J. Uijttewaal

contact for students

Dr.ir. W.S.J. Uijttewaal room: 0.08
ext: 81371

appointments

secretariat of the section
Vloeistofmechanica room: 2.91
ext: 81953

Summary

Stochastic description of turbulence, experimental techniques, balance equations for mass, momentum and energy, Reynolds equations, closure problems, turbulent flows in practice, modelling turbulence, turbulent diffusion and dispersion.

Description

Stochastic description of turbulence: mean velocity, higher statistical moments, velocity correlations, energy density spectra.
Experimental techniques: single measurements, whole field techniques; flow visualisation; optical acoustical, and electromagnetical measurement methods.
Balance equations: conservation of mass, Navier-Stokes equations, turbulent kinetic energy, energy cascade.
Reynolds equation: decomposition of velocities in (ensemble) averageed and fluctuating velocities, the closure problem for the Reynolds stresses, turbulent transport.
Turbulent flows in practice: boundary layer approximation, the flow near a wall, free turbulence, flow in complex geometries, recirculation and separation.
Turbulence modelling: constant eddy viscosity, mixing length approximation, k-epsilon, Large Eddy Simulation.
Turbulent diffusion and dispersion: Reynolds-analogy, the effects of turbulence on dispersion.

Goal

- Insight in turbulence phenomena and associated non-linear processes
- The ability to make estimates concerning lenght scales and velocity scales that characterise the turbulent motions
- A feeling for the effects of turbulence on bed material, structures and the transport of matter
- Knowledge concerning currently applied turbulence models and their restrictions
- A view on new developments in the field of turbulence research

CourseType

- lecture

Course Relations

- CT5312 uses CT2100
- CT5312 uses CT3310

Testing

Test type

Oral exam

Grading

calculation

exam-grade

Materials

obligatory lecturenote(s)/textbook(s):

- "Turbulence in Hydraulics"
  Available at the Blackboard website.

CT5314 Flood Defences

ECTS credits: 3
schedule:

MSc-programme, semester 2.1

lecturer

Prof.drs.ir. J.K. Vrijling

ir. J. Weijers

appointments

secretariat of the section
Waterbouwkunde room: 3.73 ext: 83345

Summary

- the design of flood defences in the natural and the socio-cultural environment
- technical design of dikes
- improvement of existing dikes
- construction
- detailed design of toe protection, revetment etc.
- integrated solutions (River cities, room for Rivers)
- exercise

Description

Goal

Gain a clear understanding of the design philosophy of flood defences special and constructural modelling of the defences. Encourage creativity in designing sophisticated dikes.

CourseType

- lecture
- exercise
- excursion

Testing

Test type

oral exam (case study)

Materials

obligatory lecturenote(s)/textbook(s):

- Manuals flood defences, Waterkeringen

Available at the section secretariat.

obligatory other materials:

- Readers on several subjects

Available at the section secretariat.

recommended other materials:

- Leidraad rivierdijken

CT5315 Computational hydraulics

ECTS credits: 3
schedule:
MSc-programme, semester 2.2

lecturer

Prof.dr.ir. G.S. Stelling

tutor

Dr. J.D. Pietrzak

contact for students

Dr.ir. M. Zijlema room: 2.94 ext: 83255

appointments

secretariat of the section Vloeistofmechanica room: 2.91 ext: 81953

Summary

Backgrounds of three-dimensional hydrostatic modelling. The course will be given once a week including practical. During the first practical, the flow model Delft3D-FLOW will be introduced in a tutorial manner. This model will be used in the following practicals. The content of the subsequent lectures and practicals are: specifying the initial and (open) boundary conditions, applying the Alternating Direction Implict (ADI) technique for efficient computations, calculation of stratified flows and a sensitivity analysis for a case study.

Description

Goal

learning some basics of applying a computation model with respect to hydrodynamics and hydraulics. Of crucial importance is the knowledge concerning the abilities and restrictions of the computer model.

CourseType

- lecture
- exercise
- practical

Testing

Test type

- Oral exam based on report
- Task

Grading

calculation

Report grade

Materials

obligatory lecturenote(s)/textbook(s):

- Lecture notes

  Available at the first lecture.

obligatory other materials:

- A list of literature

  Available at the first lecture.

recommended other materials:

- User Manual of Delft3D-Flow

  Available at the first lecture.

CT5306 Ports and Waterways 2

ECTS credits: 4
schedule:
MSc-programme, semester 1.1

lecturer

Prof.ir. H. Ligteringen

ir. R. Groenveld

contact for students

ir. R. Groenveld room: 3.84 ext: 84740

appointments

secretariat of the section Waterbouwkunde room: 3.73 ext: 83345

Summary

Functional design of port terminals

- ro/ro terminals
- liquid bulk terminals
- dry bulk terminals
- fishery ports
- marinas
- IWT-ports

Capacities of inland waterways

- capacities of open inland waterways
- capacities of constructions of inland waterways
- functional design of locks

Simulation models in ports and inland waterways

- introduction simulation models
- stochastic models
- computer simulation models/ boundary conditions/ evaluation output

Description

Ports and Terminals

- general cargo- and multipurpose terminals
  non-containerised general cargo, number of berths and quay length, storage area and overall terminal lay-out, multipurpose terminals
- ro/ro and ferry terminals
  lay-out ro/ro and ferry terminals, special design aspects
- liquid bulk terminals
  oil- and gas carriers, nature of the products, terminals, the berth, jetties, dolphins, storage areas, offshore terminals
- dry bulk terminals
  dry bulk commodities, dry bulk ships, unloading systems, loading systems, on-terminal handling and storage, climatic and environmental considerations
- fishery ports
  types of fishery ports, site selection, fishing vessels, port planning, unloading equipment, fishery port organisation and management
- marinas
  yachting and yachts, general lay-out of the port, basins and berths, port structures
- Ports and terminals for inland water transport
  vessels, types of ports, terminals

Capacities of inland waterways

- explanation terms used, operational capacity, intensity, density, water resistance, ship speed
- open waterways
  calculation methods based on knowledge and experience, virtual area, simulation
- closed waterways
  lock cycle, lock capacity, passing times, cycle times and waiting times
- vessel traffic service
  history, radar systems, VTS- Amsterdam-Tiel, registration and utilisation

- safety
  safety in general, risk analysis, probability of failure in practice, codes
- cases

Service systems in ports and inland waterways

- deterministic and stochastic models
- simulation tools random numbers, sampling from distribution functions, used for the description of port- and inland navigation systems
- computer simulation models description methods, components and attributes, structure of the computer model; examples of simulation models
- analysis of input- and output data characteristics of the relevant distribution functions, Chi square test, Kolmogorov Smirnov test.

Goal

1. The student is a full interlocutor of experts in the field of ports and waterways
2. The student is capable to analyse relevant processes in ports and waterways
3. The student is capable to develop a design of the wet infrastructure of a port
4. The student is capable tot develop a functional of port terminals as:
   - liquid bulk terminals
   - dry bulk terminals
   - fishery ports and
   - marinas
5. The student has knowledge of the capacity controlling parameters of port systems
6. The student has knowledge of the capacity controlling parameters of inland waterway systems as locks
7. The student is capable to develop a functional design of a canal system with locks
8. The student has knowledge of traffic flow simulation models in ports and inland waterways for the estimation of capacity and safety

CourseType

- lecture
- exercise

Course Relations

- CT5306 uses CT3740
- CT5306 uses CT4330
- CT5306 uses CT5300
- CT5306 uses CT5303
- CT5306 uses CT5307
- CT5306 uses CT5308
- CT5306 uses CT5309
- CT5306 uses CT5311
- CT5306 uses CT5316
- CT5306 uses CT5317
- CT5306 uses

Testing

Test type

- oral exam
- Computer simulation exercise

Grading

Bonus

maximum 1 bonus point for the computer simulation exercise

Materials

obligatory lecturenote(s)/textbook(s):

-
  - Ports en Terminals
  - Capacities of Inland Waterways
  - Service Systems in Ports and Inland Terminals

Available at BookShop Civiele Techniek.

CT5330

Foundation engineering and underground construction

ECTS credits: 4
schedule:

MSc-programme, semester 2.2

lecturer

Prof.ir. A.F. van Tol

guest lecturers

contact for students

Ing. H.J. Everts room: 0.10 ext: 85478

appointments

secretariat of the section Geotechniek room: 0.13 ext: 81880

Summary

The main topics of the course deal with the interaction between soil and structure in tunneling, foundations and deep excavations. The content of the lectures will be practised in a realistic case concerning the design of a building pit and the prediction of the effects on neighbouring structures.
It is possible to combine this course with the course "submerged tunnels" (CT5305). In that case the number of ECTS will be 8.

Description

The main topics of the course deal with:

- soil-investigation; design of scope and interpretation
- design of appropriate foundations regarding the characteristics of soil and structure
- the effects of interaction between soil and structure
- the possibilities of improving foundations
- the design of building pits
- shieldtunneling; the analysis of the front stability and prediction of effects on adjacent structures
- the possibilities of improving soil characteristics; grouting

- the design of tension piles
- the design of laterally loaded piles (due to soil deformation or external loads)

Goal

The course intends to get the knowledge and the proficiency to identify all relevant aspects concerning the design of buildings pits, tunnels or piled foundations and the interaction between soil and structure.

CourseType

- lecture
- instruction
- case study

Course Relations

- CT5330 uses CT5331

Testing

Prerequisite

Attendence of the lectures

Test type

- Written presentation
- Oral presentation
- Practice(s)

Materials

syllabus:

-
  - CT5330 "Foundation Engineering and Underground Construction"
  - CT5740 "Trenchless Technology"

Available at BookShop Civiele Techniek.

obligatory lecturenote(s)/textbook(s):

- Lecture notes

Available at the Blackboard website.

CT5308 Breakwaters and Closure Dams

ECTS credits: 4
schedule:
MSc-programme, semester 1.2

lecturer

ir. H.J. Verhagen

tutor

ir. J. Olthof

contact for students

ir. H.J. Verhagen room: 3.88 ext: 85067

appointments

secretariat of the section Waterbouwkunde room: 3.73 ext: 83345

Summary

Design and construction of breakwaters and closure dams in estuaries and rivers. Functional requirements, determination of boundary conditions, spatial and constructional design and construction aspects of breakwaters and dams consisting of rock, sand and caissons.

Description

Overview and history of breakwater and closure dam construction. The general design principles of a breakwater and a closure dam. Determination of boundary conditions for dams and breakwaters, with special attention to the design frequency. Methods to determine the design wave height from wave statistics. Overview of other boundary conditions (geotechnical and hydraulic).

Materials, quarries and rock properties.

Various properties of the different types of dams and breakwaters, like stability of riprap in current and wave conditions, design of armour layer, natural rock and concrete elements. The use of caissons for breakwaters and closure dams. Computation of element size using classical formulae, partial safety coefficients and probabilistic methods. Plan and cross section of breakwaters. Practical examples of breakwaters and closure dams.

Execution (marine or land based equipment) of the works.

Failure mechanisms and (cost) optimisation.

One-week exercise in which a group of two students has to design a breakwater and a closure dam.

Goal

After the course, the student has to be able to:

- Determine the type of breakwater required
- Determine the type of closure required
- Determine the boundary conditions (waves, waterlevels, currents)
- Make a preliminary design of a breakwater and a closure dam
- Be able to optimise the design on basis of cost and availability of resources like labour and materials

CourseType

Lectures with illustrations (video, numerical examples). Exercise in groups of two students to design a breakwater and a closure dam.

Course Relations

- CT5308 uses CT4310
- CT5308 uses CT4320

Testing

Test type

Design exercise or oral exam
(Book "Breakwaters and Closuredams")

Grading

calculation

One mark, based on Design exercise or on Oral Exam

Materials

obligatory lecturenote(s)/textbook(s):

- Book: "Breakwaters and Closuredams"
  Available at bookshop and VSSD.

obligatory other materials:

- Handouts and list of videos
  Available at the Blackboard website.

recommended other materials:

- The Closure of tidal Basins (Huis in 't Veld)
  Available at BookShop Civiele Techniek.
- Coastal Engineering Manual (pdf, downloadable)
  Available at the website.

recommended lecturenote(s)/textbook(s):

- Manual on the use of Rock (CUR Publication)
  Available at BookShop Civiele Techniek.

CT5318 Fieldwork Hydraulic Engineering

ECTS credits: 4
schedule:

MSc-programme, semester 1.1

lecturer

ir. H.J. Verhagen

contact for students

ir. H.J. Verhagen room: 3.88
ext: 85067

appointments

ir. H.J. Verhagen room: 3.88
ext: 85067

Summary

Fieldwork on location in The Netherlands or abroad. Preparation (30 hours). Execution of measurements at a coast, a river or at a coastal structure (one week). Elaboration of data in a report (50 hours). Option for a morphologic or a construction oriented fieldwork.

Description

For the fieldwork a number of options are possible, which may change on a yearly basis, depending on the availability of appropriate locations for the fieldwork. In the near future the following options are planned:

The **construction oriented fieldwork** will be done in Bulgaria. A quarry will be visited; here the students have to asses several parameters of rock, like the Dn50, density, blockiness, etc. At the coast some profile measurements will be made, sand sample will be taken and the instantaneous wave condition will be observed. At some rock structures pressure fluctuations will be observed due to wave impact.

The **morphologically oriented fieldwork** will be done along the Dutch coast. Measurements will be done on the beach, like profile measurements, sand sampling, sediment transport measurements, etc. The collected data will have to checked to the deep water boundary conditions (waves and currents) which are available via the routine measuring facilities of Rijkswaterstaat (ministry of public works).

Before starting with the actual fieldwork, a measuring plan will have to be drafted. During the measurements the collected data will have to be processed and put down into a measurement protocol. After the fieldwork the data will have to be analysed and conclusions will have to be drawn. The group will have to

make one joint report with the technical data and each student has to make an individual report with other observations.

Goal

After finalisation of this fieldwork students have to have insight in how to set up a measuring campaign, how such a campaign will be executed and how it should be reported. The student has to experience that there is a large degree of flexibility to be built into the planning of measurements in nature, because the weather conditions cannot be predicted accurately. The student has to get understanding in the degree of accuracy which can be obtained during measurements in the field. The student has to build up experience in organizing and in the logistics of a measuring campaign.

CourseType

Fieldwork

Course Relations

- CT5318 uses CT2320
- CT5318 uses CT4300

Testing

Prerequisite

A mark is only given when the following elements are completed:

- measuring plan
- participation in the fieldwork
- reports of the measurements
- final report

Test type

Grading

calculation

The mark is based on the participation during the fieldwork, the quality of the measurement report and the quality of the final report.

Materials

syllabus:

- Available at the Blackboard website.

obligatory lecturenote(s)/textbook(s):

- Bed- bank and shoreprotection (Schiereck)

Available at bookshop and VSSD.

obligatory other materials:

- Various handouts, downloadable from Blackboard.

recommended other materials:

- Manual on the Use of Rock.

  Available at BookShop Civiele Techniek.

UPC SYLLABI

Course contents (C=Compulsory, O=Optional)

Marine climate and hydrodynamics	*C.04.170.00*	*7*	*C*

Aims: To offer a specific training in marine processes and the basic tools for the design of marine civil engineering structure works.

Description: Marine civil engineering. Marine environment. Basic concepts. Environmental conditions. Coastal hydraulics. Structural types. Regular waves. Irregular waves. Waves regime. Storms regime. Return periods and admissible risks. Wave generation, propagation and breaking. Wave generation. Shoaling. Refraction. Diffraction. Reflection. Breaking. Models. Currents, tides and other hydrodynamic processes. Currents. Meteorological tides. Astronomical tides. Other processes. Other hydrodynamic processes. Transport processes. Dispersion processes. Applications to sediments and pollutants. Physical models. Basic concepts. 2DV and 3D models. Reliability of an structure. Failure modes and functions. Probabilistic analysis of isolated failure modes. Random variables. Time function. Failure probability for various failure systems. Structural reliability calculus. Coefficient method to fulfil a specific reliability. Harbour and coastal applications. Examples of harbour and coastal projects. Tools evaluation.

Teaching staff: J.P. Sierra, A. Sánchez-Arcilla and others.

Teaching and Learning Methods: Theory and practise and an optional "subject work".

Assessment: Exam with practical and theoretical questions. There is also the option that the students develops a course work related to the subject.

Coastal protection. Hard and soft works	*C.04.176.00*	*7*	*C*

Aims: To give the students the necessary knowledge to deal with the design of coastal protection works, including: typical problems in the coastal zone, mechanisms and processes that generate these problems, functional design of solutions to these problems either as a function of their origin or the nature of the zone to act on, impact of the actions to the coast and introduction to the management of the coast.

Description: Introduction. Coastal problems. Definition of the concept of problem (processes versus problems). Definition of the coastal zone as a multi-component system. Concept of time and spatial scales for the definition of processes, problems and solutions. Basic typology of coastal problems and conceptual solutions. Basic tools. Sediment transport mechanics. Suspended transport. Bed-load transport. Longshore sediment transport. Crosshore sediment transport. Coastal evolution. Equilibrium concept. Active depth concept. Sediment balance. Plan shape and profile changes. Coastal evolution models. Shoreline and profile analytical models. 1 line model for shoreline changes. Profile changes models. 2DH and 3D models. Long scale models. Groins. Longitudinal works detached breakwaters. By-pass, artificial nourishment and beach regeneration. The coastal zone: a multi-component system. Vulnerability and sustainability.

Teaching staff: A. Sánchez-Arcilla, J.A. Jiménez, V. Gracia and C. Mösso.

Teaching and Learning Methods: Theoretical and practical lectures. Practical work based on a real problem to be solved during the course by the student.

Assessment: The subject will be assessed by a tutored work which will be developed during the course.

Coastal and estuarine morphodynamics	*C.04.182.00*	*4.5*	*O*
Aims: To present a multi-scale analysis of coastal driving factors and responses. The emphasis will be in microtidal environment and corresponding processes. *Description:* Morphodynamics, spatial and time scales. Driving factors. Dynamic of pocket and open beaches. Deltaic coast dynamics. Estuarine coast dynamics. Dune dynamics. *Teaching staff:* A. Sánchez-Arcilla, J.A. Jiménez and others. *Teaching and Learning Methods:* Theory and practise and an optional "subject work". *Assessment:* Course work.			

Numerical and hydraulic modelling	*20057*	*4.5*	*C*

Aims: To familiarize the student with state of art numerical and hydraulic models commonly used in coastal oceanography, with emphasis on engineering application.

Description: Presentation of problems and solutions for numerical and hydraulic models in engineering and oceanography. Hydrodynamic models with finite elements and finite differences. Wave models. Current models. Models for mixing and dispersion of contaminants. Models of coastal evolution. Scaling laws for hydraulic models. Flume models. Basin models. Practical exercises.

Teaching staff: M. Espino, X. Gironella and A. Sánchez-Arcilla.

Teaching and Learning Methods: Theory and practise and an optional "subject work".

Assessment: Exam and/or research report

Impacts, conflicts and risks	*C.04.179.00*	*7*	*O*

Aims: To present the coastal zone as a dynamic zone submitted to an increase in pressure of use and, thus, with a high level of risk for the infrastructures/activities that "rigidize" it. To present the main driven factors of this coastal dynamics in terms of the risk that they produce. To present how the risk does develop, how to manage it and its perception by the "agents" that live at and use the coast.

Description: Introduction. Coastal zone. Estuarine areas. Dynamics and risks. Evaluation of the environmental impact of the marine environment. Environmental vigilance of the marine environment. Management of polluted sediments. River flooding risks. Precipitation, floods and river mouth discharges. Erosion and flooding risks at the coastal fringe. Pollution risks. Sources, dispersion and evolution. Risk assessment. Vulnerability and resilience. Risk forecasting. Operational models and services. Risk management. Risk communication. Introduction to the coastal environmental law.

Teaching staff: A. Sánchez-Arcilla, J.A. Jiménez and others.

Teaching and Learning Methods: Motivation talks whose emphasis is on
- Problem approach
- Some examples to illustrate the dimension of the problem
- Some examples of results to illustrate the tools to solve the problem

Assessment: A case study, to the chosen by the student or group of students (maximum 3), to be resolved at conceptual level as follows
- Problem
- Approach
- Solution

With an approximate extension of 15 pages corresponding a workload of approximately 10 hours

Specialization project (minor thesis)	*C.04.183.00*	*11.5*	*O*
Aims: *Description:* *Teaching staff:* *Teaching and Learning Methods:* *Assessment:*			

Southampton

CENV6084 Maritime and Coastal Engineering

Aims

The main aim of this module is to introduce theory and practical applications relevant to engineering in a marine environment.

Teaching and Learning Methods

Contact hours	40
Private study hours	110
Total	*150*

TEACHING ACTIVITY:
lectures and seminars.

LEARNING ACTIVITY:
class discussion, a roleplay (developer vs environmentalist), group work and private study

Assessment

Details	Weight	Issue wk.	Deadline wk.
Examination	67%		
Group Project	28%		
Group Oral Presentation	5%		
	100%		

Written feedback will be given within 3 weeks of the project work being handed in. The group oral presentation will receive peer and tutor review.

Learning Outcomes

Having successfully completed the module, you should be able to demonstrate knowledge and understanding of the following:

1. Wave and tidal theory
2. Marine construction
3. Environmental aspects of the land-water interface

Intellectual skills. Having successfully completed the module you should be able to:

1. Analyse marine data
2. Critically evaluate the results of calculations in view of practical consideration
3. Understand the importance of the environment in marine engineering and development

Practical skills. Having successfully completed the module you should be able to:

Key skills

- Argue a case

- Discussion
- Group work
- Oral presentation

Topics

Tidal Theory
Hydrographic Surveying
Maintenance Dredging
Wave Theories
Wave Refraction
Wave Diffraction
Wave Reflection
Breakwaters
Coastal Defence
Marine Construction
Long Sea Outfalls
Estuaries
Sediment transport

CENV6087 Environmental Audit and Risk Assessment

Aims

Environmental safety and environmental planning are essential pre-requisites to project planning and necessary to comply with current legislation covering risk and legal duty of care to employees. They encompass knowledge of environmental risk management techniques and environmental audits. Through this module, you should have the confidence and skills to carry out a full risk assessment.

Teaching and Learning Methods

Contact hours	30
Private study hours	120
Total	*150*

Teaching methods will include:

-Lectures
-Site visits
-Project work

Learning methods will include:

-Listen to lectures
-Group interaction
-Project work
-Developing and writing an Environmental Impact Statement

Assessment

Details	Weight	Issue wk.	Deadline wk.
EIA Report	100%		
	100%		

The EIA report is a full environmental impact statement on a large engineering project. It is carried out in groups of 3-4.

40% of the marks are allocated for the overall quality of the project, 60% for individual effort.

Students will be given written feedback on their report within 4 weeks of handing in their work.

Learning Outcomes

Having successfully completed the module, you should be able to demonstrate knowledge and understanding of the following:

1. The areas of risk, such as sounds, sight, air quality and hydrology
2. The principles of environmental risk management
3. How to scope, audit and manage risk
4. The adopted methods of risk assessment

5. The current legislation covering risk and the legal duty of care for all employees

Intellectual skills. Having successfully completed the module you should be able to:

1. Analyse the basic tools available for risk assessment
2. Appraise ,evaluate and summarize the basic data
3. Critically evaluate the quality of information

Practical skills. Having successfully completed the module you should be able to:

1.

Key skills

- Critical Analysis
- Decision Making
- Problem analysis and problem solving
- Self management (e.g. time management)

Topics

Environmental Impact Assessment Issues:

-the law
-public expectations
-identifying ecological issues
-environmental issues
-sound
-visual
-hydrological
-air quality

Generally adopted methods:

- Scoping : EIA construction Phase, Operation Phase, Public Inquiries, Planning to overcome restrictive issues

- Conducting an EIA (practical exercise)

- Risk Assessment : principles of risk assessment, the law and responsibilities, audit of risk, managing risk

SOES 6011: Applied Sediment Dynamics

Coordinator	Professor CL Amos	**Other teaching staff**	
Semester	1	**Timetable slot**	To be advised
Credit points	15	**Level**	4

Prerequisites

None. Restricted to Undergraduate and Postgraduate Masters students. [Not to be taken with SOES 3014 (OA320)]

Synopsis

This unit describes and extends upon fundamental principles of the movement of non-cohesive and cohesive sediments under waves and currents. These concepts are considered within different sedimentary environments. Sediment transport determinations are described, under unidirectional currents, waves and wave/current interaction. A series of applied studies are described, including: modelling of non-cohesive/cohesive sediment transport; sea bed scouring; beach replenishment; marine aggregates and sea bed mobility.

Aims

- To develop the basic concepts of sediment movement into applied studies within coastal and inner continental shelf waters.

Objectives

At the end of the unit, you should:

1. be conversant with the basic concepts of sediment movement, within the context of applied studies on coastal and inner continental shelft waters.

Key Skills Acquired

- Problem Analysis
- Written Communication
- Ability to learn
- Critical Analysis

Learning & Teaching

- Formal Lectures
- Laboratory Classes
- Fieldcourse: ½ day

Assessment

- Written examination 75%

GEOG6012: GIS for Coastal Engineers

Introduction

The course aims to give an understanding of the theory behind Geographic Information Systems (GIS) and the application of GIS to environmental and coastal engineering. This is delivered through a series of lectures and practicals, together with a number of lectures given by guest lecturers working in the coastal and marine industries.

This is an introductory course, aimed at those with little knowledge or experience of GIS, therefore there are no pre-requisites for the unit. Attendance at all lectures and practical sessions is expected from those who intend to be assessed for the unit.

The lectures supply most of the formal theory of GIS, while the practicals aim to put these theories into practice using environmental and coastal data sets and GIS software that is widely used by industry, local government and government agencies involved in environmental management. The guest lectures aim to provide context by demonstrating the use of GIS in the coastal and marine industry.

The supervised practical sessions will be computer based, using the ArcView 9 GIS software. They will concentrate on the development of analytical and mapping skills and their application to environmental and coastal projects.

Assessment:

GIS Project: 100%

1. Assessment for this unit will consist of a GIS project. This will involve the application of the skills you have learned to a real coastal engineering project.

City University List of Courses and Syllabi
(All Courses 7.5 ECTS)

Maritime Operations. **Code EPM 782**

Educational Aims:
To provide an overview of operations in the various sectors of the coastal and marine industries; to provide an awareness of the need to identify and manage risks as they affect organisations, including financial and other exposures, which occur at various stages of operations. To provide an understanding of the contractual elements that may be used to reduce risks.

Content:
Commercial, coastal, and ocean transport. The interface between marine activities and sea transport. Military logistics, Ministry of Defence marine and shipping activities.
Ocean bed exploration such as the following,
Fossil fuel exploration, production and maintenance operations,
Offshore mining and sea bed litigation,
Offshore alternative energy operations.
Extent and categories of contractual and financial risks. The management of risk. Organisations liability to reduce risk and its impact. Control systems to minimise the effects of risk.

Maritime Technology. **Code EPM 783**

Educational Aims:
To describe the principles, practice and management of present and future technologies for coastal and marine applications. To provide a common technical and operational foundation in communications, power generation, propulsion, sea keeping, structures, ship systems and associated risks.

Content:
The basic principles of thermodynamics, fluid mechanics, combustion and exhaust emissions. Technologies involved in coastal and marine developments and their inter-relationship. Strategies for identifying relevant technology appropriate to specific tasks such as prime movers, gearboxes, ship hydrodynamics, electrical components and controls. An introduction to environmental issues. Principles of risk management in the context of coastal and marine operations. Hazard identification, screening and ranking, risk registers. Cost implications of design solutions.

Maritime Law and Insurance. **Code EPM 784**

Educational Aims:
To integrate legal and insurance considerations into the management of coastal and marine operations.

Content:
UNCLOS (United Nations Conference 1982 on Loss of Life at Sea.) International and appropriate national laws. Coastal and marine commercial law. Personnel law. Law specific to national and international coastal and marine operations. Environmental law. The workings of underwriting syndicates. Indemnity liabilities. Reinsurance, claims and procedures. Insurance broking, surveyors and adjusters.

Finance, Accounting and Economics. **Code EPM 785**

Educational Aims:
To provide a knowledge and understanding of management accounting as a medium used for evaluating the performance of an organisation and for determining future operational strategies.

Content:
The business structure of coastal and marine organisations. A review of the principles of financial management**.** The measurement of the worth of an organisation and the cost centres within it. Case studies Depreciation and tax considerations. Cost effectiveness analysis. Break even, sensitivity and risk analysis. Decision models.

Management Studies-Human Resources, Crisis and Risk. **Code EPM 786**

Educational Aims:
To provide a knowledge and understanding of the basic principles of the management of organisations whose activities are concerned with coastal and marine operations.

Content:
Introduction to the principles of management. Human response in the workplace. Company management structures. Responsibility and ownership. Crisis and risk management. Safety case management. Harvard case study models, to include, the management issues surrounding ports and harbours, coastal zone management and management strategies for regions. Role playing and communication.

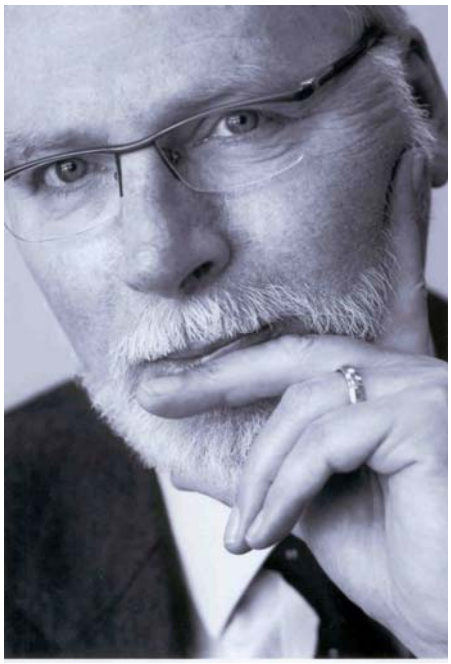
Appendix 3: CV’s of core teaching staff

Appendix 3: CV’s of core teaching staff Delft

FAMILY NAME:	Stive
FIRST NAMES:	Marcel Jacobus F.
DATE OF BIRTH:	February 25, 1951
NATIONALITY:	Dutch
MARITAL STATUS:	Married, three children
ADDRESS:	Dotterbloemeiland 2 2285 JX Rijswijk
EDUCATION: (only higher vocational or academic)	• PhD Civil Engineering, Delft University of Technology • MSc Civil Engineering, Delft University of Technology

LANGUAGE SKILLS:
(specify native tongue and then apply a scale of 1 (excellent) to 5 (poor) to other languages)

	spoken	written
Dutch	native tongue	native tongue
English	1	1
German	2	4
French	2	3
Spanish	2	4
Catalan	5	5

PRESENT POSITION	Professor of Coastal Engineering, Delft University of Technology, Faculty of Civil Engineering and Geosciences, Section of Hydraulic Engineering
YEARS WITH THE INSTITUTE:	1994 - present
KEY QUALIFICATIONS: 	Professor Stive has more than 25 years experience in research and projects in the fields of hydraulic engineering, coastal morphodynamics, coastal biogeomorphology and coastal and estuarine management, as team member, as team leader and as advisor. His record involves coasts, estuaries, harbours and offshore projects in several countries in Europe, Asia, Africa and the Americas, using fieldwork and experimental physical and mathematical physical models. He was involved in several projects sponsored by the science and technology programmes of the EU, of one of which he was overall co-ordinator. Moreover, he spent two years as visiting professor on the Universitat Polytecnica de Catalunya, and was part-time professor Coastal Morphodynamics at Delft University of Technology from 1994 to 2000. In 2001 he accepted the fulltime chair of Coastal Engineering at the Faculty of Civil Engineering and Geosciences of Delft University of Technology. His current long-term responsibilities involve the development of a Delft University of Technology research centre Water and the scientific co-ordination of the theme Coasts and Rivers in the Delft Cluster programme. He is a member of the National Advisory Committee on Water Defence, of the Board of Trustees of the Netherlands Centre for Coastal Research and of the Netherlands Centre for River Engineering. He has written many publications on a variety of topics, ranging from geology to hydraulic engineering and coastal zone management.
PROFESSIONAL EXPERIENCE RECORD:	

1994-2001	Senior Specialist Marine and Coastal Management, DELFT HYDRAULICS (0.70 FTE);
1994-2001	Professor Coastal Morphodynamics, Netherlands Centre for Coastal Research, Faculty of Civil Engineering and Geosciences, Hydrotechnical Section, Delft University of Technology (0.3 FTE
1992-1993	Visiting Professor, Universitat Politècnica de Catalunya, Departament d'Enginyeria Hidràulica, Marítima i Ambiental, Laboratori d'Enginyeria Marítima
1990-1991	Deputy Director, Division Harbours, Coasts and Offshore Technology, DELFT HYDRAULICS

1983-1989	Senior Research Engineer, DELFT HYDRAULICS
1977-1983	Project & Research Engineer, DELFT HYDRAULICS

MEMBERSHIP OF PROFESSIONAL BODIES	- Member Royal Dutch Institution of Engineers (KIVI) - Member European Union of Conservation of Coasts (EUCC) - International Affiliate Member American Society of Civil Engineers (ASCE)
OTHER: • LECTURES	*Teaching activities for 2002/2003:* - fifth-year graduate course: Coastal inlet and tidal basins (DUT) - fourth-year graduate course: Introduction Coastal Engineering (DUT) - fourth-year graduate course: Physics of Coastal Systems (UU) - second-year course: Introduction Hydraulic Engineering (DUT)
PUBLICATIONS *Principal (journal) publications (since 2003)*:	

2004	Hibma, A., Stive, M.J.F. and Wang, Z.B., 2004. Estuarine morphodynamics, Coastal Engineering 51: 765 - 778
2004	Duin, M.J.P. van, Wiersma, N.R., Walstra, D.J.R., Rijn, L.C. van, Stive, M.J.F., 2004. Nourishing the shoreface: observations and hindcasting of the Egmond case, The Netherlands, Coastal Engineering 51: 813 - 837
2004	Stive, M.J.F., 2004. How important is global warming for coastal erosion? Climatic Change 64 (1-2): 27-39
2004	Kragtwijk, N.G., Zitman, T.J., Stive, M.J.F. and Wang, Z.B., 2004. Morphological response of tidal basins to human interventions, Coastal Engineering 51: 207 - 221
2003	Elias, E., Stive, M., Bonekamp, H, and Cleveringa, J., 2003. Tidal inlet dynamics in response to human intervention. Coastal Engineering Journal, Vol. 45, No. 4, 629-658
2003	Cowell PJ, Stive MJF, Niedoroda AW, de Vriend HJ, Swift DJP, Kaminsky GM, Capobianco M, 2003. The coastal-tract (part 1): A conceptual approach to aggregated morphodynynamics of low-order coastal change, JOURNAL OF COASTAL RESEARCH 19 (4): 812-827 FAL 2003
2003	Cowell PJ, Stive MJF, Niedoroda AW, Swift DJP, de Vriend HJ, Buijsman MC, Nicholls RJ, Roy PS, Kaminsky GM, Cleveringa J, Reed CW, de Boer PL, 2003. The coastal-tract (part 2): Applications of aggregated morphodynamics of lower-order coastal change, JOURNAL OF COASTAL RESEARCH 19 (4): 828-848 FAL 2003
2003	Hanson H, Aarninkhof S, Capobianco M, Jimenez JA, Larson M, Nicholls RJ, Plant NG, Southgate HN, Steetzel HJ, Stive MJF, de Vriend HJ, 2003. Modelling of coastal evolution on yearly to decadal time scales, JOURNAL OF COASTAL RESEARCH 19 (4): 790-811 FAL 2003
2003	Larson M, Capobianco M, Jansen H, Rozynski G, Southgate HN, Stive M, Wijnberg KM, Hulscher S, 2003. Analysis and orphodyn of field data on coastal morphological evolution over yearly and decadal time scales. Part 1: Background and linear techniques, JOURNAL OF COASTAL RESEARCH 19 (4): 760-775 FAL 2003
2003	Van Goor, M.A., Zitman, T.J., Wang, Z.B. and Stive, M.J.F., 2003. Impact of sea-level rise on the morphological equilibrium state of tidal inlets. Marine Geology 202 (3-4): 211-227
2003	Hibma, A., de Vriend, H.J., and Stive MJF. 2003. Numerical modelling of shoal pattern formation in well-mixed elongated estuaries, Estuarine Coastal and Shelf Science, 57 (5-6): 981-991
2003	M. van Koningsveld, M.J.F. Stive, J.P.M. Mulder, H.J. de Vriend, B.G. Ruessink en D.W. Dunsbergen, 2003. Usefulness and effectiveness of coastal research: A matter of perception? *Journal of Coastal Research*, 19, 2, 441-461
2003	M.J.F. Stive and A.J.H.M. Reniers, 2003. Sandbars in motion, *Science*, 299, 1855 – 1856

CURRICULUM VITAE

Name	: VRIJLING, Johannes, Kornelis
Year of birth	: 1947
Nationality	: Dutch
Education	: MSc. C.E. Delft Univ.of Technology MSc. Economics Erasmus Univ.R'dam
Affiliations	: Royal Institute of Engineers
Languages	: Dutch, English, French, German
Overseas Exper.	: Saudi Arabia, Canada, Bangladesh, India
Employer	: Delft University of Technology
Position	: Professor of Hydraulic Engineering and Probabilistic Design at Delft University of Technology Advisor of the Construction Division Ministry of Transport and Public Works

Overview

Vrijling finished his master's study at Delft University of Technology in 1974 with a thesis on prefabricated office buildings. In 1980 he received his masters degree in Economics at the Erasmus University.
After a short period at the engineering office of the Adriaan Volker Group he was sent to the Jubail harbour project as site-engineer, supervising the construction of ancillary structures and the opening of a quarry.
In 1976 he was seconded to the Easternschelde storm surge barrier project. In this project mr.Vrijling developed the probabilistic approach to the design of the barrier. During the project he moved through the ranks to become the member of the project management team responsible for the research.
After the completion of the barrier in 1986 he became deputy-head of the Hydraulic engineering branch of the Civil Engineering Division of Rijkswaterstaat. Since 1989 he is responsible for the research and computer activities of the Civil Engineering Division.
In 1989 he became part time professor of Probabilistic Design in Hydraulic Engineering in Delft**.** Since 1995 he is full time professor of Hydraulic Engineering and Probabilistic Design

Research

Prof. Vrijling's research is directed at the decision-making in civil engineering design. His studies encompass, engineering design of fixed and flexible

structures, statistical analysis of hydraulic boundary conditions, the analysis of the consequences of failure and decision theory.

Administrative posts

Chairman of the Hydraulic en Geotechnical Engineering Group of the Faculty of Civil Engineering and Geoscience

Vice-dean of the Faculty of Civil Engineering and Geoscience

Member of the Dutch national Committee on Flood Defence

Selected publications

J.K. Vrijling, J.P.F.M. Janssen and J. Bruinsma, A Practical Method to Obtain Wave and Storm Surge Conditions for Predictions and Probabilistic Calculations, North Sea Dynamics, Springer Verlag, Hamburg, 1983, p.233-247, ISBN 3-540-12013-0

J.K. Vrijling, J. Oosting, Probabilistic Design of Flexible Dolphins, Dock and Harbour Authority, september 1985, p.95-98

J.K. Vrijling, Probabilistic design of waterretaining structures, Engineering Reliability and risk in water ressources, L. Duckstein and E.J. Plate, Eds. Nijhoff, Dordrecht,1986, p.115-134 ISBN 90-247-3492-4

J.K. Vrijling, Are models of any use for the designer of civil structures ?, Modelling Soil- Water -Structure Interactions SOWAS-88 Eds, Kolkman et al. Balkema, Rotterdam, 1988 p.7-15, ISBN 90 6191 8154

J.K. Vrijling et alt., Involvement of ecology in the decision process, Journal of IAHR, Vol 29,1991, p.20-23.

J.K.Vrijling , G.J.Meyer, Probabilistic coastline position computations, Coastal Engineering, 17 (1992) 1-23.

J.K.Vrijling et alt., Engineering Probabilistic design and Maintenance for Flood protection, Kluwer Ac. Publ., Dordrecht 1997

J.K.Vrijling et alt, Acceptable risk as a basis for design, Journ. Rel. Engin. & Syst. Saf. 59, 1998

Curriculum Vitae Henk Jan Verhagen

Associate professor in Hydraulic Engineering
Delft University of Technology, the Netherlands

Name	Verhagen, Hendrik Jan
Date of birth	12 March 1952
Nationality	Dutch
Education	Diploma civil engineering (M.Sc. in coastal engineering) Delft University of Technology in 1978.
Main discipline	Coastal engineering, coastal zone management
Present position	Associated professor in hydraulic engineering at the Delft University of Technology, Department of Hydraulic and Geotechnical Engineering, Delft, The Netherlands.
Specialisation	- Coastal protection works - Coastal policy problems - Policy analysis techniques - Co-operation between governmental agencies
Years with the institute	Since 2000
Professional affiliations	Dutch representative in MarCom of PIANC. Member of working group "Technology" of the Technical Advisory Committee on Waterdefences (TAW) of the Dutch minister of Public Works. Member of the Commission on the Environmental Impact Assessments of the Netherlands Government.
Employment Record	
2000 to date	Associate professor in Hydraulic Engineering, Delft University of Technology, The Netherlands
1991 - 2000	Associate professor in Coastal Engineering, Unesco-IHE, Delft, The Netherlands.
1983 - 1991	Ministry of Public Works, various positions at consultancy offices in Vlissingen, Middelburg, The Hague and Delft.
1978 - 1983	Hydronamic bv, Sliedrecht.

Professional Experience Record

Delft University of Technology
Responsibilities:
As Associate Professor in Hydraulic Engineering in charge of the subjects "Bank, Bed and Shoreline protection", "Breakwaters and Closure works", "Fieldwork Hydraulic Engineering" and "Integrated Coastal Zone Management". Supervision and guiding M.Sc. and Ph.D.-students in their assignments and (experimental) research work in coastal protection works, revetments and breakwaters. Courses in the framework of the permanent education programme of Delft University. Research related the topic of coastal structures.
Other teaching:
Teaching assignments in Indonesia and Vietnam for the Ministry of Public Works, focusing on the development of coastal engineering. Teaching assignments in Vietnam and Bangladesh in the framework of development cooperation with universities in those countries. Development of a Coastal Engineering curriculum for the Hanoi Water Resources University, including training of staff.
Expert opinion/supervision.
Advice to the Royal Society for the Protection of Birds regarding the Environmental Statement for the Bayside Container Terminal, Harwich, UK. Advice to the Port of

London Authority regarding the Environmental Statement for the London Gateway Container Terminal Projects (focus on sedimentation processes). Advice to the Government of Belgium on the improvement of dikes along the Scheldt river; advise regarding the EIA-statement on the container terminal at Vlissingen. On request of the Netherlands Ministry of Public Works production of a coastal protection manual for the coast of Tamil Nadu (India).
Review of a computer package developed for Lifecycle analysis of coastal protection works.
Development in the framework of Delft Cluster a Knowledge Information System for the Hydraulic Engineering Community. In cooperation with the Ministry of Public Works and IHE-Delft the development of the computer package Cress for design of coastal and river engineering structures.

International Institute for Infrastructural, Hydraulic and Environmental Engineering (presently UNESCO-IHE institute for water education)
Responsibilities:
As Associate Professor in Coastal Engineering in charge of the branch "Coastal, Estuarine and Port engineering" of the International Course in Hydraulic engineering. Organisation of the yearly Senior Advanced Course on Coastal Zone Management, a short course developed for experienced coastal managers, focussing on policy problems. Supervising the M.Sc. work in Coastal, Estuarine and Port engineering.
Other teaching:
Teaching assignments in Indonesia, Colombia and Malaysia for the Ministry of Public Works, focusing on the development of coastal engineering groupwork, as well as teaching courses in Coastal Zone Management. Special courses in CZM for various groups, given in the Netherlands (e.g. from Taiwan, Venezuela, etc.). Refresher courses in Brazil and the Philippines.
Expert opinion/supervision:
Providing advisory services to the design of a closure dam near Batam-island, Indonesia, as part of a container port under construction. On behalf of the Dutch Government supervision of a study, conducted by a consultant on new coastal protection methods in S.W.-Netherlands. Giving an expert-opinion on various coastal projects in the Netherlands on request of the Dutch ministry of Public Works (Long Groyne project Eijerland, perched beaches in Zeeuwsch-Vlaanderen). Providing advisory services to UNDP regarding the capacity building for institutional improvements in Central Asia in order to ameliorate the situation regarding the Aral Sea.

Ministry of Public Works
Several functions in consultancy departments. Special attention to the integration of disciplines and the co-operation of several governmental agencies. Development of probabilistic design methods and risk analysis in the field of hydraulic engineering. The development of environmentally friendly shoreline protection methods. Coordination of the Sea defence and river dike works in the Netherlands; coastal protections, dunes.
Selection of projects:
Assessment of safety of the dike through the build-up area of the town of Harlingen. Development and application of a method to determine the required dike-height along tidal rivers, using probabilistic techniques. Determination of a formalised method to determine the present and future coastline. Development of several methods required for the implementation of the Law on Seadefence and the National Coastal Policy in the Netherlands.

Pieter van Gelder
CV

Short Summary: Dr.ir. Pieter van Gelder is full-time associate professor (universitair hoofddocent) of probabilistic methods in civil engineering at Delft University of Technology. He has been involved in research and education on safety and reliability for over 10 years. His research interest is in risk-based hydraulic structural design, and extreme value statistics for hydraulic loads determination. Dr. Van Gelder has worked for the Ministry of Water Management on hydraulic engineering projects where high degrees of reliability were demanded and where statistical information was scarce. Van Gelder is also consultant for Nedstat BV on statistical analysis, and part-time lecturer at IHE, and PAO. He has authored and co-authored over 100 conference - and journal papers, and has supervised over 30 MSc-students from the Faculty of Civil Engineering. He is currently management board member of ESRA (European Safety and Reliability Association), and project leader in several international research projects. Van Gelder is furthermore member in a number of Technical Programme Boards and Scientific Committees of annual international conferences and workshops. Van Gelder also holds visiting professorships at the Institute of Risk Research (IRR) of the Faculty of Civil Engineering of the University of Waterloo, Canada, and at the Centre for Ships and Ocean Structures of the Norwegian University of Science and Technology, Trondheim, Norway.

Research

The principal objects of Van Gelder's research are the developments of reliability methods for the optimal design of different types of structures. Design is considered in a wide sense, which includes design of the structure's dimensions as well as the design of the maintenance system. Not only attention is paid to a structure's ultimate limit state, but also to its various serviceability limit states before collapse through its lifetime. Reliability formulations also include a consistent treatment of cost and safety requirements. The research is concerned with aspects of load definition, its impact on the reliability-based decisions and the derivation of load factors for design. Mathematical formulation of the design optimization problem by considering the minimization of lifecycle costs of different structures under different types of uncertainties and failure mechanisms and the influence of nontechnical aspects on the optimization process amongst others are objects of research. The research is aimed at the engineering profession. The research is analytical and relies heavily on theoretical work. Identified key processes are modelled in a statistical physics-based framework, first analytically and then numerically or by simulation. Some research versions of models have been developed into operational models. Stochastic optimization models are implemented into decision support systems. Keywords of Van Gelder's research include: risk analysis, uncertainty analysis, extreme events, engineering probability, decision making, and Bayesian inference. There are 4 research topics identified:

Research Interests

- Risk-based optimal design.
- Acceptable risks assessment.
- Statistical methods for modelling environmental variables.

- Bayesian analysis and extreme events.

Van Gelder is currently task leader of 'Reliability assessments of flood defences' in the EU-project FLOODSITE and of 'Natural Hazards Assessments' in the EU-project SAFERELNET (Safety and Reliability of Industrial Products, Systems and Structures (2001-2004)), the NWO-project STATFLOOD (Statistical properties of flood runoff of North Euroasia rivers under conditions of climate change (2002-2005)), China II, the cooperation programme (1999-2003) with Hohai University (Nanjing) sponsored by the Netherlands Embassy in China and Delft Cluster. Furthermore Van Gelder is the Dutch project leader of the SANPAD project NEMISA (New Models in Survival Analysis (1999-2003)), the NWO project CASPIANSEA (Risk of extreme hydrometeorological events in low-lying areas of the North and the Caspian seas (2002-2005)), the DelftCluster (1999-2004) projects DC2.01.02 FLOOD MITIGATION DECISION SUPPORT SYSTEMS and DC2.03.02 GEVOLGEN VAN OVERSTROMINGEN, and finally the VROM project P3009 'Framework for judging risk' (2004-2008).

Selection of Publications

Available at the Homepage:
www.hydraulicengineering.tudelft.nl/public/gelder/homepg.htm

Teaching

Teaching Areas

- Probabilistic design
- Probabilistic methods in hydraulic engineering

Teaching Experience

1994-present	UNIVERSITY OF DELFT Tutorial classes and examination of • fourth year Probabilistic design, • fifth year Probabilistic methods in hydraulic engineering.
2003	IVW Course on Inspection and Reliability Modelling for Inspectors of the Ministry of Water
2000 - present	IHE Presentation of a course of 16 hours on Probabilistic methods in hydraulic engineering for last-year students in Hydraulic Engineering
1997	POLISH MINISTRY OF WATER MANAGEMENT A one-week course on river inundations presented by a team of Dutch engineers (sponsered by Arcadis and Dutch Ministry of Water Management)
1996	UNIVERSITY OF BUCHAREST Presented a course of 18 hours on reliability engineering to final year Civil Engineering students in French language (sponsored by the Romanian Ministry of Education)
1993	RESEARCH INSTITUTES AND UNIVERSITIES IN SOUTH AFRICA Lecturer in risk assessment and probabilistic design of flood defences at a series of visits to research institutes and universities throughout South Africa to introduce civil engineers to latest technologies in the Netherlands (sponsored by the Dutch Ministry of Water Management).

CV
Jan van de Graaff

Name:	Jan van de Graaff
Date of Birth:	September 24th, 1944
Profession:	Senior Scientific Officer Coastal Engineering, Delft University of Technology
Years with Firm:	Over 25 years
Nationality:	Dutch

Key Qualifications:

Coastal Engineering, Coastal Morphology; Dune Erosion; Coastal Protection.
Various research projects sponsored by European Union.
Involved in many coastal protection and coastal morphology projects.

Education and Memberships:

1969: MSc. Civil Engineering, Delft University of Technology.
1988: PhD. Delft University of Technology; The Netherlands.
Member Program Committee Netherlands Center of Coastal Research.
Member Technical Committee on Sea Defenses (2 Working groups).
Member Advisory Board Elsevier's 'Coastal Engineering'.

Experience Record:

1969 - 1975: Project-engineer Delft Hydraulics.
Various projects
Since 1975: Delft University of Technology.

Appendix 3: CV's of core teaching staff Trondheim

Key academic personnel from Department of Civil and Transport Engineering in the International Master program in

Coastal and Marine Civil Engineering

Norwegian University of Science and Technology
Faculty of Engineering Science and Technology

Professor	Eivind Bratteland
Professor	Sveinung Løset
Associate Professor	Øivind Arntsen
Professor	Geir Moe
Professor	Steinar Nordal
Professor	Tore Sager
Adjunct Professor	Svein Fjeld
Adjunct Professor	Ove Tobias Gudmestad

Curriculum Vitae

Name: Eivind Bratteland
Born: September 7th 1940
Nationality: Norwegian
Present position: Professor, Norwegian University of Science and Technology
Department of Civil and Transport Engineering
Degrees: Sivilingeniør, MSc, NTH, 1964
Languages: Norwegian (mother tongue), English (oral and writing), German (working knowledge)

Work Experience:
1971 to date: Norwegian University of Science and Technology **(NTNU)**
Associate professor 1982, professor 1985.
Lecturing, research and projects on planning, design and operation of ports, terminals and coastal works, including:

- hydraulics in coastal and port areas, erosion and littoral drift
- loads on port and coastal structures, stability of breakwaters
- coastal zone management
- transportation analysis and transport modes, cargo and cargo handling
- port planning design and engineering, port operation and maintenance
- international education and research

Dean, Faculty of Civil and Environmental Engineering 1994 – 1999.
Invited guest lecturer to Japan, China, Sri Lanka and Costa Rica. Lecturing at a number of courses given by the Norwegian Society of Chartered Engineers. Cooperation on floating marine structures with Port and Harbour Research Institute and University of Tottori, Japan. 1990 – 96 cooperation program with Sri Lanka Ports Authority on operation and maintenance improvements in Port of Colombo. Development of a short course in Port Management for IMO (1990), with two co-authors. 1981 – 95 course leader for an annual 10 month post-graduate Diploma course at NTNU on Port and Coastal Engineering. Secretary for a comprehensive Norwegian Port Manual (1985 – 88). Giving a 3-week short course on port planning and engineering at Hohai University, Nanjing, China, 1981. Lecture notes translated to Chinese.

1991 – 1992: 12 months sabbatical leave at Coastal Engineering Research Center, Waterways Experiment Station, US Army Corps of Engineers, Vicksburg, USA. Mainly involved in laboratory work on Navigation tests on Barbers Point Harbour, Hawaii. Also cooperation with Bureau of Port and River Works, Ministry of Public Works and Transport, Costa Rica.
1986: 6 months sabbatical leave at The No 4 Survey and Design Institute for Harbour Engineering, Guangzhou, China. Working on developments and planning of new port facilities on south-eastern coast of China.
1977 – 1978: 12 month sabbatical leave, partly working at the Institute of Transport Economics, Oslo. Working on transport analysis, port and terminal planning and design, and related cargo and cargo handling.

1970 – 1971: One year at University of Florida, Gainesville, USA. Field work on beach erosion, coastal set-back lines and littoral drift.
1968 – 1970: River and Harbour Laboratory, SINTEF. Laboratory work on wave action and forces related to ports, coastal and offshore structures, including breakwater stability. Two international projects in India and the Philippines.
1967 – 1968: Consultant K.M. Soløy, Bodø. Traditional consultant work on buildings. Planning and layout of new port terminal at the port of Bodø.
1965 – 1967: Scientific assistant at Norwegian Institute of Technology, in port and coastal engineering.

Membership in academic and professional committees:
Member of Management Committee in European Civil Engineering Education and Training. (EUCEET) Chairman for Working Group.

Present doctoral students supervised:
PhD student on Behaviour of stabilized contaminated sediments in confined disposal facilities (CDFs).

Fields of interests and present research activities:

- Education in port and coastal engineering on a post-graduate international level.
- Development of an MSc international degree programme in Coastal and Marine Civil Engineering.
- International network and cooperation in research and education.
- Cleaning up of contaminated sediments in ports and at the coast. Dredging and disposal of the dredged materials.
- Use of laboratories both in research and as an important part of the educational activities.
- Ports as a vital link in the transportation chain.
- Challenges for future development, exploitation and use of the coastal zone.

Selected recent publications:

1. E. Bratteland et al: *An Operation and Maintenance Improvement Programme of Port of Colombo.* Third Seminar on Ports and Inland Waterways, PIANC, PCDC, India November 1995.
2. E. Bratteland: *Experts in Team – an interdisciplinary course unit at NTNU* EUCEET – ECCE International Conference, Sinaia, Romania, July 2001.
3. Michael Briggs, Leon E. Borgman, Eivind Bratteland *Probability assessment for deep-draft navigation channel design.* Coastal Engineering 48 (2003) 29 – 50.
4. E. Bratteland and E. Hjelseth: *PBL: Introducing Civil Engineering at NTNU. Collaboration, experiences and evaluation.* I International Meeting in Civil Engineering Education, Ciudad Real, September 2003, Spain.
5. E.Bratteland and J.E. Nilsen Netter: *Port and Transportation Development* Input to supplementary volume of P. Bruun: *Port Engineering.* To be published.

CURRICULUM VITAE

PERSONAL:

Name: Løset, Sveinung
Born: 1956
Nationality: Norwegian
Present position: Professor in Arctic Marine Engineering, Department of Civil and Transport Engineering, Norwegian University of Science and Technology (NTNU)
Professor II at the University Centre in Svalbard (UNIS)
Civil Status: Married with Berit Walslag; children: Mari (b. 1984) and Hilde (b. 1987)
Address: Norwegian University of Science and Technology,
Department of Civil and Transport Engineering,
7491 Trondheim, Norway
Teleph./fax: +47-73594640/+47-73597021
E-mail: Sveinung.Loset@ntnu.no
http://www.bygg.ntnu.no/~sveinulo/

EDUCATION:

1990-93: Dr.ing. in marine technology, The Norwegian Institute of Technology, Trondheim.
1978-79: Pedagogic Training for Civil Engineers (PUFS), The Norwegian Institute of Technology.
1976-80: "Sivilingeniør", The Norwegian Institute of Technology.
1973-76: Volda gymnas.

EMPLOYMENT:

May 04-present: Vice-dean, Faculty of Engineering Science and Technology, NTNU.
Jan. 02-present: Professor, Department of Civil and Transport Engineering, NTNU.
Sep. 02-May 04: Head of Study Program “I&IKT”, NTNU
Jan. 02-Sep. 02: Head of Study Program “Civil and Environmental Engineering”, NTNU.
Jan. 99-Dec. 01: Vice-dean, Faculty of Civil and Environmental Engineering, NTNU.
Jan. 97-present: Professor II at UNIS.
Mar. 95-Dec. 02: Professor, Department of Structural Engineering, NTNU.
June 94-Feb. 95: Associate Professor, Department of Structural Engineering, NTH.
Sep. 93-May 94: Research Manager, SINTEF Norwegian Hydrotechnical Laboratory.
Sep. 90-Sep. 93: Dr. student, Department of Structural Engineering, NTH.
1986-Sep. 90: Research Manager, SINTEF Norwegian Hydrotechnical Laboratory.
1984-1985: Senior Res. Eng., Norwegian Marine Technology Research Inst. A/S (MARINTEK).
1981-1984: Research Engineer, The Ship Research Institute of Norway (NSFI).
Jan.-May 1981: Assistant Professor, Div. of Physics, The Norwegian Institute of Technology.
June-Aug. 1979: Student scholarship, The Israely Institute of Technology, Haifa, Israel.

PROFESSIONAL SOCIETIES AND OTHER ASSIGNMENTS:

Professional membership: Norwegian Academy of Technological Sciences
European Geophysical Society/ Norwegian Geophysical Association
International Association for Hydraulic Research (IAHR)
Norwegian Society of Chartered Engineers (NIF).

Assignments: Member of ISO WG8 Arctic Offshore Structures Standard, Technical Panel Leader
Member of the Norwegian Council for Higher Education (UHR), Section Technology (NRT) (2003-07)
President of POAC (Port and Ocean Engineering under Arctic Conditions) (2002-03)
International Ship and Offshore Structures Congress (1996-97), Norway’s member of the Specialist Committee on Ice-Structure Interaction
Member of the Norwegian MAST Reference Group (1995- 97)
International Association for Hydraulic Research (IAHR), Norway's Committee
Member of the IAHR Committee on Ice Research and Engineering (1992-96)
Norway's Committee Member of the POAC International Committee (1993-)

Regularly referee of international journals, and chairman on international conferences.

KEY QUALIFICATIONS:

Scientific: Knowledge and direct experience of ice engineering from more than 15 years (1986-03) of field/laboratory investigations and numerical modelling:

- Ice physics and mechanics
- Ice loads on offshore and coastal structures (field/laboratory investigations, computations)
- Sea ice dynamics and rheology (field/laboratory investigations, computations)
- Statistics on sea ice and icebergs, Barents Sea
- Planning of oil/gas terminals in icy waters
- Thermodynamics of icebergs and sea ice ridges
- Cold climate engineering
- Oil in broken ice; behaviour, spreading and response
- Friction of solid materials on snow and ice

These items involve erudition on ice mechanics, ice physics and dynamics, structural engineering, statistical analysis as well as application of remote sensing techniques. Applied physics (with emphasis on dynamics, thermodynamics and numerical modelling) has been the key discipline in most of my practice.

International collaboration: Chairman of the 17th International POAC Conference, Trondheim, 2003.
Substantial collaboration with St. Petersburg State Technical University, Russia (1995-).
Extended contact with Helsinki University of Technology and VTT, Finland (1995-).
Extended contact with Hamburgishe Schiffbau-Versuchsanstalt, Germany (1988-).
Chairman of 12th International IAHR Ice Symposium, Trondheim, 1994.

Administr.: Practice from administration at NTNU and SINTEF:
Vice-dean, Faculty of Engineering Science and Technology, NTNU (May 04-).
Head of study programme I&IKT, NTNU (Sep. 02-June 04)
Head of study programme Civil and Environmental Engineering, NTNU (Jan.02-Sep.02)
Vice-dean, Faculty of Civil and Environmental Engineering, NTNU (1999-01).

PUBLICATIONS:

- 12 books and compendia
- 21 international refereed journal papers
- 75 refereed international conference papers
- 26 conference papers (selected)
- 54 technical reports (selected)
- 3 approved patents

CURRICULUM VITAE

Name: Øivind Asgeir Arntsen
Born: December 9th, 1952
Nationality: Norwegian

Present position: Associate Professor in Marine Civil Engineering
Department of Civil and Transport Engineering
Norwegian University of Science and Technology (NTNU).
Address: Høgskoleringen 7a
NO-7491 Trondheim, Norway,
Phone: + 47 73 59 46 25
fax: + 47 73 59 70 21
E-mail: oivind.arntsen@bygg.ntnu.no

Degrees:

1990	Dr.ing. (Ph.D.) degree in Technical Oceanography, The Division of Structural Engineering, The Norwegian Institute of Technology.
1979	Cand.real. (M.Sc.) degree. The Department of Mechanics, University of Oslo.
1976	Cand.mag. (B.Sc) degree. The Faculty of Mathematics and Natural Sciences, University of Oslo.
1972	Examen artium, (Norwegian highschool) reallinjen (mathematics and natural sciences).

Membership in academic and professional committees:

Norwegian Society of Ocean Research.
Norwegian Society of Geophysical Research.
Norwegian Society of Chartered Engineers (NIF).
Member of The National (Norwegian) Committee for The Intergovernmental Oceanographic Commission (IOC) (1992-1995).
Member of the Norwegian MAST (Marine Science and Technology (EC-research program)) reference group (1992-1995).
European Geophysical Society (EGS).
International Association for Hydraulic Reseaerch (IAHR), Maritime Section.

Present doctoral students supervised:

1998 –	Walman Hutahaean. *Ocean currents, internal waves and the vertical mixing of the ocean.* (Project coordinator and co-supervisor).

Past doctoral students supervised:

2002-2004	Jon Vidar Jonsson. *Arctic harbours and terminals.* Not completed.
1997-2000	Svein Helge Gjøsund. *Kinematics in Regular and Irregular Waves based on a Lagrangian Formulation.* (co-supervisor)
1997-2000	Stig Magnar Løvås. *Hydrodynamic conditions in kelp forests - wave damping - beach erosion.* (Project coordinator and co-supervisor)

1992-1995 Alfonse Dubi. *Damping of water waves by submerged vegetation. A case study of laminaria hyperborea* (Project coordinator and co-supervisor).

Peer-reviewed journal papers:

Arntsen, Øivind A. (1997): Lee waves and hydrodynamical loads due to the motion of a submerged horizontal cylinder in a three layer fluid. Journal of Hydraulic Research, Vol 35, 1997, No4.

Arntsen, O.A. (1996):"Disturbances, lift and drag forces due to the translation of a horizontal circular cylinder in stratified water". Experiments in Fluids 21 (1996), pp 387 - 400.

International conference proceedings 2000-2005:

Arntsen, Ø. A., and A. Tørum (2005): On wave measurements with buoys in shallow water. Proc. WAVES 2005, the Fifth International Symposium on Ocean Wave Measurement and Analysis. 3rd-7th July 2005, Madrid, Spain.

Brørs, B., Ø. A. Arntsen and A. Tørum (2004): Numerical modelling of breaking waves on a beach and pore pressures inside a breakwater, Proc. ICCE2004, the 29th International Conference on Coastal Engineering, Sept 19-24, 2004, Lisbon, Spain.

A. Tørum, S. Bjørdal, M. Mathiesen, Ø.A. Arntsen and A. Jacobsen (2003): Berm breakwaters, Comparison between model scale and prototype stability behaviour. POAC'03 Trondheim, Norway, June 16-19, 2003.

Arntsen, Ø. A., I. J. Malmedal, B. Brørs and A. Tørum (2003): Numerical and experimental modelling of pore pressure variation within a rubble mound breakwater. POAC'03 Trondheim, Norway, June 16-19, 2003.

Moe, Geir and Øivind Arntsen (2002): Experiences with VIV analyses of SCR based on complex modes. OMAE2002-28359.

Gjøsund, Svein H., Geir Moe and Øivind A. Arntsen (2001): Kinematics in broad-banded Irregular ocean Waves by a Lagrangian formulation. OMAE-2001, 3rd-8th June, 2001, Rio de Janeiro.

Gjøsund. Svein H., Geir Moe and Øivind A. Arntsen (2001): Mass transport and rotation in regular waves – conflicts between the Eulerian and Lagrangian descriptions. Waves 2001, 3rd-5th September 2001, San Francisco.

Moe, Geir and Øivind A. Arntsen (2001): An analytical model for static analysis of caternary risers. Presentation at the 10th International Offshore and Polar Engineering Conference, June 17-22, 2001, Stavanger, Norway.

Moe, G, Arntsen, Ø. A. , Hoen, C. (2001): VIV Analysis of Risers by Complex Modes, Presentation at the 10th International Offshore and Polar Engineering Conference, June 17-22, 2001, Stavanger, Norway.

Arntsen, Øivind A., Kuhnen, Franziska, Menze, Andreas, Lilleås, Tom, Lõbermann, Matthias and Tørum, Alf. (2000): Wave kinematics and wave bottom pressures in the surf zone. Proceedings of the 27th International Conference on Coastal Engineering ICCE2000, Sydney, Australia

CURRICULUM VITAE

Name: Moe, Geir

Nationality: Norwegian

Date of birth:August 29, 1938

Present position: Professor, Marine technology, Faculty of Civil Engineering Norwegian University of Science and Technology (NTNU)

Education:

1963	'Sivilingeniør', The Norwegian Institute of Technology, (now NTNU), Trondheim, Norway
1975	Doctor of Science (Sc.D), MIT, Cambridge, Mass, USA

Employment history:

1963 - 65	The Norwegian Institute of Technology, Trondheim, Norway
1966 - 68	The Boeing Co, Seattle, Washington, USA
1968 - 72	Det norske Veritas, Oslo, Norway
1975 - 76	"Overingeniør", The Norwegian Institute of Technology, Trondheim, Norway
1976 - 77	SINTEF, Trondheim, Norway
1977 - 80	"Dosent" (Assoc prof), The Norwegian Institute of Technology, Trondheim, Norway
1980 -	Professor, The Norwegian Institute of Technology (NTH), Trondheim, Norway (NTNU)
1985 - 86	Visiting Professor with Conoco, (PES), Houston, Texas
1999	Visiting professor, MIT (6 months)
2000	Visiting professor, Texas A&M (6 months)

Membership in accademic and professional committees: International advisory board of OMAE-2002, OTRC International Committee, ISOPE Technical Program committee (several years), Steering board for the SUP 'Computational Science and Engineering', Steering board for the SUP 'Wind Energy', Several Doctoral committees, head 'Norsk forening for vindteknikk' 2005-present.

Board of Directors: Chairman Norwegian Hydrotechnical Laboratories 1995

SINTEF, Institute for Civil and Environmental Engineering, 1996 -1999 .
SINTEF: Suppleant Sep 1987 - 1988 and deputy member 1988 - 1994

University of Trondheim (UNIT) Jan 1990 - Dec 1992
Vice Dean Civil and Environmental Engineering, 1989 and 1996-98

Head Department of Structural Engineering, 1997-98

Professional Interests: Hydrodynamics (Experiments and numeric models)
Water waves
Wave and current forces
Hydroelastic problems, notably: Vortex Induced motions
Wind engineering and turbulence
Structural dynamics, notably random vibrations
Stochastic processes and extremes

Recent Research Interests/Projects:

1. Vertical resonant vibrations of tension leg platforms
2. Wave forces and hydrodynamic damping of offshore structures
3. Vibrations of tubular trusses in wind
4. Flow-induced vibrations of structures in water or wind
5. Numerical analysis of separated flows in water and air
6. Kinematics of irregular water waves

Doctoral supervision: Supervised 17 doctoral students at NTH/NTNU

Publications: Publications list with 120 entries. Last 10 years: 7 articles in scientific journals and 21 papers in refereed proceedings from conferences.

CURRICULUM VITAE

NAME: **NORDAL, Steinar**
BORN: **March 11, 1954**
NATIONALITY: Norwegian

PRESENT POS: Professor, Department of Civil and Transport Engineering, Geotechnical Division,
Norwegian University of Science and Technology (NTNU)

DEGREES: 1983 Dr.ing. (PhD), NTH
1977 Sivilingeniør (MSc), NTH

WORK EXP.:

1987 -	Professor, Geotechnical Eng. NTH / NTN
1991 – 1992	Visiting Professor, University of Colorado, USA
1984 – 1987	Associate Professor, Geotechnical Eng. NTH
1983 – 1984	Assistant Professor, Geotechnical Eng. NTH
1981 – 1983	University Scholar, NTH
1979 – 1980	Research Engineer, SINTEF
1978 – 1979	Royal Norw. Navy, working on Marine Structures

PRESENT ADM. POSITIONS:

Member of the board of the Faculty of Engineering Science and Technology at NTNU from 2002

Member of the board of UNIS (University Centre at Spitsbergen), from 1999

Observer in the board of the Norwegian Geotechnical Institute, from 1997

Deputy member of the board of the Faculty of Architecture and Fine Art from 2002

Member of the board of the International Centre for Geohazards (ICG) from 2003

European Techn. Com. ETC7 of ISSMGE: Numerical Methods in Geotechnical Eng. From 1996

PUBLICATIONS SINCE 2002:

S. Tadesse, S. Nordal, (2002): "Simulating sand behavior using a state parameter model",
NUMGE 2002

O.K. Søreide, S. Nordal and P.G. Bonnier (2002): "An implicit friction hardening model for soil materials", NUMGE 2002.

S. Nordal (2002): "Buckling of slender piles in weak soils" In Norwegian, Professional cont. education course on Pile group foundations. April 2002 in Sandefjord

S. Nordal (2002): "Soil structure interaction" - In Norwegian, Invited speaker at Cont. Education course organized by the National Public Roads Administration, October 2002 at Gardermoen.

S.Nordal (2003): "The Finite Element Method for Analyzing Slope Stability", In Norwegian, Professional NGF/NIF Cont. Education course in Stability analyses for

slopes, cuts and embankments. May 2003 in Stjørdal.

S. Nordal (2003): "The Hardening Soil Model in PLAXIS", International Course on Computational Geotechnics, August 2003 in Prague.

M.G. Sæterbø Glåmen, S. Nordal (2004): "Slope Stability Evaluations using the Finite Element Method", Nordic Geotechnical Meeting, Ystad, Sweden, May 2004.

S.Nordal (2004): "Geohazard - a challenge for research" National speaker lecture at Nordic Geotechnical Meeting, Ystad, Sweden, May 2004.

S. Nordal, M.G. Sæterbø Glåmen (2004): "Some examples of slope stability evaluations from Norwegian geotechnical practice", Geotechnical Innovations, Universität Stuttgart, June 2004

Grimstad G., Thakur V. and Nordal S. (2005): Experimental Observation on Formation and Propagation of Shear Zone in Norwegian Quick Clay, accepted for ICFL, Norway sept. 2005.

Thakur V., Nordal S. Jostad H.P., Andresen L. (2005): "Study of porewater pressure dissipation during shear banding in sensitive clays", accepted for IACMAG, Torino, June 2005.

SOME CONSULTING AND RESEARCH PROJECTS SINCE 2002:

2002	The Leistad Landslide, Cause of failure, for the National Public Roads of Norway.
2003	Expert panel B for the Valhall, IP Platform pile refusal, Activity 4.4: "Evaluation of drainage conditions during driving and corresponding dynamic soil resistance." Confidential report by S. Nordal and A. Emdal , March 2003 to PB and Aker Eng.
2002-	NFR-CoE –"International Centre for Geohazards" - with NGI, Research Coordinator for NTNU and project leader for project 11: MSc and PhD studies in geohazards at UiO and NTNU.
2005	Busan fixed link project, South Korea, evaluation of creep settlements for submerged tunnel.

INVITED OPPONENT FOR Dr.ing./PhD. CANDIDATES (from 2002):

- Kim Parsberg Jakobsen (2002), Alborg University:"Elements of constitutive Modelling and Numerical Analysis of Frictional Soils"
- Liming Li, (2002), NTNU: "Particle Scale Reservoir Mchanics"
- Jostein Aksnes (2002), NTNU: "A Study of Load Responses Towards the Pavement Edge"
- Lars Andresen, (2002), UiO: "Capacity Analysis of Anisotropic and Strain-Softening Clay."
- Mehdi Bahrekazemi, (2004), Kungl Tekniska Högskolan: "Train Induced Ground Vibrations and Its Prediction"

CV

Name: Tore Sager
Born: 23 June 1945
Nationality: Norwegian
Present position: Professor in the Department of Civil and Transport Engineering, NTNU
Degrees: Cand. oecon., Dr. techn

Work experience:

1970-71 Research scholar, Institute of Transport Economics, Oslo.
1971-76 Researcher, same place.
1976-77 Research scholar, Institute of Economics, University of Oslo.
1977-78 Researcher, SINTEF Transport Engineering.
1978-82 Research Economist, Norwegian Institute for Urban and Regional Research.
1982-83 Head of Department, same place.
1983-85 Associate Professor, Department of Transport Engineering, Norwegian Institute of Technology, University of Trondheim. Head of Department 1983-1986.
1985-2002 Professor, same place (renamed: Norwegian University of Science and Technology - NTNU). Head of Department 1998-2001.
2003- Professor, Department of Civil and Transport Engineering, NTNU.
Counsellor agreement with the research group SINTEF Road and Transport Engineering.

Membership in academic and professional committees:

Currently on the editorial board of the following journals:
- "Planning Theory"
- "Planning Theory and Practice"
- "European Journal of Spatial Development"
- "Journal of Architectural and Planning Research"

Present doctoral students supervised:

For the time being, I have four PhD students, two of them external. Six of my former students have received their PhD degrees. I have been a member of six other PhD committees at the Norwegian University of Science and Technology, one committee at the University of Lund, Sweden, one at Murdoch University, Western Australia, and one at the Queensland University of Technology, Australia. At the University of Bergen, Norway, I have acted as examiner in one defence.

Teaching

I teach master level courses in "Transport Systems" and "Public Transport and Transport Economics". At the doctoral level, I teach "Transport Economics".

Selected academic and professional publications 1999-2004:

- *Peer-reviewed journals:*

'The rationality issue in land-use planning'.
Journal of Management History, 1999, 5(1)87-107.
'Rhetoric of economic rationality: the foundation of Norwegian transport planning'.

European Planning Studies, 1999, 7(4)501-18.
'Manipulation in planning: the social choice perspective'.
Journal of Planning Education and Research, 1999, 19(2)123-34.
'Planning style and agency properties'.
Environment and Planning A, 2001, 33(3)509-32.
'Positive theory of planning: the social choice approach'.
Environment and Planning A, 2001, 33(4)629-47.
'Manipulative features of planning styles'.
Environment and Planning A, 2001, 33(5)765-81.
'Deliberative planning and decision making: an impossibility result'.
Journal of Planning Education and Research, 2002, 21(4)367-78.
'Rationality types in evaluation techniques. The planning balance sheet and the goals achievement matrix'.
European Journal of Spatial Development, 2003, No. 2, 30 pages.
'Inter-agency transport planning: Co-ordination and governance structures'.
Planning Theory and Practice, 2004, 5(2)171-195.

- *Other professional publications*

'Democratic Planning and Social Choice Dilemmas'.
Ashgate, Aldershot, UK, 2002, 330 pages.
'A planning theory perspective on the EIA'.
In: Hilding-Rydevik, T. (Ed.): "EIA, Large Development Projects and Decision-making in the Nordic Countries", Stockholm: Nordregio, 2001, pp 197-222.

Fields of interests and present research activities:

Main fields of interest are transport economics, evaluation technique, and planning theory. I often borrow theories and concepts from economics and political science and apply them to planning theory. Currently, I study institutions and planning processes in the transport sector in light of planning theory and new institutional economics. This is reflected in work on the Norwegian "National Transport Plan". The following three articles (co-authored with Inger-Anne Ravlum at the Institute of Transport Economics) are now in the pipeline:

- Coordination, governance structures, and an interagency transport planning case. (Accepted for a book on planning in the network society)
- The political relevance of planners' analysis: the case of a parliamentary Standing Committee. (Accepted by the journal *Planning Theory*)
- From projects to strategies: a transaction cost approach to politicians' problems with strategic transport planning. (Accepted by the journal *Planning Theory and Practice*).

I am the Project Manager of a transdisciplinary project on the "Technological Space of Mobility", connecting very different academic disciplines at the NTNU. The project runs from 2003 to 2006 and has a budget of $300 thousand in 2004. The research network of 15-20 participants comprises economics, transport engineering, architecture, product design, psychology, urban planning, ethics, and religious history.

Tore Sager
11 March 2005

Curriculum Vitae

Svein Fjeld

Biographical data

Name : Svein Fjeld

Positions : Director, Technology and Business Development

: Professor II in structural engineering, Norwegian University of Science and Technology

Education : PhD (Dr.Ing.), Structural engineering, NTH

Year of birth : 1939

Languages : Scandinavian, English, German and French

Key qualifications

International experience in design, construction and in service follow-up of large civil structures:

- Offshore structures
- Immersed tunnels
- Coastal structures

Professional expertise in the following disciplines:

- Coastal and marine engineering
- Structural design
- Concrete technology
- Soil mechanics

Education

1969	PhD. (Dr. Ing), Structural engineering, NTH (Technical University of Norway)
1961	M.Sc., Technical University of Norway, Civil Engineering
1983	Business Education, International Management Development Institute, Lausanne, Switzerland

Professional experience

2001 -	Dr.techn.Olav Olsen a.s, Director, Technology and Business Development
1999 -	NTNU (Norwegian University of Science and Technology), Professor II in structural engineering
1998 – 2001	Norwegian National Costal Administration, Chief engineer and deputy director for harbours and fairways
1995 -1998	COWI Consulting engineers and planners, Chief Engineer, Marine structures
1986 -1995	Norwegian Contactors, Vice president, Project development
1974 -1986	Det Norske Veritas, Veritec, Vice President, technical activities
1969 -1974	Multiconsult, Chief Design Engineer
1967 -1968	Norges Tekniske Høyskole , Research fellow
1965 -1967	Christiani & Nielsen, Copenhagen, Design Engineer

1961 -1965 Norwegian Geotechnical Institute, Consulting engineer

Other activities

- Author of 85 articles concerning harbour construction, marine constructions and safety
- Speaker and lecturer at a number of international congresses and conferences
- Technical authority and technical judge in Norwegian and international court cases
- Chairman of board, Monitoring Services AS
- Board member, Norsk Undervannsbro AS

Professional societies and committees

Norwegian Petroleum Directorate:

- Member of Code Committee for Regulations concerning Loadbearing Structures in the petroleum activities
- Technical secretary for developing guidelines for safety evaluations of platform concepts.

Department of energy (United Kingdom):

- Member of committee to develop regulations for certifying oil platforms.

Newfoundland Petroleum Directorate, Canada:

- Member of Committee for Construction and Survey Regulations for Structures Offshore Newfoundland.

ACI (American Concrete Institute), USA

- Member of ACI Committee 357, Offshore Concrete Structures on the US Continental Shelf.

Member of international committees for evaluation of marine structures a. o.:

- Bjørvika immersed tunnel (Norway).
- Storebælt immersed tunnel crossing (Denmark).
- Submerged floating bridges (Norway).
- Benghazi LPG Load Terminal (Libya).
- Beaufort Sea drilling platform (Dome Petroleum, Canada).

FIP (Federation International de la Precontrainte):

- Chairman of commission for Concrete Sea Structures.
- NTNU (Norwegian University of Science and Technology)
- Member of committees for evaluation of professorship applicants and of doctorate theses.

Selected project assignments

- Responsible for design of substructure of the Øresund high bridge
- Responsible for design of the new container quay for Oslo harbour
- Responsible for the design of Sirevåg breakwater
- Responsible for fairway planning for main entrance to Oslo and Drammen
- Engineering manager for Heidrun TLP
- Design of Offshore gravity structures, a.o. Troll, Gullfaks A, B and C, Statfjord A,B and C
- Chief design engineer for Cod and Tor jacket structures

Curriculum Vitae 26th May 2003

NAME:	**Ove Tobias Gudmestad**
DATE OF BIRTH:	10. March 1947
NATIONALITY:	Norwegian Citizen
FAMILY STATUS:	Married with 4 grown-up children

PROFESSION:

-Advisor in Marine Technology, Statoil, Stavanger, Norway. Employed since 1975

-Professor (Adjoint) of Arctic Offshore Engineering, Norwegian University of Science and Technology (NTNU), Trondheim, Norway since 2005.

-Professor (Adjoint) of Marine Technology, University of Stavanger, Stavanger, Norway since 1994.

- Course responsible, Petrad, Stavanger, Norway

EDUCATION:

-Dr. Scient, Hydrodynamics, University of Bergen, Norway, 1985

-Courses in Civil and Ocean Engineering, Massachusetts Institute of Technology, USA, 1979

-M.Sc. Applied Mathematics, University of Tromsoe, Norway, 1973.

-Teaching Training Seminar for High school teachers and University lecturers, 1971, University of Bergen, Norway

-B.Sc. Mathematics and Physics, University of Bergen, Norway, 1971

LANGUAGES:

Scandinavian languages	All fluent
English	Fluent in speaking, reading and writing
German	Fair in reading, operational in speaking
French	Operational in reading

KEY QUALIFICATIONS:

Academic degree (MSc) in mathematics and physics with professional training as teacher. Advanced degree (Dr. Scient) in hydrodynamics with emphasis on waves and oceanographic conditions.

Additional training in civil and ocean engineering, arctic engineering, the assessment of the environment, risk and safety analysis, fabrication and construction aspects, concrete technology, management of the development of hydrocarbon resources and the economics of large projects.

Internationally recognized expert within his fields of expertise with preparation of 4 books, several compendia and presentation of 1800 papers in international journals and at international conferences. Holder of 20 Norwegian and International patents.

Extensive teaching activities with responsibility for several courses at University of Stavanger and the University Studies at Svalbard (since 1997). Responsibility for 30 M.Sc. and Ph.D. students.

In charge of an 8 weeks course on "Management of Petroleum Developments and Operations", Petrad/ Norwegian Petroleum Directorate (since 1991) and presentations of technology at a number of universities and companies.

27 years of experience from different positions within Statoil, Stavanger, Norway with emphasis on technology, project management and field development. The expertise covered includes aspects such as meteorological and oceanographic issues; civil, ocean and arctic engineering; design and installation of offshore pipelines; design, fabrication and installation of offshore platforms including jackets, concrete gravity platforms, floaters and ships. Furthermore, the expertise covers assessment of risk and safety of construction and installation projects; field and platform decommissioning; development and economical assessment of offshore hydrocarbon fields; project definition and management; and initiation of technology development projects.

COUNTRIES WORKED IN: Norway, Denmark, England, France, Italy, European Commission (Belgium), Russia, China, Vietnam, India, Nigeria, Iran, Cuba, Venezuela and USA.

ELECTED POSITIONS AND HONORARY POSITIONS HELD:

-Member of several national and international committees preparing Regulations and Guidelines for design of offshore platforms, 1982- Present
-Member and committee chairman preparing Norwegian Standards for Civil Engineering Structures, 1990-Present
National delegate for preparation of ISO code on Ice loads
-Chairman Norwegian Society of Earthquake Engineers, 1989-1990 and 1999-2000

AWARDS:

-Melzer Grant, University of Bergen, 1971.
-NATO Science Fellowship Grant 1322, 1980.
-Norwegian Science Foundation Grant 2823, 1984.
-NATO Double Jump Grant 823/83, 1984.
-NATO Grant to arrange an Adv. Research Workshop, 1989
-Norwegian Science Foundation, Grant 110181/730, 1996/97
-Stavanger College, Grant for Strategically Research, 1997/98
-Stavanger University College, Grant to work with Gubkin University, Moscow.
- Doctor Honoris Causa at the Gubkin University of oil and gas, Moscow
- Appointed Technology Pioneer at Ocean Energy Center,

Appendix 3: CV’s of core teaching staff Barcelona

CURRICULUM VITAE (May 2005)

PERSONAL DETAILS

Name: Agustín Sánchez-Arcilla
Nationality: Spanish
Work address: Maritime Engineering Laboratory, LIM
Technical University of Catalonia, UPC
c/ Jordi Girona, 1-3, Campus Nord Edif. D1, 08034 Barcelona, Spain
Pho. 34-93-4016468, Fax. 34-93-4011861
E-mail: agustin.arcilla@upc.edu

EDUCATION

1977	Civil Engineer, Faculty of Civil Engineering, Madrid University of Technology, Madrid (Spain)
1979	Wegemt Graduate, Univ. Trondheim & Aachen, Norway and Germany
1979	Ph.D. in Civil Engineering, Technical University of Catalonia, Barcelona (Spain)

RESEARCH EXPERIENCE

1977-1984	Researcher Harbour and Coasts Lab, CEDEX, Ministry of Public Works, Madrid (Spain)
1984-1990	Senior Researcher. Maritime Engineering Laboratory, Technical University of Catalonia, Barcelona (Spain).
1987-1991	Head of the Department of Hydraulic, Maritime and Environmental Engineering, Technical University of Catalonia, Barcelona (Spain).
1990-to date	Head of the Maritime Engineering Laboratory, Technical University of Catalonia, Barcelona (Spain).
1994-to date	Vice-president of the International Centre for Coastal Resources Research - CIIRC (Spain)
1994-2002	Head of the Department of Hydraulic, Maritime and Environmental Engineering, Technical University of Catalonia, Barcelona (Spain).

TEACHING EXPERIENCE

1980-1984	Associate Professor. Civil Engineering High School, Technical University of Catalonia, Barcelona (Spain).
1984-to date	Full Professor. Civil Engineering High School, Technical University of Catalonia, Barcelona (Spain).

LANGUAGES

	Speaks	Reads	Writes
Spanish	H	H	H
Catalan	H	H	H
English	H	H	H
French	H	H	H
German	M	H	M

(H: high, M: medium)

RECENT RESEARCH PROJECTS

2000-2003	Researcher in the EU(DG-XII)-HPP/ARI project Transnational access for researchers to the majors research infrastructure "Canal de Investigación y Experimentación Marítima (CIEM)" (WAVELAB) (HPRI-CT-1999-00066)

2000-2003 Researcher in the EU(DG-XII)-HPP/ARI project Development and implementation of novel imaging velocimetry techniques suited to large-scale hydraulic facilities (HYDRIV) (HPRI-CT-1999-50019)
2000-2004 Researcher in the EU(DG-XII)-IHP project Research infrastructure cooperation network (HYDRALAB-II) (HPRI-CT-1999-40008)
2001-2004 Researcher in the EU(DG-XII)-EESD project Environmental design of low crested coastal defense structures (DELOS) (EVK3-CT-2000-00041)
2001-2004 Coordinator of the EU(DG-XII)-INCO project Estuaries and coastal areas. Basis and tools for a more suitable development (ECOSUD) (ICA4-CT-2001-10027 INCO-DEV)
2003-2004 Researcher in the EU(DG-XII)-HPP/ARI project Transnational access for researchers to the majors research infrastructure "Wave flume Canal de Investigación y Experimentación Marítima II" (WAVELABII) (HPRI-CT-2002-00195)
2004-2006 Researcher in the EU(DG-XII)-Global Change and Ecosystems project Integrated Flood Risk Analysis and Management Methodologies (FLOODsite) (GOCE-CT-2004-505420)
2003-2006 Coordinator of the MCYT project Previsión de oleaje en el Mediterráneo Español. Limitaciones, errores y propuesta de mejora (PREVIMED) (REN2002-03415)
2005-2009 Coordinator of the EU(DG-XII) Marie Curie project Modelling and assimilation for RofI Environments. Limits of predictability (MARIE) (MTKD-CT-2004-014509)

PUBLICATIONS

Summary of all publications

- fifteen (15) books, more than 7 chapters of book, more than 55 articles in peer-reviewed journals, more than 120 communications in conferences and workshops, more than 100 technical reports.
- 16 directed Ph.D. Theses in Port, Coastal and Oceanographical Engineering.
- 32 M.Sc. Theses directed in Port, Coastal and Oceanographical Engineering.

RECENT PUBLICATIONS

Sánchez-Arcilla, A.; Simpson, J.H. (2002). "The narrow shelf concept: coupling and fluxes". Continental Shelf Research, (Special Issue FANS-Fluxes Across a Narrow Shelf), vol. 22, no. 2, pp. 153-172. ISSN: 0278-4343

Mestres, M.; Sierra, J.P.; Sánchez-Arcilla, A.; González del Río, J.; Wolf, T.; Rodríguez, A.; Ouillon, S. "Modelling of the Ebro river plume. Validation with field observations". Scientia Marina, vol. 67, num 4, pp. 379-391. ISSN: 0214-8358. (2003).

Tagliani, P.R.A.; Landazuri, H.; Reis, E.G.; Tagliani, C.R.; Asmus, M.L.; Sánchez-Arcilla, A. "Integrated coastal zone management in the Patos Lagoon estuary: perspectives in context of developing country". Ocean & Coastal Management, vol. 46, num. 9-10, pp. 807-822. ISSN: 0964-5691. (2003).

Jiménez, J.A.; Guillén, J.; Sánchez-Arcilla, A.; Gracia, V.; Palanques, A. "Influence of benthic boundary layer dynamics on wind-induced currents in the Ebro delta inner shelf". Journal of Geophysical Research, 107, 7-1-7-11. (2002)

Jiménez, J.A., Sánchez-Arcilla, A. "A long-term (decadal scale) evolution model for microtidal barrier systems". Coastal Engineering, 51, 749-764. (2004).

Flexas, M.M.; van Heijst, G.J.F., Jordà, G., Sánchez-Arcilla, A. "Numerical simulation of barotropic jets over a sloping bottom: comparison to a laboratory modeo of the Northern current". Journal of Geophysical Research, 109, 1-410. (2004)

OTHER MERITS AND PRECISIONS

- Associate Member of "The Society of Naval Architects and Marine Engineers"
- Associate Member (grade I) of "The Royal Institute of Naval Architects"
- Member of the "American Shore and Beach Preservation Association"
- Felow Member of ASCE, American Society of Civil Engineers
- Membre of the International Association on Computational Mechanics (IACM)
- Member of the Canadian Coastal Science and Engineering Association
- Member of IFIAS (International Federation of Institutes for Advanced Study)
- Member of the International Association for Hydraulic Research (IAHR)
- Member of the European Geophysical Society - EGS
- Member of the Coastal Education Research Foundation

CURRICULUM VITAE (May 2005)

PERSONAL DETAILS

Name: José Antonio Jiménez
Nationality: Spanish
Work address: Maritime Engineering Laboratory, LIM
Technical University of Catalonia, UPC
c/ Jordi Girona, 1-3, Campus Nord Edif. D1, 08034 Barcelona
Pho. 34-93-4016468, Fax. 34-93-4011861
E-mail: jose.jimenez@upc.edu

EDUCATION

1987	Marine Sciences, Faculty of Marine Sciences, University of Las Palmas de Gran Canaria, Las Palmas (Spain)
1996	Ph.D. in Marine Sciences, Technical University of Catalonia, Barcelona (Spain)

RESEARCH EXPERIENCE

1989-1992	Researcher, Maritime Engineering Laboratory, Technical University of Catalonia, Barcelona (Spain).
1992-1997	Head of the research area on Coastal morphology, Maritime and Environmental Engineering, Technical University of Catalonia, Barcelona (Spain).
1997-to date	Head of the research area on Morphodynamics and coastal management, Maritime and Environmental Engineering, Technical University of Catalonia, Barcelona (Spain).
2000-2005	Head of the Maritime Engineering Division, Department of Hydraulic, Maritime and Environmental Engineering, Technical University of Catalonia, Barcelona (Spain).

TEACHING EXPERIENCE

1989-1997	Associated professor, Department of Hydraulic, Maritime and Environmental Engineering, Civil Engineering High School, Technical University of Catalonia, Barcelona (Spain).
1997-to date	Professor, Department of Hydraulic, Maritime and Environmental Engineering, Civil Engineering High School, Technical University of Catalonia, Barcelona (Spain).

LANGUAGES

	Speaks	Reads	Writes
Spanish	H	H	H
Catalan	H	H	H
English	H	H	H

(H: high, M: medium)

RECENT RESEARCH PROJECTS

2001-2004	Researcher in the EU(DG-XII)-EESD project Environmental design of low crested coastal defense structures (DELOS) (EVK3-CT-2000-00041)
2002-2005	Researcher in the EU(DG-XII)-EESD project Video monitoring of littoral processes in support of coastal-zone management (CoastView) (EVK3-CT-2001-00054)

2003-2006 Coordinator of the MInisterio de Ciencia y Tecnologia MCYT project Desarrollo y validación de un método de valoración del recurso playa como ayuda a la gestión integrada de zonas turísticas costeras (MeVaPLaya) (REN2003-09029-C03/MAR)

2004-2006 Researcher in the EU(DG-XII)-Global Change and Ecosystems project Integrated Flood Risk Analysis and Management Methodologies (FLOODsite) (GOCE-CT-2004-505420)

PUBLICATIONS

Summary of all publications

- six (6) chapters of book, more than 46 articles in peer-reviewed journals, more than 118 communications in conferences and workshops, more than 60 technical reports.
- 6 directed Ph.D. Theses in Port, Coastal and Oceanographical Engineering.
- 52 M.Sc. Theses directed in Port, Coastal and Oceanographical Engineering.

RECENT PUBLICATIONS

Palanques, A.; Puig, P.; Guillén, J.; Jiménez, J. ; Gracia, V.; Sánchez-Arcilla, A.; Madsen, O. "Near-bottom suspended sediment fluxes on the microtidal low-energy Ebro continental shelf (NW Mediterranean)". Continental Shelf Research, (Special Issue FANS-Fluxes Across a Narrow Shelf), vol. 22, no. 2, pp. 285-303. ISSN: 0278-4343. (2002).

Guillén, J.; Jiménez, J.A. ; Palanques, A. ; Gracia, V.; Puig, P.; Sánchez-Arcilla, A. "Sediment resuspension across a microtidal low-energy inner shelf". Continental Shelf Research, (Special Issue FANS-Fluxes Across a Narrow Shelf), vol. 22, no. 2, pp. 305-325. ISSN: 0278-4343. (2002).

Galofré, J.; Sánchez-Arcilla, A.; Jiménez, J.A.; García, M.A. "A note on FANS conclusions: From research analyses to management implications". Continental Shelf Research, (Special Issue FANS-Fluxes Across a Narrow Shelf), vol. 22, no. 2, pp. 379-385. ISSN: 0278-4343. (2002).

Jiménez, J.A.; Guillén, J.; Sánchez-Arcilla, A.; Gracia, V.; Palanques, A. "Influence of benthic boundary layer dynamics on wind-induced currents in the Ebro delta inner shelf". Journal of Geophysical Research, vol. 107, num. C6, pp. 7.1-7.11. ISSN: 0148-0227. (2002).

Hanson, H.; Aarninkhof, S.; Capobianco, M.; Jiménez, J.A.; Larson, M.; Nicholls, R.J.; Plant, N.G.; Southgate, H.N.; Steetzel, H.J.; Stive, M.J.F.; de Vriend, H.J. "Modelling of coastal evolution on yearly to decadal time scales". Journal of Coastal Research, vol. 19, num. 4, pp. 790-811. ISSN: 0749-0208. (2003).

Jiménez, J.A.; Madsen, O.S. "A simple formula to estimate the settling velocity of natural sediments". Journal of Waterway, Port, Coastal and Ocean Engineering, ASCE, vol. 129, num. 2, pp. 70-78. ISSN: 0733-950X. (2003).

Pereira, L.C.C.; Jiménez, J.A.; Braga, P.; Medeiros, C.; Da Costa, R. "Effects of sedimentation on scleractinian and actinian species in artificial reefs at the Casa Caiada Beach (Brazil)". Journal of Coastal Research, SI 35, 418-425. (2003).

Pereira, L.C.C.; Jiménez, J.A.; Medeiros, C. "Environmental degradation of the littoral of Casa Caiada and Rio Doce, Olina-Pe (Brazil)". Journal of Coastal Research, SI 35, 502-508. (2003).

Pereira, L.C.C.; Jiménez, J.A.; Medeiros, C.; Da Costa, R. "The influence of the environmental status of Casa Caiada and Rio Doce, Olinda-Pe (Brazil)". Ocean & Coastal Management, 46, 1011-1030. (2003).

Jiménez, J.A.; Madsen, O.S. "Closure to a simple formula to estimate the settling velocity of natural sediments". Journal of Waterway, Port, Coastal and Ocean Engineering, ASCE, vol. 130, num. 4, pp. 220-221. ISSN: 0733-950X. (2004).

Jiménez, J.A., Sánchez-Arcilla, A. "A long-term (decadal scale) evolution model for microtidal barrier systems". Coastal Engineering, 51, 749-764. (2004).

CURRICULUM VITAE (May 2005)

PERSONAL DETAILS

Name: Joan Pau Sierra
Nationality: Spanish
Work address: Maritime Engineering Laboratory, LIM
Technical University of Catalonia, UPC
c/ Jordi Girona, 1-3, Campus Nord Edif. D1, 08034 Barcelona, Spain
Pho. 34-93-4016467, Fax. 34-93-4011861
E-mail: joan.pau.sierra@upc.edu

EDUCATION

1984	Civil Engineer, Faculty of Civil Engineering, Technical University of Catalonia, Barcelona (Spain)
1990	Ph.D. in Civil Engineering, Technical University of Catalonia, Barcelona (Spain)

RESEARCH EXPERIENCE

1985-1986	Junior Researcher, Maritime Engineering Laboratory, Technical University of Catalonia, Barcelona (Spain)
1986-1991	Researcher. Maritime Engineering Laboratory, Technical University of Catalonia, Barcelona (Spain).
1988-1991	Head of the Maritime Engineering Division, Department of Hydraulic, Maritime and Environmental Engineering, Technical University of Catalonia, Barcelona (Spain).
1991-1995	Head of the research area on Maritime climate, Maritime and Environmental Engineering, Technical University of Catalonia, Barcelona (Spain).
1994-2000	Head of the Maritime Engineering Division, Department of Hydraulic, Maritime and Environmental Engineering, Technical University of Catalonia, Barcelona (Spain).
1997-to date	Head of the research area on Coastal hydrodynamics, Maritime and Environmental Engineering, Technical University of Catalonia, Barcelona (Spain).
2000-2003	Secretary of the Department of Hydraulic, Maritime and Environmental Engineering, Technical University of Catalonia, Barcelona (Spain).
2003-to date	Head of the Department of Hydraulic, Maritime and Environmental Engineering, Technical University of Catalonia, Barcelona (Spain).

TEACHING EXPERIENCE

1986-1991	Associate Professor. Civil Engineering High School, Technical University of Catalonia, Barcelona (Spain).
1991-to date	Full Professor. Civil Engineering High School, Technical University of Catalonia, Barcelona (Spain).

LANGUAGES

	Speaks	Reads	Writes
Spanish	H	H	H
Catalan	H	H	H
English	H	H	H
French	M	M	M

(H: high, M: medium)

RECENT RESEARCH PROJECTS

1997-2001 EU(DG-XII)-MAST-III project Coastal study of three-dimensional sand transport processes and morphodynamics (COAST 3D) (CT97 0086 MAST III)

1998-2001 EU(DG-XII)-MAST-III project Preparation and integration of analysis tools towards operational forecast of nutrients in estuaries of European rivers (PIONEER) (CT98 0170 MAST III)

2001-2004 EU(DG-XII)-EESD project Environmental design of low crested coastal defense structures (DELOS) (EVK3-CT-2000-00041)

2001-2004 EU(DG-XII)-INCO project Estuaries and coastal areas. Basis and tools for a more suitable development (ECOSUD) (ICA4-CT-2001-10027 INCO-DEV)

2005-2009 EU(DG-XII)-Marie Curie project Modelling and assimilation for RofI Environments. Limits of predictability (MARIE) (MTKD-CT-2004-014509)

PUBLICATIONS

Summary of all publications

- 5 chapters of book, more than 24 articles in peer-reviewed journals, more than 68 communications in conferences and workshops, more than 55 technical reports.
- 6 directed Ph.D. Theses in Port, Coastal and Oceanographical Engineering.
- 32 M.Sc. Theses directed in Port, Coastal and Oceanographical Engineering.

RECENT PUBLICATIONS

Sierra, J.P.; Sánchez-Arcilla, A.; González del Río, J.; Flos, J.; Movellán, E., Mösso, C.; Martínez, R.; Rodilla, M.; Falco, S.; Romero, I. "Spatial distribution of nutrients in the Ebro estuary and plume". Continental Shelf Research, (Special Issue FANS-Fluxes Across a Narrow Shelf), vol. 22, no. 2, pp. 361-378. ISSN: 0278-4343. (2002).

Pérez, M.C.; Comas, A.; González del Río, J.; Sierra, J.P. "Some planktic chlorophyceae from the lower part of the Ebro river (Spain)". Acta Botanica Croatica, vol. 61, num. 2, pp. 99-124. ISSN: 0365-0588. (2002).

Mestres, M.; Sierra, J.P.; Sánchez-Arcilla, A., González del Río, J.; Wolf, T.; Rodríguez, A.; Ouillon, S. "Modelling of the Ebro river plume. Validation with field observations". Scientia Marina, 67 (4), 379-391. (2003).

van Rijn, L.C.; Walstra, D.J.; Grasmeijer, B.; Sutherland, J.; Pan, S.; Sierra, J.P. "The predictability of cross-shore bed evolution of sandy beaches at the time scale of storms and seasons using process-based profile models". Coastal Engineering, vol. 47, num. 1, pp. 295-327. ISSN: 0378-3839. (2003).

Mestres, M.; Sánchez-Arcilla, A.; Sierra, J.P.; Mösso, C.; González del Río, J. "Basis and tools for a sustainable development of estuaries and coastal areas: a case study from Cullera Bay". Management of Environmental Quality, 15 (1), 25-32. (2004).

Sierra, J.P.; Sánchez-Arcilla, A.; Figueras, P.A.; González del Río, J.; Rassmussen, E.K.; Mösso, C. "Effects of discharge reductions on salt wedge dynamics of the Ebro river". River Research and Applications (print), 20, 61-77. (2004).

Appendix 3: CV’s of core teaching staff Southampton

FAMILY NAME:	Nicholls
FIRST NAMES:	Robert James
DATE OF BIRTH:	18 July 1958
NATIONALITY:	British
ADDRESS:	School of Civil Engineering and the Environment, Southampton University, Southampton, SO17 1BJ
EDUCATION: (	• PhD Southampton University • BSc Southampton University
LANGUAGE SKILLS:	English (mother tongue) French (poor)
PRESENT POSITION	Professor of Coastal Engineering, Deputy Head of School and Director of Research
YEARS WITH THE INSTITUTE:	2004 - present
KEY QUALIFICATIONS:	His research has focused on understanding and managing long-term coastal change, especially impacts and adaptation to climate change and sea-level rise, including methodological developments, case studies and regional and global analyses. Within the DEFRA-funded 'Fast Track' Programme, a series of global analyses were developed (e.g., Nicholls, 2004) and this expertise has now been incorporated into a more general global assessment tool within the EU-funded DINAS-COAST project. He also co-ordinated the SURVAS project (http://www.survas.mdx.ac.uk/) and is a main contractor to the RegIS-2, ATLANTIS and BRANCH Projects, as well as three Tyndall Projects on the coast of East Anglia. He has been a lead author of chapters in four reports of the Intergovernmental Panel for Climate Change (IPCC): Second Assessment Report (1996); the Regional Assessment (1998); the Special Report on Technology Transfer (2000); and the Third Assessment Report (2001), and currently he is co-ordinating lead author of the 'Coastal Zones and Low-Lying Areas' chapter in the IPCC fouth assessment report which will be completed and published in 2007. He has also provided expertise to national assessments such as the Foresight Flood and Coastal Defence Assessment, and international assessments such as the GEF-funded 'Caribbean: Planning for Adaptation to global Climate Change'. He is an Associate Editor of *Journal of Coastal Research* and author of more than 80 journal papers and book chapters.
PROFESSIONAL EXPERIENCE RECORD:	
2000-2003	Professor, Flood Hazard Research Centre, Middlesex University, London
2001	Senior Visiting Scientist, Center For International Earth Science Information Network (CIESIN), Lamont-Doherty Observatory, Columbia University, New York (While Receiving Leverhulme Trust Fellowship)
1996-2000	Reader, Flood Hazard Research Centre, Middlesex University, London
1994-1996	Senior Lecture, Flood Hazard Research Centre, Middlesex University, London
1990-1994	Faculty Research Associate, Laboratory for Coastal Research, University of Maryland

Teaching activities for 2002/2005:

- Coastal Geomorphology (at Middlesex)
- Coastal Mannagement (at Middlesex)
- Research Methods (at Middlesex)
- Comtemporary Coastal Engineering
- Coastal Morphodynamics (to start 2005/06)

PUBLICATIONS

Principal (journal) publications (since 2002):

ARNELL, N.W., CANNELL, M.G.R., HULME, M., KOVATS, R.S., MITCHELL, J.F.B., NICHOLLS, R.J. PARRY, M.L., LIVERMORE,, M.T.J. & WHITE, A. 2002. The consequences of CO_2 stabilisation for the impacts of climate change *Climatic Change*, 53, 413-446.

NICHOLLS, R.J. 2002. Analysis of global impacts of sea-level rise: A case study of flooding. *Physics and Chemistry of the Earth*, 27, 1455-1466.

STIVE, M.J.F. AARNINKOFF, S.J.C., HAMM, L., HANSON, H, LARSON, M., WIJNBERG, K., NICHOLLS, R.J. & CAPOBIANCO, M. 2002. Variability of shore and shoreline evolution. *Coastal Engineering*, 47, 211-235.

SMALL, C. & NICHOLLS, R.J. 2003, A Global Analysis of Human Settlement in Coastal Zones, *Journal of Coastal Research*, **19(3)**, 584-599.

HANSON, H., LARSON, M., STEETZEL, H., NICHOLLS, R., CAPOBIANCO, M., JIMENEZ, J., PLANT, N., STIVE, M., SOUTHGATE, H. & AARNINKHOF, S. 2003. Modelling of Coastal evolution on a yearly to decadal timescale. *Journal of Coastal Research*, 19, 790-811.

COWELL, P., STIVE, M.J.F., NIEDORODA, A.W., SWIFT, D.J.P., De VRIEND, H.J., BUIJSMAN, M.C., NICHOLLS, R.J., ROY, P.S., KAMINSKY, G.M., CLEVERINGA, J., REED, C.W. & de BOER, P.L., 2003. The Coastal-Tract (Part 2): Applications of aggregated modeling to lower-order coastal change. *Journal of Coastal Research*, 19, 828-848.

KLEIN, R.J.T., NICHOLLS, R.J. & THOMALLA, F., 2003, Resilience to natural hazards: How useful is this concept? *Environmental Hazards*, 5, 35-45.

NICHOLLS, R.J. 2004. Coastal flooding and wetland loss in the 21st Century: Changes under the SRES climate and socio-economic scenarios. *Global Environmental Change*, 14, 69-86.

NICHOLLS, R.J. and LOWE, J.A., 2004. Benefits of Mitigation of Climate Change for Coastal Areas. *Global Environmental Change*, 14, 229-244.

ARNELL, N., LIVERMORE, M.J.L., KOVATS, S., LEVY, P.E., NICHOLLS, R., PARRY, M.L. and GAFFIN, S.R., 2004. Climate and socio-economic scenarios for global-scale climate change impact assessments: Characterising the SRES storylines. *Global Environmental Change*, 14, 3-20.

HOLMAN, I.P., ROUNSEVELL, M.D.A., SHACKLEY, S., HARRISON, P.A., NICHOLLS, R.J., BERRY, P.M., & AUDSLEY, E. 2004. A regional, multi-sectoral and integrated assessment of the impacts of climate and socio-economic change in the UK: I Methodology. *Climatic Change. In press.*

HOLMAN, I.P., NICHOLLS, R.J., BERRY, P.M., HARRISON, P.A., AUDSLEY, E., SHACKLEY, S. & ROUNSEVELL, M.D.A., 2004. A regional, multi-sectoral and integrated assessment of the impacts of climate and socio-economic change in the UK: II Results. *Climatic Change. In press.*

VAFEIDIS, A. T., NICHOLLS R. J., MCFADDEN, L., HINKEL, J. & P. S. GRASHOFF, 2004. Developing a Global Database for Coastal Vulnerability Analysis: Design Issues and Challenges. The International Archives of Photogrammetry, Remote Sensing and Spatial Information Sciences, Vol. XXXV, Part B4. *in press.*

CURRICULUM VITAE

John Reginald CHAPLIN

Present position (since 1999)

Professor of Applied Fluid Mechanics,
School of Civil Engineering and the Environment, University of Southampton,
Southampton SO17 1BJ.

Academic qualifications: BSc (1st class honours, 1967) and PhD (1970) in Civil Engineering, University of Bristol.

Professional qualifications: Chartered Engineer, Fellow of the Institution of Civil Engineers.

Previous employment:

1986 – 1999	Professor of Hydraulics, Department of Civil Engineering City University, London
1985 – 1986	Senior Research Engineer, Applied Fluid Mechanics Division, British Maritime Technology Ltd (formerly National Maritime Institute), Teddington, Middlesex.
1974 – 1985	Lecturer (appointed Senior Lecturer 1983) in Civil Engineering, University of Liverpool.
1972 – 1974	Assistant Engineer, Rendel, Palmer & Tritton (Consulting Engineers), London
1970 – 1972	Research Associate, Institute of Hydromechanics, Karlsruhe University, Germany

Research Interests

Focused since the mid 1970s on experimental and theoretical work on waves and fluid/structure interaction. Much of this work has relied on innovative experimental techniques applied to problems of non-linear wave mechanics, wave loading and structural response. It has led, for example, to improved understanding of the violent water surface motion generated by wakes of bluff bodies, the ringing response of compliant offshore structures, hydrodynamic damping of submerged cylinders, and vortex-induced vibrations of deep water tension risers.

Membership of other bodies

- American Society of Mechanical Engineers
- EPSRC Peer Review College 1997–2005
- Society for Underwater Technology (Chairman of the SUT Group on Environmental Forces 1995-2000)

- International Society of Offshore and Polar Engineers (Member of the Technical Committee)
- Editorial Boards: *Applied Offshore Research*, *International Journal of Offshore and Polar Engineering*
- 23rd International Towing Tank Conference Committee on Waves
- British Marine Hydrodynamics Panel.

Recent research projects

- Splash zone pressures on a vertical cylinder in steep waves, Statoil, 2005-2006
- Data logger characteristics, BP, 2005-2006
- Vortex-induced vibrations of deep water risers (in collaboration with Imperial College), EPSRC, EC, B P Exploration Operating Co Ltd, 2002-2005
- Strong turbulence at a free surface (in collaboration with University of Bristol, and INSEAN, Rome), EPSRC, 2002-05
- Scars and flow separation from a free surface (in collaboration with University of Bristol), EPSRC, 2004-07
- Hydrodynamics of Marine Current Turbines for Electrical Power Generation, EPSRC, 2002-05
- The Onset of Disturbed-Laminar Flow Over an Oscillating Cylinder, EPSRC, 2001-04
- The hydrodynamics of an articulated cylinder wave energy converter, EPSRC, 2000-02
- Hydrodynamic damping of cylinders in waves and current s at large scale, EPSRC, 1998-2000
- Violent water surface behaviour around large vertical cylinders in large waves, EPSRC, 1998-2000

Selected publications

Chaplin, J.R., Bearman, P.W., Huera Huarte, F.J., Pattenden, R.J., Laboratory measurements of vortex-induced vibrations of a vertical tension riser in a stepped current. *Journal of Fluids & Structures*, in the press, 2005

Chaplin, J.R., Bearman, P.W., Cheng, Y., Fontaine, E., Graham, J.M.R., Herfjord, K., Huera Huarte, F.J., Isherwood, M., Lambrakos, K., Larsen, C.M., Meneghini, J.R., Moe, G., Pattenden, R.J., Triantafyllou, M.S., Willden, R.H.J. Blind predictions of laboratory measurements of vortex-induced vibrations of a tension riser. *Journal of Fluids & Structures*, in the press, 2005

Murzyn, F, Mouazé, D, Chaplin J R, Experimental study of hydraulic jump properties with optical probes, *International Journal of Multiphase flow*, 31(1) 141-154 2005.

Ourmières, Y. & Chaplin, J. R. Visualisations of the disturbed-laminar wave-induced flow above a rippled bed *Experiments in Fluids* 36(6) 908-918, 2004.

Chaplin, J.R. & Teigen, P. Steady flow past a vertical surface-piercing circular cylinder *Journal of Fluids and Structures.***18**(3-4), 271-285, 2003.

Chaplin J.R. History forces and the unsteady wake of a cylinder, *Journal of Fluid Mechanics*, **393**, 99-122, 1999.

Chaplin J.R., Rainey R C T & Yemm R W Ringing of a vertical cylinder in waves, *Journal of Fluid Mechanics*, **350**, 119–147, 1997

Chaplin J.R., On frequency-focusing unidirectional waves, *International Journal of Offshore and Polar Engineering*, **6**(2) 131–137, 1996.

Chaplin J.R., Orbital flow around a circular cylinder: part 2 – attached flow at larger amplitudes, *Journal of Fluid Mechanics*, **246**, 397–418, 1993.

Chaplin J.R., Orbital flow around a circular cylinder: part 1 – steady streaming in non-uniform conditions, *Journal of Fluid Mechanics*, **237**, 395–411, 1992.

Chaplin, J.R., Non–linear forces on a horizontal cylinder beneath waves, *Journal of Fluid Mechanics*, **147**, 449–464, 1984.

Chaplin, J.R., Mass transport around a horizontal cylinder beneath waves, *Journal of Fluid Mechanics*, **140**, 175–187, 1984.

Chaplin, J.R., Developments of stream function wave theory, *Coastal Engineering*, **3**, 179–205, 1980.

Recent Invited lectures and seminars

Norwegian University of Science and Technology; University of Sao Paulo; Imperial College (Civil Engineering, Aeronautics), Oxford University (Engineering), Washington University (Civil Engineering), University of California at Berkeley (Naval Architecture), UC Santa Barbara (Ocean Engineering), WEGEMT Workshop, Université Toulon-Var, France, Danish Technical University (Applied Mathematics and Mechanics).

CURRICULUM VITAE

Name: Gerald U. Müller

Address: 352 Winchester Road
Southampton SO16 6TW
UK

e-mail: g.muller@soton.ac.uk

Tel.: 023 8051 2417 (Home)
023 8059 2442 (Work)

Date of Birth: 23.03.61

Marital Status: Single

Nationality: German

Summary : At present I am employed as a senior lecturer at the University of Southampton, Civil Engineering Department. My duties involve teaching, administration and research. I am the co-ordinator for the MSc course in Coastal Engineering, lecturing Fluid Mechanics and Coastal Engineering.

My research activities can be broadly categorised as follows:

- Environmental loadings in the coastal environment, fluid-structure interaction and structural integrity and response.
- Low head hydro power system development
- Marine energy systems.

Qualifications:

7/80 Abitur

6/85 Diplom - Ingenieur, FH Frankfurt, Civil Engineering Department, Specialisation: Structural Engineering, *Final mark: 1.5 (= 90%)*

12/86 M.Sc., Queen's University Belfast, Civil Engineering Department

7/93 Ph.D., Queen's University Belfast, Civil Engineering Department

Employment History:

01/2005 – present: Senior Lecturer, University of Southampton, Civil Engineering Department

M.Sc. course co-ordinator

2/2000 – 12/2004: Lecturer, Queen's University Belfast, Civil Engineering

2/99 – 1/2000: Industrial experience, *Bundesanstalt für Wasserbau*, Karlsruhe, sabbatical financed by the Royal Academy of Engineering (Engineering Foresight Programme), working on river engineering.

7/94 – 1/99: Lecturer, Queen's University Belfast, Civil Engineering Department. Lecturing in Structural Engineering Design and Fluid Mechanics Supervising Final Year, M.Sc. and Ph.D. Projects. Research projects: wave/structure interaction, pressure propagation in water filled cracks.

7/93 - 6/94 Research Fellow, Queen's University Belfast, Civil Engineering Department. Involved in study of design loads and stability of Vertical breakwater caissons, teaching and project supervision.

1/89 - 6/93 Research Assistant, Queen's University Belfast ,Civil Engineering Department. Member of Wave Energy Project, concerned with wave impact pressures on shoreline structures.

10/87 - 12/88	National Service, 15 months, PzGrnDiv 2, PzAufklBtl 2 / BrgSpZg 4 in 3436 Hessisch-Lichtenau, Group leader (PFC), 20mm gunner, radio operator (morse code), NBC specialist
10/86 - 9/87	Structural Engineer, 12 months, Wayss & Freytag AG, Theodor Heuss Allee 110, 6000 Frankfurt 1. Design team leader,
5/85 - 8/85	Structural Engineer, 4 months, Fichter Schlüsselfertigbau GmbH, 6100 Sprendlingen

Education:

9/71 - 6/80	Herrmann Staudinger Gymnasium, 8765 Erlenbach (Grammar School)
9/80-02/82	Universität Mannheim, Fakultät Sozialwissenschaften (Department of Sociology)
3/82-7/85	Fachhochschule Frankfurt, Fb. Bauingenieurwesen, Civil Engineering Department
9/85-9/86	Queen's University Belfast, Department of Civil Engineering

Awards:

3/85	Mörsch - Studienpreis (Mörsch Award) for best final year project. (Design of a footbridge in partially prestressed concrete)
1/87	Hawker - Siddeley Prize for best Master's project (Compressive Membrane Action in Reinforced Concrete)

Affiliations:	Member Institution of Civil Engineers Member Society for Underwater Technology Member International Association for Hydraulic Research IAHR Reviewer for *Coastal Engineering*

Selected publications

"The breast shot water wheel: design and model tests", Müller G. & Wolter C., 2004, *Proc. ICE Eng. Sustainability*, Vol. 157, 203-212, ISSN 1478 4637.

"Performance characteristics of water wheels", Müller G. & Kauppert K., 2004, *IAHR Journ. Hydr. Res.*, Vol. 42, No. 5, ISSN 0022-1686.

"'Modern' engineered water wheels of the late 19th Century", G. Müller, 2004, *IAHR Newsletter*, Vol. 21, No. 2, 25-26, ISSN-0022-1686.

"Characteristics of pressure pulses propagating through water filled cracks", G. Müller, G. Wolters & M. Cooker, 2003, Coastal Engineering, Vol. 49, No. 1-2, 83-98, ISSN 0378-3839.

"Discussion note for: Old Watermills – Britain's new source of energy?" by G. Müller & K. Kauppert, Goring O., 2003, *Proc. ICE, Civ. Eng.*, Vol. 156, 107, ISSN 0965 089 X.

"Old water mills – Britain's new source of energy?", G. Müller & K. Kauppert, 2003, *Het Ingenieursblad* (Journal of the Belgian Institution of Engineers), No. 3, 8 - 9 (shortened reprint).

"Old water mills – Britain's new source of energy?", G. Müller & K Kauppert, 2002, *Proc. ICE Civ. Eng.*, Vol. 150, No. 4, 178-186, ISSN 0965 089 X.

FAMILY NAME:	Amos
FIRST NAMES:	Carl Leonetto
DATE OF BIRTH:	June 15, 1949
NATIONALITY:	British
MARITAL STATUS:	Married
ADDRESS:	69 Ashdown Way, Romsey Hampshire, UK, SO51 5QR
EDUCATION: (only higher vocational or academic)	• PhD Sedimentology, Imperial College, London • BSc Oceanography/geology, University of Wales, Swansea

LANGUAGE SKILLS:
(specify native tongue and then apply a scale of 1 (excellent) to 5 (poor) to other languages)

	spoken	written
English	native tongue	native tongue
Italian	1	1
French	2	2

PRESENT POSITION	Personal Chair, School of Ocean and Earth Sciences, National Oceanography Centre, University of Southampton
YEARS WITH THE INSTITUTE:	1999 - present
KEY QUALIFICATIONS:	Professor Amos is co-director of the Centre for Coastal Processes, Engineering and Management and head of the Sediment Dynamics research theme of the National Oceanographic Centre, Southampton (NOCS). He has a wide background in applied coastal sediment transport practice and theory spanning 30 years that is strongly linked to applied issues of the coastal zone. He co-directs a M.Sc. in Environmental Coastal Engineering and is central to the development of coastal research at NOCS. He is presently involved in three major EU projects (BIOFLOW, EURODELTA and EUROSTRATFORM) which links 30 coastal institutes throughout Europe and about the same number in USA and Canada. He teaches coastal dynamics at the International Maritime Academy (IMO/IMA) at Trieste and is on the board of advisors to the Coastal Centre (ENEA, La Spezia, Italy). He is a consultant to Consorzio Venezia Nuova (the builders of the storm gate project in Venice) and CORILA (Committee for Research in Venice Lagoon). He is a member of the Science Committee for Ocean Research (SCOR) on Sea-level rise on erosion of muddy coasts (Working Group 122) and is on the editorial board of Journal of Coastal Research and Estuarine, Coastal and Shelf Science. His recent contributions have been the preparation and execution of coastal research at Southampton University and the preparation of a long-term strategy for coastal research at NOCS.
PROFESSIONAL EXPERIENCE RECORD:	

1999-2003	Senior Lecturer, School of Ocean and Earth Sciences, National Oceanography Centre
1998-1999	Research Scientist (RES-4) Geological Survey of Canada, Bedford Institute of Oceanography
1992-1998	Research Scientist (RES-3) Geological Survey of Canada, Bedford Institute of Oceanography
1982-1992	Research Scientist (RES-2) Geological Survey of Canada, Bedford Institute of Oceanography
1977-1982	Research Scientist (RES-1) Geological Survey of Canada, Bedford Institute of Oceanography

MEMBERSHIP OF PROFESSIONAL BODIES	- Member International Association of Sedimentologists - Member American Geophysical Union - Member SCOR Committee 122
OTHER: • LECTURES	*Teaching activities for 2003/2004:* - Third-year course: Applied Sediment Dynamics - Second-year course: Estuaries - Second-year course: Coastal floods and erosion - First-year field course: oceanography Key Skills

PUBLICATIONS

Principal (journal) publications (since 2003):

2004	UMGIESSER, G., FERRARIN, C., DE PASCALIS, F., and **AMOS**, C.L. Modeling the grain size distribution in the Venice Lagoon. PECS Conference, 2004 : 4p.
2004	CAPPUCCI, S., **AMOS**, C.L. HOSOE, T., and UMGIESSER, G. SLIM: a numerical model to evaluate the factors controlling the evolution of intertidal mudflats in Venice Lagoon, Italy. Journal of Marine Systems 51: 257-280.
2004	THOMSON, C., **AMOS**, C.L. and UMGIESSER, G. Bed shear stress determination of vegetated tidal flats in Venice Lagoon. Journal of Marine Systems 51: 293-308.
2004	**AMOS**, C.L., BERGAMASCO, A., UMGIESSER, G., CAPPUCCI, S., CLOUTIER, D., FLINDT, M. DENAT, L., and CRISTANTE, S. The stability of tidal flats in Venice Lagoon – the results of *in situ* measurements using two benthic flumes. Journal of Marine Systems 51:211-242.
2004	CORACI, E., UMGIESSER, G., SCLAVO, M. and **AMOS**, C.L. 2004. Modelling sand transport in the Venice Lagoon inlets. In Scientific Research and Safeguarding Venice. CORILA Special Publication: 145-173.
2004	**AMOS**, C.L. UMGIESSER, G., REED, P., MUNFORD, G. and LEA, J. The residual tidal circulation of water, sediment and organics in northern Venice Lagoon, Italy. In Scientific Research and Safeguarding Venice. CORILA Special Publication: 189-202.
2004	THOMPSON, C., **AMOS**, C.L., LECOUTURIER, M and JONES, T.E.R. Flow deceleration as a method of determining drag coefficients over roughened flat beds. Journal Geophysical Research 109(C03001): 1-12.
2004	QUARESMA, V. S. **AMOS**, C.L. and FLINDT, M.. The influences of biological activity and consolidation time on laboratory cohesive beds. Journal Sedimentary Research, 74(2): 184-190.
2003	SHIMETA, J. **AMOS**, C.L. BEAULIEU, S.E. and KATZ, S.L. Resuspension of benthic protests at sites with differing sediment composition in Buzzards Bay, Massachusetts. Marine Ecology Progress Series, 259: 103-115.
2003	BERGAMASCO, A., DENAT, L., FLINDT, M.R., and **AMOS**, C.L. Interactions and feed-backs amongst phytobenthos, hydrodynamics, nutrient cycling and sediment transport in estuarine ecosystems. Coastal and Nearshore Oceanography 23(17): 1715-1741.
2003	THOMPSON, C., **AMOS**, C.L., JONES, T.E.R. and CHAPLIN, J. The manifestation of fluid-transmitted bed shear stress in a smooth annular flume – a comparison of methods. Journal of Coastal Research 19(4): 1094-1103.
2003	**AMOS**, C.L. DROPPO, I.G. and MURPHY, T. 2003. The stability of a remediated bed in Hamilton harbour, Lake Ontario, Canada. Sedimentology 50: 149-168.
2003	**AMOS**, C.L. LI, M.Z., CHIOCCI, F.L., LAMONICA, G.B., CAPPUCCI, S., and KING, E.H. 2003 The origin of gutters from the shoreface of Sable Island, Canada. Journal of Geophysical Research 108(C3): 29-1 – 29-16.

FAMILY NAME:	Tanton
FIRST NAMES:	Trevor William
DATE OF BIRTH:	14/3/45
NATIONALITY:	British
ADDRESS:	School of Civil Engineering and the Environment, Southampton University, Southampton, SO17 1BJ
EDUCATION: (	• PhD Southampton University • BSc
LANGUAGE SKILLS:	English
PRESENT POSITION	Professor of Environmental Engineering and Head of the Environmental Group
YEARS WITH THE INSTITUTE:	1981 - present
KEY QUALIFICATIONS:	Professor Tanton has been working in the area if environmental management and planning for over 25 years. He is presently carrying out research into the sustainability of Spartina salt marshes in the south of England and into the joint probabilities of flooding in estuarine towns resulting from sea level rise and increased fluvial events. He is leading large European research teams looking into both the sustainability of the water resources in the Aral Basin and the sustainability of the River Nura in Northern Kazakhstan and the sustainability planning of the water resources for the internationally important terminal wetlands. He is researching on the use of satellite data for water resource planning and in the use of remotely sensed data for determining evapotranspiration. He has developed water resource planning models for the water resources of the Aral Basin He is a strategic advisor to the world Bank on environmental and infrastructure projects in the former CIS. And holds an Honorary Chair at the Academy of Architecture He has extensive experience working with saline and sodic soils and their reclamation and in the management of irrigated water resources. He has expensive experience in developing practical solutions for the large environmental problems of central Asia
PROFESSIONAL EXPERIENCE RECORD:	
1981-2005	Lecturer, Senior lecturer and Professor of Environmental Management , Southapton University
1981-2005	He has worked as a member of a number of strategic plans for the sustainable management of the water resources in of large river basins, Nile, Indus, Aral and San Francisco
1991-1997	Carried out a number of EIAs for development projects on Island States in the Pacific and Caribbean, and in East Africa
1992	Writing of a position paper for the World Bank: Management of the water

	Resources of the Indus basin
1971-1981	Environmental Physics and Mico-climatologist with DFID

- LECTURES

Teaching activities for 2002/2005:

- Masters level Courses in Water Resource Management
- Masters level course in Envirionmental inpact assessment
- Second year course in Envoironment and Environmental Chemistry

PUBLICATIONS

Principal (journal) publications (since 2003):

2005	El-Magd, I.A. & Tanton, T.Remote Sensing and GIS for irrigation water planning, International J. of Remote Sensing. 46: 2031-2045*).*
2004	N. Kyei-Baffour, Rycroft, D.W. and Tanton, T.W. The Impact of Sodicity on Soil Strength. Irrigation and Drainage. **53.** 77-85.
2003	El-Magd, I.A. & Tanton, T. Improvements in Land Use Mapping for Irrigated Agriculture from Satellite Data Using a Multi Stage Maximum Likelihood Classification, International J. of remote Sensing, Vol 24 (21), 4197-4206*.*
2002	Heaven, S. Koloskov, G.B. Lock A.C and Tanton TW. Water Resources Management in the Aral Basin: A River Basin Management Model for the Syr Darya. Irrigation and Drainage, **51**. 109-118
2002	Rycroft DW, Kyei-Baffour N, Tanton T . The effect of sodicity on the strength of a soil surface. IRRIG DRAIN **51** (4): 339-346 DEC 2002
2001	Tanton, T.W., Ilushenko M.A. and Heaven S. Some Water Resources issues in Central Kazakhstan. Water and Maritime Engineering, **148** p227-333.
2001	Ullrich, S.M., Tanton, T.W. and Abdrashitova, S.A. Mercury in the Aquatic Environment: A Review of factors Affecting Methylation. . Critical Reviews in Environmental Sciences and Technology, **31**: 241-293.
2000	Ullrich, S.M., Tanton, T.W. and Abdrashitova, S.A. Mercury in the Aquatic Environment: A Review of factors Affecting Methylation. . Critical Reviews in Environmental Sciences and Technology, 31: 241-293.
2001	Heaven S., Ilyushchenko M.A., Tanton T.W., Ullrich S.M. and E.P. Yanin (). Mercury in the River Nura and its floodplain, Central Kazakhstan: I. River sediments and water. Sci. Tot. Environ. 258.
2001	Heaven S., Ilyushchenko M.A., Kamberov I.M., Politikov M.I., Tanton T.W., Ullrich S.M. and E.P. YaninMercury in the River Nura and its floodplain, Central Kazakhstan: II. Floodplain soils and riverbank silt deposits. Sci. Tot. Environ. 258.
2000	Tanton, T.W. and Heaven, H (The Worsening of the Aral Basin Crisis: Can there be a solution? Proc American Soc. Civil Engineers).
2000	Tanton, T.W., Ilushenko M.A. and Heaven S. Some Water Resources issues in Central Kazakhstan. Water and Maritime Engineering, 148 p227-333.

Appendix 3: CV’s of core teaching staff City. London

CURRICULUM VITAE (May 2005)
Professor L.F.Boswell

- **Current Position: Professor of Civil Engineering**

- School of Engineering and Mathematical Sciences
- City University
- Northampton Square
- London EC1VOHB
- Phone 44 (0) 207 040 8140 Fax: 44 (0) 207 040 0119
- E-mail L.F.Boswell@city.ac.uk

Nationality British

Degrees and Professional Qualifications:

- Doctor of Philosophy, University of Leeds 1969
- Doctor of Science, Technical University of Iasi, 1998
- Fellowship Membership of the following institutions,
- Institution of Civil Engineers,
- Institution of Structural Engineers
- International Association of Offshore and Polar Engineering

Academic Employment:

- Research Fellow, University of London, Oct 1968-Jan 1972
- Lecturer, City University, Jan 1972-Oct 1984
- Reader, City University, Oct 1984-Dec 1998
- Head of Dept of Civil Engineering, Aug 1991-Jul 1998
- Professor, City University, Dec 1994-to present
-

Personal Research, Scholarship and Awards: Professor Boswell has been engaged in theoretical, experimental and numerical research in the areas of structural mechanics, analysis and design during his university career. Some of this work has applications in offshore structural engineering, in particular and structural engineering in general. A great deal of his work has been driven by the industrial requirement to solve problems.

Professor Boswell has published relevant material in internationally recognised journals such as, Geotechnique, Proc. of the Institution of Civil Engineering, International Journal of Solids and Structures and the International Journal of Constructional Steelwork. Alternatively and appropriately some material has been more effectively disseminated in special publications, such as Her Majesty's Stationary Office and special editions of the International Journal of Marine Structures.

Professor Boswell has been responsible for writing a textbook and editing several others. In all, he has published over 100 papers in journals, conferences and contributions to textbooks. He has been an invited lecturer at conferences to deliver key-note address's and at seminars and workshops.

Professor Boswell has obtained significant funding for his research activities from many sources and in particular, EPSRC, European Union, Department of Energy, Department of Trade and Industry, NATO.and the Steel Construction Institute. The total value of this funding is over £2.0 million. He has obtained several awards for his research and was awarded the G.Asachi medal from the Technical University of Iasi, Romania for work involving thin walled structures in 1996 and more recently a doctorate from the same

university in 1998. In 2000, he was awarded the Structures prize from the International Society of Offshore and Polar Engineering, for his work in the area of offshore structural engineering. Professor Boswell received the best scientific poster award at the 1996 European Wind Energy Conference in Gothenberg, Sweden.

Professional Activities: **Professor Boswell's professional activities have been and are currently varied. However, they support the belief that academic members of an engineering department must have close links with industry. He has acted as a consultant to BP, Wimpey Corporation, Noble Denton, Global Maritime, the Steel Construction Institute and British Steel (now Corus) In the latter, work has been carried out to develop the three latest products for application in Civil Engineering Construction. He has been involved in several joint industry studies. Work undertaken in collaboration with Dewhurst McFarlane contributed to a national award for design for small consulting engineering organisations. Currently, Professor Boswell is a member of the Board of Directors of the International Society of Offshore and Polar Engineering and a member of the Independent Advisory Board of The American Bureau of Shipping. He is a member of the Education and Research and Development Committees of the Society of Underwater Technology and sits on European Committees for Construction and Education.**

Professor Boswell is the programme Director for the Master's degree in Marine Operations and Management, which is offered by the School of Engineering and Mathematical Sciences of City University, London.

Recent Publications:

Boswell, L F, et al, Special issue on Jack-Up Platforms, International Journal of Marine Structures, Elsevier Applied Science. 2004

McKinley, B and Boswell, L F, Large Deformation Behaviour of Double Skin Composite Construction, Journal of Constructional Steel Research, 58, 1347-1359. 2002.

Boswell, L F, et al, Incorporation of Optical Fibre Sensors in Concrete Specimens, Sensors Journal of the IEEE, vol 4, No 1. 2004.

Boswell, L F, Keynote address, Use of Optical Fibre Technology to Monitor the Performance of Concrete and Concrete Structures, 28th Conference,"Our World in Concrete," Singapore, Vol XXII, ISBN 981-04-8557-3. 2003

Boswell, L F, et al, Bridge Monitoring Using an Optical Fibre System. IABSE Symposium, Melbourne," Towards a better built environment- innovation, sustainability, information technology". 2002

NICK SINCLAIR-BROWN, LLB, MA (Cantab)

profile.

My involvement with maritime operations and vessel management arises from my commercial career as a lawyer in the offshore oil and gas industry and subsequent and continuing work in sub sea operations. It includes facilitation of the first registration for the Turks and Caicos registry and a number of registrations of vessels in various flag states. This year I have been involved with the recommissioning and reflagging of a vessel (From Bermuda to Panama). Apart from the ordinary certification surveys this included the recent implementation of International Maritime Organisation of the new ISPS code applicable under the SOLAS Convention.
This is reinforced by my academic interests in international law and shipping law each of which overlap in relation to Flag State rights and obligations in relation to registry management.
Academic discipline is strongly analytical and provides a useful basis for feasibility studies. The last feasibility study undertaken by me was for the Commonwealth Secretariat and was presented by me in Autumn 2003 at the annual meeting of Commonwealth Finance Ministers in Brunei. This related to public – private finance of infrastructure development and was focused more on organisation than implementation (copy attached). Currently pending approval by the E.U. Commission is a study on 'Organisation of Intellectual Property Legislation in Central Asia'. Here I am nominated in the proposal requested by the EU from the government of Kyrgystan. The purpose is to address the concern is local intellectual property loopholes will undermine planned investment and technology transfer by companies based in the EU.

The CV is in three parts: A. Commercial Activities; B. Academic Activities; C. Other Activities

part A commercial activities

Professional Qualification
Admitted as a solicitor 1975

Corporate Career

Mobil Exploration Norway (1976-78). Following admittance as a solicitor, I was recruited by Brown and Root to be a member of the Mobil Statfjord A project team at the inception of its programme to develop the first offshore oil field in Norway. Based in Bergen, my main role was the preparation, negotiation, and administration of major contracts and charters, co-ordination of government reporting, and liaison with head office on risk management and contract approvals.

Brown and Root (1978-80). As contracting activities wound down in Norway, I joined the legal department of Brown and Root in London. As one of the largest construction and engineering companies in the world, their activities were both diverse and world wide. My time was spent as a lawyer supporting their European and African operations where I specialised in the formation and administration of joint ventures and project management contracts, vessel charters, and protection of the company's proprietary technology.

Wharton Williams (1980 – 84). I was recruited as the legal advisor when this diving company was a couple of years old. With worldwide operations, I was given responsibility for organising its legal and contracting affairs including insurance and tax management strategies. I was also responsible for overseeing ancillary salvage operations and undertook the commercial and legal organisation of the successful diving operation to recover gold

bullion for the Russian and British Governments from the wreck of HMS Edinburgh. This lay at a depth of over 800 feet in the Barents Sea, and the operation remains in the Guinness Book of Records. By the time of my leaving the company had become one of the leading international diving and sub-sea engineering companies.

Consortium Recovery (1984-88). In 1984 I was invited to join the Board of Consortium Recovery which had just been formed by institutional funding to provide project management services to deepwater salvage operations. Here I was responsible for finance, administration and logistics as well as legal matters related to its operations. I was also able to work with the Scottish Development Agency in establishing a conservation laboratory in Dundee that enabled the freeze-drying technology, pioneered by the Mary Rose project, to be continued and expanded to fields outside archaeology such as joint programmes of archival restoration with the British Library.

Underwater Excavation Ltd (1988-94). In 1988 I was given control of Consortium Recovery and with a colleague restructured its activities. This was done by developing industrial applications for its underwater excavation technology in respect of which I had previously secured patent protection in a number of jurisdictions using international Patent Cooperation Treaty procedures. As chairman of the restructured company (Underwater Excavation), I was able to see it through initial refinancing to full operational trading. As well as excavation operations, the company built up considerable expertise in the construction and operation of underwater robotics and provided equipment and personnel to Government agencies and other clients around the world. It was winner of the Scottish Offshore Technology Award for 1989 (having been commended the previous year), a finalist in the Norwegian Offshore Technology Awards 1990, a runner up in the Castro R&D awards 1991, commended in the 1991 Aberdeen Enterprise "Business Achievements Award" and selected into the finals of the 1992 Scottish Innovation awards. As a consequence a consortium of major oil companies and the EU agreed to fund a £450,000 development programme to produce a second generation of technology. In 1994, I organised the acquisition of the company by a larger group and the Company received a Queens Award for Industry in recognition of its innovative technical achievements.

Continuing Consultancy

My consultancy activities concentrate in three industrial sectors: 1. Maritime and sub sea operations (mainly sub sea salvage projects); 2. Large scale infrastructure engineering and construction (last significant engagement: Balfour Beatty (Capital Projects); and 3. Defence (mainly anti terrorism technology – Alford Technologies and Raytheon Inc).

part B Academic activities

CURRENT ACADEMIC POSTS

Cambridge University: Fellow of the Lauterpacht Research Centre for International Law, member of the Law Faculty, Law Fellow and Vice President of Hughes Hall.

CURRENT RESEARCH

My main research interests focus on international trade (both modern and historic) and its role in promoting innovation, social change and economic development. From this has developed research in international investment, and labour, intellectual property, and environmental issues. I am an advisor to the Centre for International Sustainable Development Law at McGill University where I gave a paper on the 'Social Impacts of Unilateral Trade Measures' which was also circulated as a background paper to one of the panels at the Johannesburg Rio + 10 Summit in 2003.

My interest in infrastructure and development led to a paper 'Public Private Partnerships - a Cooperative approach to Infrastructure Development'. This was commissioned by the Commonwealth Secretariat and delivered as the technical theme paper at the 2003 Meeting of Commonwealth Finance Ministers.

Currently awaiting approval by the E.U. Commission is a study on the 'Organisation of Intellectual Property Legislation in Central Asia'. I have been put forward for this project by the Kyrgistan Government at the request of the EU Commission, which is concerned that intellectual property loopholes will undermine planned investment and technological transfer in the region.

Recent Papers etc

2003 saw two publications: a 10,000 word chapter on the 'Management of Endangered Species' in UNESCO's millennium Encyclopaedia of the World's Ecosystem; and a chapter on International Regulatory Design in 'Regulation, Enforcement and the International Trade in Wildlife'. The latter, which included a preface by the Secretary of State for the Environment, comprised the papers of an international conference chaired by me, which brought together the results of a multi-institutional initiative funded by the UK Department for Environment, Food, and Rural Affairs, and the European Commission. Currently awaiting publication is a paper on joint and several responsibility, which has been commissioned as a chapter for a critical analysis of the International Law Commission proposals on State Responsibility.

More general conference papers include contributions on international regimes concerning corruption; sanctions, arms and dual use export controls, and counter terrorism, as well as an analysis of the prospects for last years Nigerian Presidential elections.

Teaching

Cambridge University: International law and international trade and sustainable development issues on the M.Phil and M.Stud. courses in International Relations. The latter covers the history and theory of Free Trade and its institutionalisation under the GATT and WTO, analysis of issues arising from the pressures for harmonisation of standards (e.g. environmental and labour protection, intellectual property and competition and anti trust).

City University: Course advisor in shipping law for a maritime master's course. The course aims to facilitate the move to management positions on shore of experienced naval and merchant marine officers. The module covers basic law of contract and charters, the Law of the Sea Convention and the International Maritime Organisation regime, and P&I insurance.

Other lecturing during 2004

Course Director and Lecturer for a Cambridge University / Ministry of Defence short course for senior armed services officers on 'Economics in the 21st Century,

Lecturer for a course for IBM executives on international trade and the World Trade Organisation, and Intellectual Property Rights and access to medicines and the resources from which they are derived.

C.T.S. MARINE CONSULTANTS LTD.

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http://www.ctsmarine.co.uk

SIMON THOMAS CULSHAW

Nationality:- British

Qualifications:-

British Certificate Master Mariner Foreign 1967.
Bachelor of Science Joint Honours 2nd class. 1972.
Master of Philosophy. 1993.
Fellow of the Royal Institution of Chartered Surveyors. – Chartered Surveyor (1985.)
Durham University - Attended course on Marine Boundary Delimitation

Professional Organisations:-

Liveryman, Warden and Master 2003/2004- Honourable Company of Master Mariners.
Member of the Pipeline Industries Guild. (Member of subsea innovation judge panel to
The Technical and Industry committee.)
Member of the British Remote Sensing Society.
Member of the Canadian Alliance of Marine Remote Sensing
Member of the Society of Underwater Technology. (Member of policy committee)
Fellow of the Royal Institute of Navigation.
Fellow of the Royal Geographical Society.

British Consultants and Construction Bureau – Main Board Director 2002 - .present

Countries worked in:- Most Countries world-wide with a littoral zone (Coast).

Employment History:-

1985/ present.
Founded CTS Marine Consultants Ltd. -Valuations and investigations. Ports, Offshore oil and gas operations worldwide. environmental audits, Satellite and Airborne remote sensing operations, position fixing and boundary delimitation technical - subsea, marine and coastal sensing – surveys and pollution monitoring - environmental impact statements.

1982/85.
John Brown Engineering and Construction. - Installation/Marine Manager Procurement, negotiations, evaluation and management for and during the construction phase of marine and off-shore installations - platforms, pipelines and subsea developments. Forensic engineering in port development and accidents.

1981/82
CWA Offshore Ltd. – Port development, offshore oil and gas warranty surveys, P&I Club ship and accident surveys, safety, marine pollution and environmental audits.

1977/81.
Newfoundland Ocean Research Corporation. – Manager Oceanographic and hydrographic unit – procurement, negotiations, evaluation and management of Arctic, Sub-Arctic and the Newfoundland and Labrador Coast offshore oil and gas operations, marine pollution investigations, environmental

impact statements, ice engineering and high latitude navigation, terrestial / oceanographic monitoring operations.

1973/77.
Noble Denton & Associates (London & Singapore) World-wide off-shore operations - Towing and installation of mammoth structures. Port and marine safety and environmental studies and operations.

1956/73.
British Merchant Navy. - Alfred Holt & Co., Dry cargo. Decca Surveys Ltd., hydrographic surveying. British Antarctic Survey, hydrographic and environmental surveying, sea ice research and relief of British bases.

Some typical projects:-

1975-Present - Team member and manager - World-wide ports, off-shore oil & gas operations. Evaluation, negotiation and the execution of marine operations particularly in environmentally sensitive locations. Operations spearheading emergency activities, liaison with local, overseas governments, bureaus, institutions and authorities.

1991 - Consultant - World-wide, formulated construction and hydrographic requirements for the certification of "clear seabed" and "debris acceptance levels". Decommissioning of platforms and storage vessels.

1986-1990 - Marine Manager - Europe, Southern Africa, South Atlantic and South East Asia, responsible to Consulting Engineers involved in port development boundary locations of development, evaluations and dredging surveys.

1992 - Consultant - Responsible to Consulting Engineers in Great Britain for the design, specification to Canadian Government safety and environmental standards and sourcing of cost effective equipment for moorings and link spans between the land and floating structures under construction at deep-water moorings in Northern Canada.

1992 - Marine operations consultant - East Africa, Rufiji River. Responsible to the client for resolving the most safe and environmentally friendly cost effective method of crossing the river, primarily during the flood - by ferry or bridge. This river constituted a major traffic flow problem on a coast road in Tanzania.

1984-1994 - British manager - Responsible to a French marine, oil and gas design, construct and installation engineering directorate in the European and Southern African marine and off-shore markets. Business development and dealing with submissions to clients, subsea, pipeline and turnkey construction projects. Economic, location and environment planning and where required the simulation of construction activities at design phase of projects. Spearheading unusual operations and liaison with overseas governments, institutions and authorities.

1980-present - Consultant - Providing assistance which, from time to time, includes simulation and modelling activities, reports on evidence and offers expert opinion to solicitors and councillors, with particular reference to environmental, oceanographic, navigation position fixing, surveying and sub-sea operation claims and the financial implications of the claims in the marine, coastal and off-shore industries..

1991 - Marine consultant - Responsible to the engineering group designing a new port development in Malaysia advising and reporting on ship handling, pollution control and safety aspects relating to the requirement of harbour tugs, navigation, underkeel clearances and hazard control relating to hazard cargo complex. Also considered the international boundary over which the new port will extend.

1992 – 1994 Marine consultant - Employed by the Danish Government to assist the Great Belt bridge construction team submit counter claims to the International Courts of Justice in The Hague. It was claimed by a third party government that there was a requirement to provide a safe limitless air draught channel for mammoth structures e.g. mobile drilling units - to pass through a proposed bridge span.

1993-1994 - Project Manager - Research into the usefulness and cost effectiveness of satellite borne microwave sensors, particularly Synthetic Aperture Radar in ERS-1 as a possible cost effective monitoring tool for detecting marine pollution, environmental elements, area and boundary policing and assisting in the management of world-wide Exclusive Economic Zones.

1993-1994 - Consultant - Acting on behalf of the Secretary-General of the International Maritime Organisation in Azerbaijan carrying out a needs assessment mission to furnish the multi-sectoral umbrella programme - UNDP with information for the protection of the marine environment, operation of MARPOL, Local Flag register and marine operations in the Caspian Sea.

1995 - present - Part time university lecturer - Safety and planning aspects in marine, harbour and offshore construction. (Safety and anti-pollution requirements and guidelines when working over or near water).

1995/96 - Consultant - Acting on behalf of the Secretary-General of the International Maritime Organisation in the Northern Magrab States of Africa - Morocco and Tunisia. The mission was to determine the countries' stage of development for combating marine pollution MARPOL, elements of land pollution relevant to marine affairs in the above countries were also investigated.

1996 - Project Manager - Managed an environmental base line survey which also involved the evaluation of offshore and island installation response plans and the provision of a GIS to determine the location of response equipment. During this period an environmental impact statement of a new offshore installation (7 jackets and 117km pipeline) was undertaken in the southern half of the Arabian Gulf. This project also included the development of pollution emergency response planning during the transport period of the project. Satellite remote sensing data was used extensively for habitat and boundary mapping in the operational areas of the studies and also as a base for the GIS.

1996/7 - Adviser - Environmental impact audit and oil spill response plan to a future oil terminal and offshore development in the Black Sea. This included both the construction and operational phase of the project.

1997. - Consultant - Needs assessment on behalf of the United Nations Development Project in the State of Bahrain. The International Maritime Organization was charged with assessing the requirements of the State to ratify a number of international IMO conventions including Oil Spill Response Planning MARPOL.

1997 - 98 - Involved in the use of Canada Radasat - SAR - and the use of the images to track shipping and marine pollutants. Identification of ship type is now feasible down to 4m length in wind 10m/s - force 5/6.

1998 - Environmental Consultant - Advised Insurance market on the environmental and possible catastrophic pollution elements and risk analysis relating to the decommissioning of oil and gas structures world wide. Also the relevance to Littoral States EEZ was taken into account.

1998 - UK Project Manager - Navigation aids – Advising client on the environmental aspects and requirement of the LED navigation aid construction in the UK.

1999 – 2000 Safety, environmental and Navigation consultant – Redesign aids to navigation, reassessment of pollution response plans under keel clearances, channel width, local marine boundaries and anchorage to facilitate night navigation in a port in Pakistan.

2000 – Conversion surveys of vessels. Vessels to be converted from offshore supply boat to luxury vessels. Valuation of vessels.

2001 – present. Founder - Developing from embryo to operational stage. MSc course in Maritime Operation and Management with City University and the Honourable Company of Master Mariners. Lead lecturer on navigation, surveying and marine environmental module. First course started in autumn 2003 with 25 students Year 2004 / 2005 30 students .

2001 – Present - Director of a new venture – A subsea insurance services company specialising in underwater technology including marine boundary registry of vehicles and environmental aspects of introducing some technologies into environmentally sensitive subsea areas.

2001 – Present. Assisting in the delimitation of an African country's Exclusive Economic Zone (EEZ). Thereby enabling the country to police and manage all aspects of the natural environment of the EEZ under the rules of UNCLOS.

2002 – 2003 Advisor – Developing marine operations procedures for the building, towing and emplacement onto sensitive seabed of a concrete LNG process, storage and export plant to be built in Europe and towed to offshore West Africa. Developing procedures for pipeline boundary crossings

2003 – 2004 – Assessing the risk to seabed and water column, environmental, land boundary negotiations delay and construction delays during the building, installation and commissioning phases which may impact on the first product delivery of an offshore complex in the Black Sea due to be installed in the summer 2004.

2003 – Present – A forensic examination of the marine and seabed environmental aspects relating to a drill ship unable to keep station during adverse weather conditions in the Bay of Bengal.

2004 – 2005 – Hydrographic and photographic survey of an alleged damaged coral reef in the West Indies. The littoral state is demanding financial compensation from a shipping company.

2005 – Present – Public enquiry relating to the development of a port in the United Kingdom which includes negotiations with NGOs, public authorities, construction engineers and local fishery industry.

Publications: -

Winter Shipping on North Newfoundland and Labrador coasts.
POAC Conference, St. John's 1983.
S.T. Culshaw.

Ship in the Ice Project.
POAC Conference, St. John's 1983.
B.LeDrew/S.T.Culshaw

Kapakok Bay Impact Statement. Government of Newfoundland and Labrador.
S.T.Culshaw and Dr W.Russell.
Not Published 1985.

Thesaurus and I.T. Index of Navigation
Terms compiled in conjunction with RIN Library Study Group. Royal Institute of Navigation.
S.T. Culshaw Chairman 1986.

Maritime Territorial Expansion. CMS Journal Planning and Development 1993.
S.T.Culshaw.

Marine Space and the Surveyor. CMS Journal Planning and Development 1993.
S.T.Culshaw

A Visual Interpretation of an ERS-1 SAR Image of the Thames Estuary.
The Journal of Navigation. Vol 48. No. 1 January 1995.
S.T.Culshaw

Weather and future satellite monitoring systems.
IBC conference - Costly Bunker Disputes. 11th May 1995.
S.T.Culshaw.

Hydroplus Fusegates - Four years on. British Dam Society - York
1996.
S. Chevalier, S.T.Culshaw, J.P.Fauquez

The Use of Satellite Imagery in Coastal Zone Management.
European Faculty of Land Use and Development - Strasbourg.
Uuniversity of Portsmouth - 1997.
S.T.Culshaw.

The role of consultants in maritime projects.
British Maritime Industry Catalogue EEZ - 1998.
S.T. Culshaw

Satellite Borne Monitoring Sensors – help or hindrance to the Ship Master?
The International Command Seminar – 2000
S.T. Culshaw

Professional Institutions working with Universities to develop academic courses for use in the professions.
HCMM journal – 2004
S.T.Culshaw

Samples of Marine Operation Enquiries:-

"Serenitas". Late arrival at port of loading on a voyage from East Africa to Brazil. - On behalf of the Charterer submitted the **environmental factors** to support the claim that the vessel incurred the loss of the on going cargo from Brazil to Europe.

"Barge Durban". Planning Permission. - Submitted to Local Government Planners relevant factors in support of the vessel remaining at its moorings in the upper reaches of the River Thames.

"Ocean Surveyor". Loss of seismic equipment. – Submitted on behalf of the equipment owner the **environmental factors** leading to the loss of this equipment in ice infested waters.

"Vinga". Jetty damage. - On behalf of the vessel owner submitted the environmental factors which allegedly lead to the vessel breaking its moorings and subsequently damaging the jetty at Botas in the Mediterranean Sea.

"Lucyon Trader". Ice damage to the vessel. - On behalf of the Charterer and in support of a claim that the vessel was allegedly unseaworthy reported on evidence of sea ice conditions and safe navigation procedures in a sea ice environment.

"Maersk Triton". Late arrival at port of discharge on a voyage from the Gulf Coast of the USA to Japan. - On behalf of the Charterers submitted the environmental factors, route planning and safe navigation elements to support the claim that the vessel allegedly arrived behind schedule at the port of destination.

"Lok Manya". Damage to Vessel. - On behalf of the Charterers submitted findings on cold weather and ice environment operations in the Gulf of Bothnia to support a claim that the vessel was allegedly in excess of the time limit of the Charter Party.

"Kallopi T". Late arrival at port of loading on a voyage from Rotterdam to the USA Gulf ports on route to Aqaba via Mediterranean Sea. - Submitted on behalf of the Charterers environmental, route planning and safe navigation elements to support a claim that the vessel was in breach of the Charter Party.

"Offshore Marine". Personal Injury. - On behalf of the claimant submitted **environmental** and safe navigation factors to support a claim of alleged negligence on the part of the Master.

"M.S.Kareliya". Personal Injury. - On behalf of the claimant submitted **environmental** and safe navigation factors to support a claim of alleged negligence on the part of the Master.

"Tropical Lion". Hull Damage. - Examined and reported to the client on the validity and reliability of a physical model used to simulate the drift of mines seeded to the north of the storage tanker's position. It was alleged that a floating mine was responsible for the damage to the shell plating of the vessel and the subsequent oil pollution.

"Rowan Gorilla 2". Prove Salvage. - Two extra tugs were taken by the rig owners to support the tow nearing a lee shore in bad weather off the east coast of England. The exercise was to examine and report to the client on the validity of a claim of salvage by tug owners.

"Rybovsk". Container Damage. - On behalf of the cargo owners to examine the stability of the vessel which took on a heavy list during discharge. Several full containers fell onto the jetty and into the sea.

“Ioannis”. Ballasting systems malfunction. - It was alleged that the vessel damaged a part cargo of sunflower seeds during discharge at Liverpool. On behalf of the cargo owners examine the alleged malfunction of the bilge and ballast operating system. It is understood that ballast water was allowed to flow between compartments.

"Anax". Fuel and Speed Claim. - On behalf of the vessel owners to analyse the actual and forecasted weather on the vessel's route to determine the validity of a reported excessive fuel claim by the charterers.

Foundering – The investigation into the circumstances of a harbour tug foundering in the Western Approaches in connection of a prosecution brought by HM Customs and Excise.

Sample of enquiries assignments.

Drumbuie Public Enquiry:-Assistant to the Marine Operations Expert.

Drumbuie residents V. Contractors. Enquiry into the use of beach area as an area to locate a building basin in which to construct mammoth North Sea structures near to the village of Drumbuie, Loch Kishorn.

Kapakok Bay. Public Enquiry:- Project Manager.

Residents of Newfoundland and Labrador V. Mining Company.
Environmental Impact Statement in support of the extraction of "Yellow Cake" from an open cast mine on the coast of Labrador.

Bell Is. Conception Bay. Public Enquiry:- Project Manager.

Canadian Federal Government. Environmental Impact Statement examining the feasibility of using a disused mineral mine as a subterranean fuel oil storage tank. The mine seams extended several kilometres under the sea into Conception Bay.

Bell Is. Strait. Enquiry:- Project Manager.

Provincial Government of Newfoundland and Labrador. Environmental Impact Statement examining a proposed seabed cable route across the strait, particularly emphasis was given to the dangers of seabed ice scour.

Medway Ports. Planning Enquiry:-Marine Operations and Environmental Manager.

Medway Ports V. Road Developers. Impact Statement of vessels air draught and safety clearance on the height of a proposed road bridge over the River Medway.

Great Belt Bridge. International Enquiry:- Marine Operations.

The submission of counter claims on behalf of the Danish Government to the International Courts of Justice in The Hague. It was claimed that there was a requirement to provide a safe limitless air draught channel for mammoth structures to pass through a proposed bridge span.

River Severn Barrage. Public Enquiry:-Marine Operations.

Reported to the Severn Barrage Development Team on the safe and practical dimensions of shipping locks and approach channels in support of the conceptual design of the Barrage.

Piper Alpha Disaster:-Marine Operations.

Submitted to the Operator the designs of pipeline diversions around the effected area. Subsequently not used in the enquiry as the design was over taken by events.

Aquaculture Enquiries:-Environmental Manager.

Reported on coastal establishments in the Mediterranean Sea, Costa Rica, Straits of Gibraltar, Bahamas and the Red Sea in support of the alleged vulnerability of fish farm locations to sea level rise, marine, land and other pollutants and oceanographic episodes.

Appendix 4: Relevant collaboration

Appendix 4: Relevant collaboration

Department of Hydraulic Engineering, Faculty of Civil Engineering and Geosciences, Delft University of Technology

(non-exhaustive and presently active)

European collaboration on educational strategy

- EUCEET: European group of universities and higher education schools on civil engineering education (City, UPC, Trondheim are also participants)
- SEFI: Societe Europeen de Formation des Ingenieurs (also Trondheim as participant)
- IDEA League (cooperation four technical universities in the Bologna context Imperial, ETH, Aachen and Delft)

EU Socrates MSc student exchanges

- Reception of Socrates students from Spain, Italy, Germany
- Sending of Socrates students to Spain, Italy, UK, France

EU MSc students:

- Formal enrolment into both BSc and MSc program of students from Belgium, Germany, Italy and Spain

Non-EU MSc students

- Formal enrolment into both BSc and MSc program of students from China, Vietnam

EU PhD students:

- Full or partial guidance of PhD students from Italy, Rumania

Non-EU PhD students:

- Full guidance of PhD students from China, Vietnam, Egypt, Brazil, USA

EU FP6:

- Environment programme: Floodsite, Sandpit, CoastView
- Interreg programme: Northwest New Delta

International formal research collaboration:

- China: Yangtse estuary with Hohai and East China Normal University
- China: Yellow River with Tsjinhua University
- Vietnam: Red River Delta with Hanoi Water Resources University
- USA: Army Corps of Engineers, USGS, ONR, CPE

History of collaboration with partners:

- UPC: more than 15 years of joint research projects, student and staff exchanges;
- Southampton: more than 15 years of joint research projects and student exchanges with Prof R. Nicholls
- Trondheim: several years of co-operation on educational strategy;
- City, London: more than 10 years of joint research projects and staff exchanges.

Division of Marine Civil Engineering at Department of Civil and Transport Engineering, NTNU, Trondheim

Division of Marine Civil Engineering at Department of Civil and Transport Engineering cover topics in coastal, harbour, marine and arctic engineering.

National cooperation
Within the university we have cooperation with other departments at our faculty, with other faculties, and with the research organization SINTEF, which have a close cooperation with NTNU. An example of the broad cooperation is illustrated by the NTNU Strategic University Programme on *Strategic Wind Power Programme 2003 – 2007*. Here seven departments at NTNU are involved and three external national research organizations: Institute for Energy Technology, SINTEF Energy Research, and SINTEF Applied Mathematics.

SINTEF Coastal and Port Laboratory is an important partner on the laboratory side, providing access to and use of advanced and large-scale facilities for coastal and harbour experimental work. Staff is also acting as advisors on project and thesis work.

Broad and extensive cooperation has been established with the industry and public authorities. Our main collaborating partners are: Statoil, Norsk Hydro, Norwegian Petroleum Directorate, Research Council of Norway, Barlindhaug Consult, Dr.techn Olav Olsen, Norwegian Coastal Administration, and Avinor, in addition to a large number of smaller and medium-sized companies.

European cooperation
We have regularly exchange students coming from many parts of Europe, with Germany, France and Spain as the main countries. We host visits of researchers for short and longer periods of time (3 months to 1 year). Recently we have had researchers form France, Italy, Great Britain and Russia.

Through the NFR Eastern European Programme, a strong increase in cooperation with Eastern Europe, and in particular Russia has been developed. Major partners in Russia are St. Petersburg State Technical University, and Russian State University of Oil and Gas. The main activities are related to Arctic Offshore Engineering, and the cooperation has resulted in 2 books, 4 papers in international journals, 24 conference proceedings and more than 20 reports. Also more than 15 master/doctoral students have stayed in either country a year or more.

Our staff has actively participated in European networks, organizations and committees. Examples of this are position of president in POAC, chairman of PIANC working group, EUCEET Thematic Network, chairman of ISO/Technical Committees, HERCULES etc.

Within Arctic Marine Engineering the two major programmes have been LOLEIF – Validation of low-level ice forces on coastal structures and STRICE – Structures in ice. Another programme has been SCARCOST – Scour around coastal structures.

Other international cooperation
Over a 15-year period, a one-year post-graduate Diploma course was run with students coming from various developing countries all over the world (35 countries). This has created networks, which in turn have led to research cooperation with among others: Sri Lanka Ports Authority, and Institute of Marine Sciences, Zanzibar.

Through sabbatical, staff has over the recent years visited institutions as: Texas A&M, MIT, Coastal and Hydraulics Laboratory at Vicksburg, University of Houston/Conoco, University of Florida, The No. 4 Survey and Design Institute for Harbour Engineering, Guangzhou. We have hosted researchers for a one year period from Japan and China. During the latest five years, our staff has had on an average 20 joint publications with international colleagues.

Doctoral candidates at our Division are very much international. We have now candidates from Iceland, Indonesia, France, the Netherlands and Russia, and have had candidates from India, China, Turkey and Tanzania.

Universities we have developed good cooperation with include among others:

- St. Petersburg State Technical University, Russia
- Texas A&M University, USA
- University of Florida, USA
- University of Dar es Salaam, Institute of Marine Sciences, Tanzania
- University of Moratuwa, Sri Lanka
- Tottori University, Japan
- Hokkaido University, Japan
- Kyoto University, Japan
- Hohai University, Nanjing, China
- Chongqing Jiatong University, China
- Tongji University, Shanghai, China
- Ocean University of Qingdao, China

In Europe we have cooperation and exchange of students with a number of universities.

NTNU has formal collaborating agreements with some 110 universities worldwide.

Department of Hydraulic, Maritime and Environmental Engineering, Universitat Politecnica de Catalunya

The Dept. of Hydraulic, Maritime and Environmental Engineering (DEHMA) of UPC -where there is the Maritime Engineering Lab (LIM/UPC)- has a long background in Maritime Engineering student exchanges within the ERASMUS and SOCRATES EU programmes through its participation in teaching activities at the Civil Engineering High School (ETSECCPB/UPC), at both undergraduate and postgraduate levels. During the past 15 years DEHMA/UPC has exchanged students with the main European Union universities teaching Civil Engineering. Special mention should be made to the considerable number of undergraduate European students that developed their Master Thesis at the Maritime Engineering Lab of DEHMA/UPC within the field of Maritime and Coastal Engineering. The ETSECCPB/UPC also participates in several programmes of civil engineering student exchange with Latin America and East and Central Europe universities. Other programmes for students mobility includes the EU TEMPUS programme and agreements with USA, Canada, Japan and Switzerland. ETSECCPB/UPC is an academic partner of the UNITECH network which offers an intensive, full year abroad exchange, to students who wish to complement their engineering studies, with international academic and industry exposure, joint courses and insights in management theory and practise. UPC is also member of the CLUSTER (Consortium Linking Universities of Science and Technology for Education and Research), CESAER (Conference of European Schools for Advanced Engineering Education and Research), CINDA (Centro Interuniversitario de Desarrollo) and TIME (Top Industrial Manager for Europe) networks. UPC participates also in the ALFA, Intercampus and UPC/Latin America cooperation programmes with Latin America.

At a postgraduate level, DEHMA/UPC participates in the PhD in Civil Engineering of the ETSECCPB/UPC (taught in English). More specifically the postgraduate activities of DEHMA/UPC include the coordination of the Interuniversity (UPC/UB/CSIC) PhD Programme on Marine Sciences. Within the framework of this PhD programme DEHMA/UPC has participated in the "Diplome d'Etudes Approfondies Europeen en Modelisation de l'Environment Marin" Socrates/ERASMUS Diploma Eruditionum Altarum DEA europaeum. At Master programmes level, DEHMA/UPC is the coordinator of the Master in Harbour Engineering and Management and the International Master in Coastal Zone Management. Latin American and North African students represent more than half the students registered in both masters and the PhD programme. All these postgraduate programmes (masters and PhD) benefit from academic short stays for lecturing within their courses, such as the Professors Mobility Programme within the Quality Award of the PhD Programme on Marine Sciences, financed by the Spanish Ministry of Education. A specific academic exchange agreement has been signed with the Universidad Autonoma de Baja California within the PhD Programme on Marine Sciences.

Every year, the DEHMA/UPC receives postgraduate students, whose grants are mainly financed by the Spanish Cooperation Agency AECI, the MUTIS programme or the grants programme of Fundació n Carolina.

From a research standpoint DEHMA/UPC participates in several EU FP5 and FP6 research projects which include mobility programmes with other European research

institutions. Some recent examples are the HYDRALAB Network (TMR-researcher mobility) and the MARIE project (Marie Curie).

Some universities with which DEHMA/UPC has academic agreements within the undergraduate/postgraduate SOCRATES ERASMUS programme:
Aalborg Universitetscenter
The University of Liverpool
Technische Universiteit Delft
University College of Cork
Aristotelio Panepistimio Thessalonikis
The Universitat Braunschweig
Universiteit Gent
Universitetet i Trondheim
Politecnico di Milano
Universite de Nantes
Université de Toulon et du Var.

DEHMA/UPC also participates in the Diplome d'Etudes Approfondies Europeen en Modelisation de l'Environment Marin" Socrates/ERASMUS Diploma Eruditionum Altarum DEA europaeum together with the following universities:
Universidad de Las Palmas de Gran Canaria
Universitat de les Illes Balears
Université de Liège
Université de Bretagne Occidentale Brest
Université de Corse Pascal Paoli
Université Pierre et Marie Curie Paris VI
Uniservidade Nova de Lisboa
Universidade Tecnica de Lisboa

School of Civil Engineering and the Environment and School of Ocean and Earth Science, University of Southampton

(non-exhaustive and presently active)

EU Socrates MSc student exchanges
- Reception of Socrates students from France
- Sending of Socrates students to Université de Bordeaux

EU MSc students:
- Formal enrolment into both BSc and MSc program of students from Greece, Spain, the Netherlands, Italy, Germany, Ireland

Non-EU MSc students
- Formal enrolment into both BSc and MSc program of students from China, the Maldives, Mexico, Cameroon, Nigeria

EU PhD students:
- Full or partial guidance of PhD students from the Netherlands, Germany, Italy, Spain, Holland, France, Belgium

Non-EU PhD students:
- Full guidance of PhD students from USA, Mexico, Brazil

EU FP6:
- Environment programme: EUROSTRATAFORM, EURODELTA, BIOFLOW, EUMARSAND
- Interreg programme: Branch

International formal research collaboration:
- Delft Hydraulics / Netherlands
- IST Lisbon/Portugal, Mechanical Engineering Department
- TU Braunschweig, Germany
- China: Yangzee River Commission, including the estuary and delta
- GKSS (Germany) Memorandum of Understanding on Coastal Research
- UNESCO (CEISM) committee on coastal management in Mediterranean
- SCOR committee 122 (Erosion of Muddy coasts)
- APN network on Asian Megadeltas
- USA: Field Research Facility of US Army Corps of Engineers

History of collaboration with partners:
- UPC: more than 10 years of joint research projects and staff exchanges;
- Delft: more than 15 years of joint research projects and exchanges with Prof M. Stive
- Trondheim: frequent research contacts over 20 years, use of facilities at NTNU and Marintek, joint publications in 2003 and 2005.
- City, London: close links following staff relocation from City in 1999.

School of Engineering and Mathematical Sciences, City University

Introduction.
The School of Engineering and Mathematical Sciences, City University has an extensive international network of academic, industrial and commercial links. The links exist at all levels to the benefit of undergraduate students and academic staff alike. They enhance the quality of the educational programmes and the research activities. London is an international business and commercial centre and remains the global centre for marine activities. City University plays an important role in supporting theses activities.

National cooperation.
There is extensive collaboration with other UK universities within many EPSRC and ESRC funded programmes. For instance, the application of optical fibres, which can be used for monitoring the performance of marine structures, involves the universities of Kent and Cranfield. Collaborative research in the area of marine geotechnics includes Imperial College, University of London, and Oxford and Cambridge universities. Research in the area of the fatigue of marine structures is being conducted with the Marine Technology Centre, University College, and University of London. Computational fluid mechanics and fluid loading studies in the marine environment are being undertaken with the University of Southampton. There are many other examples of inter university collaboration.
Broad and extensive cooperation has been established with UK industry and public bodies. Research into the behaviour of Jack Up Platforms is being carried out with British Maritime Technology and the consultants, Noble Denton. Other UK collaborative partners include, Lloyds Register, British Petroleum, Holroyd, the Building Research Institute and the Steel Construction Institute.
The School of Engineering has very strong links with the University Business School and directly into the marine profession through associations with the Honourable Company of Master Mariners.

European Cooperation.
The School of Engineering is very active in participating in the Erasmus Socrates Mobility Schemes. Students and staff from almost all EU countries spend study periods in London, which last from 3 to 12 months. There are formal staff exchanges with the Technical University of Denmark, University of Karlsruhe, Germany, Helsinki Technical University and the Technical University of Prague. Formal links have also been established with St Petersberg State Technical University and the Politechnic University of Milan for joint degree programmes.
The academic staffs are active in thematic networks and particularly in the EUCEET civil engineering programme. They chair Euro committees, and are involved many Framework 6 research programmes such as CRAFT. These latter activities involve the participation of European companies such as the Norwegian Public Works Authority and the Swedish Optical Research Institute.
Other European organisations, which have been involved in cooperative programmes, include Delft University of Technology, the Norwegian Petroleum Directorate, the Technical University of Madrid and ENPC Paris, for example.

Other International cooperation.

The School of Engineering and Mathematical Sciences has extensive world wide collaborative programmes with both academic and industrial organisations.

There are links with Osaka University, Asian Institute of Technology, Thailand, University of Technology, Malaysia, University of Singapore, Texas A and M, the University of California, Monash University, Australia, Inchon University Korea and Dalian Maritime University, China, for example.

Examples of international industrial links include, Toyota, Yamaha, BMW, Castrol, Exxon, Marathon Le Tourneau.

NTNU Norwegian University of Science and Technology
Office of International Relations

Orientation Week
for new International Students

15 -21 August 2005

Preliminary Programme

www.ntnu.no/intersek/

Monday 15 August

Time	*Meeting place*	*Activities*
9.15	Steinan Student Village	**All international students**: Bus to NTNU Gløshaugen Campus
9.30	Moholt Student Village, (Reception)	**All international students**: Bus to NTNU Gløshaugen Campus
10.00	R2 Realfagbygget Gløshaugen Campus	**All international students:** **Welcome meeting** Welcome, Head of Office of International Relations Welcome, Rector Presentation of NTNU, Professor Arne M. Bredesen Break
11.00	R2	**Norway from** **an international student's perspective** Presentation by 3 students
11.30	R2	**An introduction to Norwegian cultural peculiarities,** Stewart Clark, Adviser NTNU and Wolfgang Laschet, Socrates Programme Coordinator
12.00	Outside R2	**Registration for the Orientation week** Registration for boat trip 20 August: NOK 100 NB. Limited number of seats available. First come, first served.
12.30	Tellus Realfag Cafeteria, Realfagsbygget Gløshaugen campus	**All international students:** Complimentary lunch
13.30	Gløshaugen Campus	**All international students:**

	(Outside Tellus after lunch)	Campus walk Guided tour of the Gløshaugen campus

Monday 15 August
Evening Programme

Time	*Meeting place*	*Activities*
18.00	Campo Kjelhuset Cafeteria, Gløshaugen campus	**All international students:** **Welcome party** The Students' Welfare Organization (SiT) and The Office of International Relations invite you to an informal welcome party Live music, barbecue

Tuesday 16 August

Time	*Meeting place*	*Activities*
08.00 Bus departure	Moholt Student Village (Reception)	**MSc/MPhil Norad fellows** Bus to Aliens Office
8.30	Aliens Office (Police station) and National Populations Register	Registration at the Aliens Office and the National Population Register *Remember to bring your passport*
8.30 Bus departure	Moholt Student Village (Reception)	**MSc/MPhil Quota Programme students /MSc/MPhil students with other funding:** Bus to Gløshaugen campus
9.00-12.00	EL 2 Elektrobygget, Gløshaugen campus	**MSc/MPhil Quota Programme students /MSc/MPhil students with other funding:** Information meeting Meet Ragnhild Brakstad, Quota Programme coordinator
10.00-12.00	Styrerommet, Main Building Gløshaugen campus	**MSc/MPhil Norad fellows:** Information meeting Meet Rita Kumar, Norad Programme coordinator

10.30 10.15 11.00	Moholt Student village Bus departure Steinan Student village Bus departure Dragvoll campus	**Exchange students:** Bus to Dragvoll campus Bus to Dragvoll campus **Exchange students:** Information meeting Meet programme coordinators
12.30-13.30	Dragvoll campus	**Exchange students: Lunch**
14.00	Dragvoll campus Outside main entrance Bus departure	**Exchange students:** Bus to Ringve Museum
12.00	Stairs at the main entrance, outside Main Building, Gløshaugen campus	**International Master's Programme students:** Group photo of all Master's Programme students and course coordinators
12.30-13.30	Campo Kjelhuset cafeteria, Gløshaugen campus	**International Master's Programme students, IFUS students & PhD students:** Complimentary lunch
14.00	Outside Main Building Gløshaugen campus Bus departure	**International Master's Programme students, IFUS students & PhD students** **(except MSc/MPhil Norad fellows):** Bus to Ringve Museum
14.30	Ringve Museum	**Guided tour of the Ringve Museum** Norway's national museum of music and musical instruments, with collections from around the world
16.00	Ringve Museum Bus departure back to Moholt / Steinan student villages	
13.45-16.00	Styrerommet, Main building, Gløshaugen	**MSc/MPhil Norad fellows** Information meeting

Tuesday 16 August
Evening programme

Time	*Meeting place*	*Activities*
19.00	Moholt Student village (Reception)	**International Master's Programme students ONLY;**
	Guided walk to the Marine Technology Centre, Tyholt	MSc in Petroleum Engineering MSc in Petroleum Geosciences MSc in Marine Technology MSc in Hydropower Development MSc in Geotechnics and Geohazards MSc in Coastal and Marine Civil Engineering MSc in Light Metal Production MSc in Information Systems MSc in Urban Ecological Planning MPhil in Development Studies MPhil in Human Development MPhil in Linguistics
19.30	Campo Tyholt Cafeteria, Marine Technology Centre, next to the Tyholt Tower	**Welcome dinner** Course coordinators are also invited

19.00		**Exchange students:** **Erasmus Student Union invites you to a welcome party/gathering**

Wednesday 17 August

Time	*Meeting place*	*Activities*
7.45	Moholt Student Village Bus departure	**MSc/MPhil Quota Programme students /MSc/MPhil students with other funding:** Bus to Aliens Office

8.00	Aliens Office (Police Station) and National Population Register	Registration at the Aliens Office and the National Population Register. *Remember to bring your passport*
8.30	Moholt Student Village Bus departure	**MSc/MPhil Norad fellows** Bus to Gløshaugen campus
9.00	Styrerommet, Main Building, Gløshaugen Campus	**MSc/MPhil Norad fellows**: Information meeting Norad Programme coordinator
10.15	Outside Main Building, Gløshaugen campus Bus departure	**MSc/MPhil Norad fellows:** Bus to Ringve Museum
10.45		**Guided tour of the Ringve Museum** Norway's national museum of music and musical instruments, with collections from around the world
12.00	Ringve Museum Bus departure back to Gløshaugen campus	
9.45	Steinan Student Village Bus departure	**Exchange students:** Bus to city centre
10.00	Moholt Student Village	**Exchange students:** Bus to city centre
10.30-12.00	City centre: Outside Trondheim Tourist Office	**Exchange students:** Guided City Walk
12.00		**Exchange students:** Walk back to Gløshaugen Campus
12.30	Tellus Realfag Cafeteria, Realfagbygget Gløshaugen campus	**All international students:** Complimentary lunch

13.30.15.00		**MSc/MPhil Norad fellows** Information meeting Norad Programme Coordinator
13.30-15.00		**MSc/MPhil Quota Programme students /MSc/MPhil students with other funding:** Information meeting Quota Programme coordinator
14.00	Gløshaugen Campus	**Exchange students:** Information meeting Cultural exchange
15.15-17.00	Gløshaugen Campus	**International Master's Programme students:** Information meeting "It's easy when you know how" The art of living comfortably in Norway

Thursday 18 August

Time	***Meeting place***	***Activities***
10.00	Moholt Student village (Reception)	**All international students:** Bus to Gløshaugen campus
10.00	Steinan Student village (Reception)	**All international students:** Bus to Gløshaugen campus
11.00	Gløshaugen campus	**Matriculation ceremony** Welcome speeches by NTNU's Rector and the Mayor of Trondheim
After the matriculation ceremony		**International Master's Programme students** <u>following courses at Gløshaugen</u> Separate programmes will be held at the respective faculties shortly after the matriculation ceremony: NOTE: The separate programmes held at the faculties will be for the international master's programme students <u>ONLY</u>
After the matriculation ceremony	Dragvoll campus	**International Master's Programme students & exchange students** <u>following courses at Dragvoll</u>: Bus to Dragvoll

		International Master's Programme students: Meet course coordinators Exchange students: meet for the Buddy Programme for all new students at Dragvoll outside Dragvoll Sport's centre. The Buddy Programme will have a separate international stand.
14.30		**International Master's Programme students** <u>following courses at Dragvoll campus</u> Separate programmes will be held at the respective faculties shortly after the matriculation ceremony: NOTE: The separate programmes held at the faculties will be for the international master's programme students <u>ONLY</u>
12.00	Garden International House Gløshaugen Campus	**Exchange students following courses at Gløshaugen, IFUS students & PhD students:** **Outdoor 'Norwegian style' barbeque** Regardless of weather conditions Dress for the occasion
15.00	R7 Realfagbygget, Gløshaugen campus	**International Master's Programme students & exchange students** <u>following courses at Gløshaugen</u> Getting to know the academic student organizations at NTNU Meeting the Norwegian students following the same courses as you Party with the Norwegian students
20.00		Matriculation Party for all new NTNU students at the Student Society (Samfundet)

Friday 19 August

Time	*Meeting place*	*Activities*
9.15	Moholt Student Village (Reception) Bus departure To Dragvoll Sport's Centre	**All international students**
9.15	Steinan Student Village Bus departure to Dragvoll Sport's Centre	**All international students**
9.30	Dragvoll Sport's Centre	**All international students:** Information about sports facilities, By Sports Consultant Arne Brevik.
10.30	Dragvoll campus	Lecture : "Economic Background to Modern Norway", Professor Jonathan Moses Dept. of Sociology and Political Science
12.30	Dragvoll campus	**Complimentary lunch**
13.30	Dragvoll campus	**All international students:** Presentation of: -Students' Welfare Organization (SiT) -Student Parliament -International Student Union (ISU) -Erasmus Student Network (ESN) -International Club of Trondheim (ICOT) -The International Student Festival in Trondheim, ISFIT 2006

Saturday 20 August

Time	*Meeting place*	*Activities*
11.00	Steinan Student Village (Vestlia final stop) Bus departure	**Only for international students** **who have registered for** **the boat trip on the Trondheim fjord:** Remember to bring your ticket and a rain/wind jacket if it is cool or rainy.
11.00	Moholt Student Village (Reception) Bus departure	**Only for international students** **who have registered for** **the boat trip on the Trondheim fjord:** Remember to bring your ticket and a rain/wind jacket if it is cool or rainy.
12.00	Pirterminalen Boat departure	Boat trip on the Trondheim fjord
13.30		**Visit to Uthaug,** **a former fishing village** **Guided tour**
		Outdoor lunch
17.00	Pirterminalen Arrival Trondheim Bus departure	**Bus back to Moholt Student Village and Steinan Student Village**

Sunday 21 August

Time	*Meeting place*	*Activities*
10.45	Steinan Student Village (Vestlia Final Stop)	**All international students:**
	Bus departure	**Guided tour of Trondheim**
11.00	Moholt Student Village (Reception) Bus departure	
12.30		**Guided tour of Trøndelag Folk Museum, Sverresborg** The Trøndelag Folk Museum is an open-air museum with more than 60 buildings from central Norway (the Trøndelag district) The museum is in a scenic natural setting, and from the ruins of King Sverre's medieval castle you get an impressive view of the city and the fjord.
		Bring your own lunch
15.00	Bus back to Moholt/Steinan student villages	