Coastal Morphodynamics

Course GEO3-4306

(Morfodynamica van Kustsystemen)

Course guidelines 2010-2011

(Studiewijzer)

Prof. dr. Piet Hoekstra and dr. Gerben Ruessink

BSc Programme Earth Sciences
Department of Physical Geography
Faculty of Geosciences
Utrecht University
P.O. Box 80.115
3508 TC Utrecht, Netherlands
1. **General course information**

- Course name: Coastal Morphodynamics
- Code: GEO3-4306
- Size: 7.5 ects
- Level: 3
- Start and end date: the course will be given from Monday 15 November 2010 up to and including Monday 24 January 2011. The course examination date is **Monday 31 January 2011**.
- Number of lectures a week: 4 hours of lectures, with an additional 2 hours of practical work and presentations/discussions
- Language: Dutch; English when required.
- Website: [www.geog.uu.nl/fg/ruessink/Onderwijs.htm](http://www.geog.uu.nl/fg/ruessink/Onderwijs.htm) (no WebCT). The website will provide lecture sheets, answers to practical work and papers to be studied.
- Course coordinators: Piet Hoekstra, room 206 and Gerben Ruessink, room 213 in the Zonneveldvleugel, tel. 030-2532753/2780, e-mail: p.hoekstra@geo.uu.nl and g.ruessink@geo.uu.nl

2. **Course contents**

This course focuses on the estuarine, coastal and marine processes and morphological features that determine the morphodynamic behaviour of coastal systems. **Coastal morphodynamics is defined as the mutual co-adjustment of coastal landforms and processes.** Emphasis is on the behaviour of sedimentary coastal systems, such as beaches and dune coasts, barrier island systems, tidal inlets, estuaries and deltas. It includes the behaviour of both sandy and muddy coasts. The time scales involved vary from less than a second (e.g., intra-wave processes; short-term) to decades (e.g., the coastal response to sea level rise; long-term). The course starts with the dynamics of wave-, tide- and current-driven processes and the effect on sediment transport processes and associated morphological change. The second part of the course deals with the morphodynamic character of different types of coastal systems. This is analysed by discussing, evaluating, and quantifying the dominant processes, the relevant morphological features and sedimentary products. Exercises, papers, and case studies are an integral part of the course and will be used to develop skills in analysing and solving coastal problems. The course also contains several lectures on coastal instrumentation (for example, remote sensing) and on the societal relevance of coastal processes in mitigating coastal erosion.

After successfully completing the course, the student will have an understanding of coastal processes, landforms, sedimentary sequences and the related terminology, and is able to read and discuss scientific literature on coastal environments. Besides, he or she can produce papers on coastal issues and is able to solve simple hydrodynamic and morphological problems.
3. **Course aims**

The main aims of this course are to:

a) develop a generic understanding of the factors, processes and morphological features that determine the short-term as well as long-term behaviour of coastal systems; the main focus is on coastal sedimentary environments;

b) determine the different spatial and temporal scales associated with the morphodynamic behaviour and to qualify and quantify the interrelations between processes and form evolution;

c) become familiar with terminology;

d) become familiar with approaches, methodologies and tools for coastal research;

e) develop skills to critically read recent scientific results as presented in the literature; and,

f) apply this knowledge in realistic case studies.

4. **Course literature**

_Tide, tidal processes, and landforms._
- Book Masselink and Hughes, 2003 (see below)
- Handouts

_Waves, wave-driven processes, nearshore morphology._

_Scientific papers_ to be analyzed during the course:

These papers and the associated questions will be made available on www.geog.uu.nl/fg/ruessink/Onderwijs.htm

5. **Course activities and timetable**

Course activities include:
- Lectures
- Exercises
- Papers (including report writing)
- Case study (including report writing)
On the website, each of the two papers is accompanied by a series of questions. The student is expected to study the paper and answer the questions in a brief report. This report should be submitted to either GR or PH (see below, section 6), after which the paper will be discussed. In the table below, “exercise” implies that the student can work on the exercise with help from either GR or PH; “paper” implies that the questions will be discussed with the entire group. **SEE IMPORTANT DATES IN SECTION 6!**

Presence during exercises and paper discussions is compulsory; presence during lectures is strongly recommended. Preparing for the exercises and lectures by reading the relevant literature as provided in Chapters 4 and in the timetable below is strongly recommended.

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LC = Lectures; WC = exercises and paper discussion

Staff: GR = Gerben Ruessink; PH = Piet Hoekstra; HR = Prof. dr. Herman Ridderinkhof (UU and Royal NIOZ).

6. **Course examination**

The result for the course is determined by:

a) Exercises and papers, 25% (each paper/exercise is 6.25%)

b) Case study report, 25%

c) Final exam, 50%

Important dates deliverables:

- 06/12/2010: report on paper 1 by e-mail submission to g.ruessink@geo.uu.nl
- 06/12/2010: (hand-written) answers to exercise 1 to GR during LC
- 10/1/2011: (hand-written) answers to exercise 2 to PH during LC
- 10/1/2011: report on paper 2 by e-mail submission to p.hoekstra@geo.uu.nl
- 12/1/2011: report on case study by e-mail submission to j.beltman@geo.uu.nl.

All e-mail submissions should be in the form of a Word or PDF document; maximum allowable size is 5 Mb. Failure to meet any of these deadlines will be marked with ‘1’.

During the final exam (**Monday 31 January 2011**), each student may use the lecture notes by PH and the book by Masselink and Hughes. The use of the exercises, their answers, case study report, papers, and all handouts (including powerpoint presentations of the lectures) is NOT allowed during the final exam! Failure to show up at the final exam will be marked with ‘1’.

The end score of 6 or higher is only awarded when the mark for the case study report is 4.0 or above and the mark for the final exam is 5.0 or above. The student is eligible to an additional oral exam, if the end score is a 4 or 5 AND the case study and final exam are both 4.0 or above. The staff will decide on the topic of this exam.