S122  Principles of Nutrient Dynamics in Coastal Areas

Coordinator:  Dr. P. Weppen
Teaching Staff:  Dr. P. Weppen

Section for SSE:  E - Open Studies  Status for SSE:  Elective
Section for EM:  B4 - Coastal Systems  Status for EM:  Elective

Credit points:  6  ECTS
Prerequisites:  None
Language of tuition:  English
Class size:  20

Contact time overall:  52 hours
Independent study:  128 hours
Overall workload:  180 hours

Teaching Units:

- Lecture  - Principles of Nutrient Dynamics in Coastal Areas
  Teaching Staff:  Dr. P. Weppen
  Contact time:  26

- Seminar  - Principles of Nutrient Dynamics in Coastal Areas
  Teaching Staff:  Dr. P. Weppen
  Contact time:  26

Competences the module has been designed to develop:

Mastery of subject matter:  strong
Mastery of methods:  minor
Application of knowledge and understanding:  medium
Problem solving competences:  minor
Communication competences:  medium
Learning competences:  medium
### Content:
- Structural aspects of coastal marine systems
- Open ocean, continental shelf, estuaries, river deltas, wetlands, intertidal systems
- Coastal waters and the river catchment continuum (LOICZ)
- Water and water chemistry: water composition, density, chemical equilibria
- Primary producers, consumers, predators, detritus feeders, degraders, the marine foodweb
- Natural biogeochemical transformation of chemical species of C, N, P, Si, and S; the Redfield Ratio of C:N:P
- Sources and sinks of nutrients; quantitative approaches
- Factors controlling primary production: Solar radiation, irradiance, spectral characteristics, zenith- and azimuth angle, absorption, reflection
- Factors controlling respiratory processes, oxygen, temperature
- Net environmental metabolism primary production vs. respiration
- Fate of pathogens in coastal waters
- Social and ethic aspects of environmental quality, legal limits vs. conservation of pristine environments
- Environmental management of coastal zones: load based approaches vs. emission related approaches
- Modelling nutrients and pathogens in the marine environment
- Purpose of modeling nutrient related processes
- What is Delft 3D WAQ and SWITCH
- Quantitative proxies of environmental metabolism,
- Implementation of nutrient related processes in Delft 3D WAQ

### Learning outcomes:
- Improve the general understanding of complex natural biogeochemical interactions in the marine environment and anthropogenic factors, which exert stress on the coastal habitat.
- Enable students to skilfully and carefully implement nutrient related tools offered by commercially available modeling software packages.

### References:
- J.S. Levington: Marine Biology, function, biodiversity, ecology, Oxford Univ. Press, New York, 2011
- Delft Hydraulics: Manual Delft 3D ECO

### Recommended previous knowledge:
- Basic knowledge of general chemistry, equilibrium chemistry, reaction kinetics, basic understanding of marine biology

### Teaching media:
- Traditional lectures, seminars, self-studies and students presentations, problem-sets, online content (if an appropriate)

### Assessment:
- Written examination: 100%

### Contact details of module coordinator:
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