



in cooperation with



MASTER OF SCIENCE PROGRAMME IN SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES

2014-2015

Research themes:

Agriculture



Biodiversity



Forestry



Land and water management



Natural products



Mineral resources



Renewable energy



Introducing the MSc in SMNR to you,

Welcome to the Master of Science programme in Sustainable Management of Natural Resources at the Faculty of Technology (FTeW) of the Anton de Kom University of Suriname (AdeKUS). Sustainable management of natural resources has received its attention many years ago and has been stimulated by international organizations such as the United Nations, but also during different international events on Sustainable Development such as the 1992 Rio Earth Summit (Brazil), the 2002 Summit in Johannesburg (South Africa), and recently the Rio+20 in Rio de Janeiro, (Brazil).

As you also know, Suriname has abundant natural resources, which are able to support social and economical development during the next decades. But, strong human impacts on the non-renewable resources in Suriname (e.g. bauxite, gold and oil) will result in fast depletion of these resources and a negative impact on the economical development. On the other hand Suriname is blessed with huge bio-natural resources which are renewable, but these are barely explored. The bio-natural resources such as biodiversity, natural products and timber products feature immeasurable economical, social, cultural and aesthetic values. The many uncontrolled and illegal exploitation activities of natural resources in Suriname threaten the livelihood of communities and are the cause of pollution and degradation of the environment and damage to biodiversity and natural products.

The projected industrial growth in the world (including population growth, food demand, climate change, and energy demand), will enlarge the exploration and exploitation of natural resources in Suriname and increase the pressure on the environment and natural resources significantly. This will also be enhanced by the large scale projects (e.g. hydropower). To minimize the negative impacts on natural resources in Suriname and to increase the socio-economic benefits for future generations, the sustainable management of natural resources is of paramount importance.

The understanding and management of Suriname's natural resources require academically trained scientists and engineers, and advanced research capacity.

The Faculty of Technology of AdeKUS plays an important role in the development of human resources in the field of natural resources. Since 2009, the FTeW organizes the MSc in SMNR and executes also SMNR related research. This is done in cooperation with experts from Flemish universities and other foreign universities, and with technical, scientific and financial support of the Belgian Directorate-General for Development Cooperation (DGDC) and the Flemish Interuniversity Council (VLIR-UOS). The objective of the master of science programme in sustainable management of natural resources is to contribute to the sustainable development and management of natural resources in Suriname in the fields of agriculture, biodiversity, forestry, land and water management, natural products, renewable energy and mineral resources, for the benefit of present and future generations in Suriname.

In the coming years you will get advanced knowledge at master level in the field of basic and applied sciences in the following domains: applied mathematics, modeling, spatial information techniques, international and national policies on sustainable development, interaction atmosphere, biosphere and lithosphere, system management of natural resources, and economy and management.

High qualified
lecturers from
AdeKUS,
Flanders and
other
universities,
and the latest
books and
software's are
hereby used.



The programme consist of lectures, computer exercises, individual and group assignments and presentations, fieldwork, excursions, guest lectures, participation in workshops, and different information sessions.



This handbook will provide you with information such as the aims and objectives of the master programme, the course structure, courses and description, MSc graduate profile

and qualifications, admission requirements, examination guidelines, other regulations and procedures, and sources of information and support. Further information of the MSc in SMNR programme can be found at the website <http://vlir-iuc.uvs.edu/smnr/> or can be obtained from the programme coordinator via msc-smnr@uvs.edu. We hope that you will enjoy your study with us. The Faculty of Technology will provide a good environment in which to undertake your studies, and the management and staff of the MSc in SMNR are committed to providing an excellent masters level education.

On behalf of the Faculty of Technology, thanks for having chosen the MSc in SMNR,

R. Nurmohamed Ph.D.
Programme coordinator



Master of Science Programme in Sustainable Management of Natural Resources (MSc in SMNR)

Your choice!

Education and Research in:

- Land and water management
- Mineral resources
- Sustainable agriculture
- Natural products
- Renewable energy resources
- Biodiversity
- Sustainable forestry

Visit:

Website: <http://vlir-iuc.uvs.edu/smnr/>

Contact address:

Faculty of Technology Anton de Kom University of Suriname
Leysweg, POB 9212, Suriname

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Introduction

Suriname features a wealth of natural resources, with a considerable potential for socio-economic development. In order to preserve these resources for present and future generations, sustainable management is an urgent need. Are you interested to become a key professional on the pathway to sustainable management of Suriname's natural resources?



The Faculty of Technology (FTeW) of the Anton de Kom University of Suriname (AdeKUS) in collaboration with the Flemish Universities (Belgium) and other international experts offers

(e.g. University of the West Indies) you a **Master of Science programme in Sustainable Management of Natural Resources (MSc-SMNR)**.

This master program offers education and research in seven themes: **land and water management, renewable energy, mineral resources, biodiversity, sustainable agriculture, sustainable forestry, and natural products**. The degree will be “**Masters of Science**”, with the abbreviation **MSc**. The duration of the Master of Science programme is 2 years.



Aim of the MSc programme in SMNR

To educate Masters of Science students in Sustainable Management of Natural Resources at the Faculty of Technology of the Anton de Kom University of Suriname and to increase the academic standards of research and services to the society in the domains of SMNR at the FTeW-AdeKUS.

Profile of the MSc graduates

The MSc graduates are capable to contribute to an integrated utilization and management of the natural resources along the United Nations (UN) guidelines of sustainable development. Graduates of this programme are well trained to work (a.o. as a staff member, researcher, project manager, lecturer, policy maker or advisor) in different institutions or organizations such as governmental agencies, semi-governmental agencies, NGO's, private sector, consultancies, international or regional organizations, and in education and research centers.



The final qualifications (end-terms) are:



Knowledge:

1. The MSc graduate has obtained knowledge about the issues of following themes: land and water management, renewable energy, mineral resources, sustainable forestry, sustainable agriculture, biodiversity and natural products.
2. The MSc graduate has acquired insight in sustainable management of natural resources.
3. The MSc graduate has obtained knowledge and insight to prepare and evaluate projects in the field of sustainable management of natural resources.



Skills:

4. The MSc graduate is able to identify relevant problems in the field of sustainable management of natural resources.
5. The MSc graduate is capable of collecting adequate and relevant data in an ethically responsible manner.
6. The MSc graduate can interpret and critically analyze data.
7. The MSc graduate is able to formulate adequate and sound solution models for complex problems.
8. The MSc graduate can report in a professional manner, transfer knowledge to others, hold scientifically based presentations, and can publish research results in scientific media.
9. The MSc graduate is capable of monitoring and evaluating implemented solutions to natural resources related management problems.



Attitude:

10. The MSc graduate is capable of taking initiatives, to take the lead in a team, and to cooperate with others.
11. The MSc graduate is able to provide sound guidance in the field of sustainable management of natural resources.

The MSc programme in SMNR is built upon 11 knowledge and 7 thematic domains

| <i>The knowledge domains are:</i> | <i>The thematic domains ('building stones') are:</i> |
|--|---|
| 1. Spatial information techniques | 1. Applied mathematics |
| 2. Numerical methods / modeling/mathematics | 2. Modeling (adapted to different disciplines) |
| 3. Statistics | 3. Spatial information techniques |
| 4. National and international (environmental) law | 4. International and national policies on sustainable development |
| 5. Abiotic processes | 5. Interaction atmosphere, biosphere and lithosphere (linked to human impact) |
| 6. Biotic processes | 6. System management of natural resources |
| 7. Experimental set up and research techniques | 7. Economy and management |
| 8. Economy, management and planning | |
| 9. Management of ecosystems (biosphere/atmosphere) | |
| 10. Natural and artificial production processes | |
| 11. Technology (related to nature-technical aspects) | |



The research programme in SMNR focuses on the following themes:

| | |
|----------------------------------|---|
| Biodiversity | Contact person: Dr. P. Ouboter (p.ouboter@uvs.edu) |
| Land and water management | Contact person: R. Nurmohamed PhD (riad.nurmohamed@uvs.edu) |
| Mineral resources | Contact person: <i>msc-smnr@uvs.edu</i> |
| Natural products | Contact person: Dr. R. Bipat (r.bipat@uvs.edu) |
| Renewable energy | Contact person: C. Wijngaarde MSc (c.wijngaarde@uvs.edu) |
| Sustainable agriculture | Contact person: Dr. L. Ori (l ори@uvs.edu) |
| Sustainable forestry | Contact person: <i>msc-smnr@uvs.edu</i> |



Admission requirement

Students with a Bachelor of Science degree or equivalent diploma will be considered for enrolment. Each application will be reviewed on an individual basis and a maximum of 30 students will be selected yearly. The review will be based on:

- the records for all courses in the BSc programme
- a short essay in English about the motivation to enroll for the MSc programme in SMNR and about the professional expectations upon graduation, and
- proficiency in speaking and writing English (essay and possible interview)

Students with a Bachelor of Science degree of the Faculty of Technology of the Anton de Kom University with an average mark of 7,0 (seven) or higher are directly accepted for enrolment. All students with any other diploma need to request a certificate of equivalence from the Ministry of Education and Community Development. Students with a two year Master of Science degree are also directly allowed for enrolment. Students with a average mark between 6,0 and 6,4 will **not** be allowed for admission. Students with a mark between of 6,5 and 6,9 can be allowed for admission under certain conditions.

Applications should be received by **30th of July**. By **15th of August**, the candidate will receive a notification of acceptance or rejection by email and post. Selected candidates are then invited to the final registration in **September**. In **October** the introduction days are organized. The programme finally starts in **November**.

The application forms and instructions can be downloaded at the SMNR website. Candidates for the MSc programme in SMNR should send their application in hardcopy format to the office of the MSc-SMNR programme coordinator at the Faculty of Technology of AdeKUS. The annual registration and the annual tuition fee are posted at the SMNR webpage (<http://vlir-iuc.uvs.edu/smnr/>).

The application should include:

1. The application form (download this from the website under “MSc in SMNR program” => “Application procedure”).
2. Copy of records of all courses in the BSc programme including copy of diploma.
3. A short essay in English (max. one A4) about the motivation to enrol in the MSc programme in SMNR and about the professional expectations upon graduation.
4. Curriculum Vitae (CV).
5. Letter of recommendation from employer (if applicable for you and only for persons who are working).



Structure two-year MSc programme in SMNR

The MSc programme accounts for a total of **122 ECTS**, of which **30 ECTS** are allocated for the **master thesis**. A list of **mandatory courses** serves to meet the final qualifications of all future graduates, irrespective of specialization in one or more domains. A limited list of **elective courses** serves to allow for in depth study of one or more domains, and provides flexibility towards the job market. The topic of the Master thesis may require an appropriate selection of elective courses. Thesis topics are supervised by specialized staff. Detailed guidelines of the thesis can be found at the SMNR website. A list of thesis topics is also posted on the SMNR website.

| Year 1 | | Year 2 | |
|--------------------------|---------|--------------------------|---------|
| Mandatory courses | 54 ECTS | Mandatory courses | 23 ECTS |
| Elective courses | 5 ECTS | Elective courses | 10 ECTS |
| | | Thesis | 30 ECTS |
| Subtotal | 59 ECTS | Subtotal | 63 ECTS |

This program starts in November of every academic year and is offered yearly. Teaching and examinations are given in English; except for one or two courses. It is thus essential that students have a good knowledge of English. Courses are offered during all months, with a typical duration of about two weeks for a 5 ECTS course (45 hours) and one week for a 3 ECTS course (25 hours). Most courses consist of primarily lecturers, and some also of practical assignments (computer work), field work, group discussions and presentations. Most exams are written and a few are oral exams or reports with presentations. Examinations are taken in June and October. Some courses have only one exam option per year. September is the period of registration of students and holiday. During the year, excursions (inland and coastal area) are organized for different courses. Students are also invited to relevant SMNR related workshop and conferences in Suriname.

According to the examination guidelines, you have max. 5 years to finish master programmes at the FTeW. Students are allowed to register as full time students (maximum duration of study is 2 years) or as part time students (maximum duration of study is 4 years). In the last case there is a certain flexibility to choose the courses you want to follow in the different years. During the introduction days students will receive in depth information about the organization of the programme and who the time table works including examinations.

Courses of the MSc programme in SMNR

The 2 year programme is composed of **mandatory and elective courses** including the thesis. The table below lists these courses per semester including the course credits. The second table shows a detailed composition of the workload of each course.

| Code | Course | ECTS |
|----------|--|------|
| | Semester 1 | |
| | Mandatory courses: | |
| SMNR0701 | Applied statistics and data modeling | 5 |
| SMNR0702 | Aquatic and terrestrial ecology | 5 |
| SMNR0703 | Climatology and hydrology | 5 |
| SMNR0704 | Economy and valuation of natural resources | 5 |
| SMNR0705 | Energy management | 5 |
| SMNR0706 | Sustainable development | 3 |
| | Semester 2 | |
| | Mandatory courses: | |
| SMNR0801 | Advanced engineering mathematics | 5 |
| SMNR0802 | Advanced GIS | 5 |
| SMNR0803 | Environmental law | 3 |
| SMNR0804 | Environmental pollution and sanitation | 5 |
| SMNR0805 | Remote sensing | 5 |
| SMNR0806 | Scientific communication | 3 |
| | Elective courses: | 5 |
| | Semester 3 | |
| | Mandatory courses: | |
| SMNR0901 | Biodiversity conservation | 5 |
| SMNR0902 | Geostatistics | 5 |
| SMNR0903 | Integrated project | 5 |
| SMNR0904 | Land use development and management | 5 |
| SMNR0905 | Project management | 3 |

| | | |
|----------|----------------------------------|----|
| SMNR0906 | Thesis (start) | 5 |
| | <i>Elective courses:</i> | 5 |
| | Semester 4 | |
| | <i>Mandatory courses:</i> | |
| SMNR0906 | Thesis (ctd) | 25 |
| | <i>Elective courses:</i> | 5 |
| | List of elective courses | |
| SMNR0907 | Coastal erosion and protection | 5 |
| SMNR0908 | Electrical energy technology | 5 |
| SMNR0909 | Forest management | 5 |
| SMNR0910 | Hydrogeology and modeling | 5 |
| SMNR0911 | Integrated pest management | 5 |
| SMNR0912 | Mineral resources management | 5 |
| SMNR0913 | Nature conservation management | 5 |
| SMNR0914 | Pharmaceutical biology | 5 |
| SMNR0915 | Renewable energy systems | 5 |
| SMNR0916 | Sustainable farming systems | 5 |
| SMNR0917 | Water resources management | 5 |

Note: courses may in time be liable to modifications; 1 ECTS = 30 study hours (SBU), 1 lecture = 4 SBU, 1 practicum (field or lab work, assignments, computer sessions, excursions) = 1.5 SBU. Details of the workload (Co (Le), In, We (Co), Pr) are provided in the course description.

Composition of the workload

| Course | Le | In | Pr/Wo | Co | Tu | ECTS |
|--|-----------|-----------|--------------|-----------|-----------|-------------|
| Applied statistics and data modelling | 25 | 10 | 15 | 87.5 | 137.5 | 5 |
| Aquatic and terrestrial ecology | 35 | 5 | 5 | 97.5 | 142.5 | 5 |
| Climatology and hydrology | 25 | 10 | 15 | 87.5 | 137.5 | 5 |
| Economy and valuation of natural resources | 35 | 5 | 5 | 97.5 | 142.5 | 5 |
| Energy management | 35 | 5 | 5 | 97.5 | 142.5 | 5 |
| Sustainable development | 15 | 5 | 10 | 52.5 | 82.5 | 3 |
| Advanced engineering mathematics | 25 | 10 | 15 | 87.5 | 137.5 | 5 |
| Environmental pollution and sanitation | 35 | 5 | 5 | 97.5 | 142.5 | 5 |
| Environmental law | 15 | 5 | 10 | 52.5 | 82.5 | 3 |
| Geostatistics | 25 | 10 | 15 | 87.5 | 137.5 | 5 |
| Scientific communication | 15 | 5 | 10 | 52.5 | 82.5 | 3 |
| Advanced GIS | 25 | 10 | 15 | 87.5 | 137.5 | 5 |
| Biodiversity conservation | 15 | 5 | 35 | 77.5 | 132.5 | 5 |
| Integrated project | 5 | 10 | 50 | 72.5 | 137.5 | 5 |
| Project management | 30 | 10 | 10 | 95 | 145 | 5 |
| Coastal erosion and protection | 25 | 10 | 15 | 87.5 | 137.5 | 5 |
| Electrical energy technology | 25 | 10 | 15 | 87.5 | 137.5 | 5 |
| Forest management | 25 | 10 | 15 | 87.5 | 137.5 | 5 |
| Hydrogeology and modeling | 25 | 10 | 15 | 87.5 | 137.5 | 5 |
| Sustainable farming systems | 25 | 10 | 15 | 87.5 | 137.5 | 5 |

| | | | | | | |
|-------------------------------------|----|----|-----|------|-------|----|
| Integrated pest management | 25 | 10 | 15 | 87.5 | 137.5 | 5 |
| Land use development and management | 25 | 10 | 15 | 87.5 | 137.5 | 5 |
| Nature conservation management | 15 | 5 | 35 | 77.5 | 132.5 | 5 |
| Mineral resources management | 25 | 10 | 15 | 87.5 | 137.5 | 5 |
| Pharmaceutical biology | 25 | 10 | 15 | 87.5 | 137.5 | 5 |
| Remote sensing | 25 | 10 | 15 | 87.5 | 137.5 | 5 |
| Renewable energy systems | 25 | 10 | 15 | 87.5 | 137.5 | 5 |
| Water resources management | 25 | 10 | 15 | 87.5 | 137.5 | 5 |
| Thesis | | | 400 | 400 | 800 | 30 |

Le is lecture hours, In is instruction hours, Pr is practicum hours, Wo is working group hours, Co is contact hours, Tu is total hours. Co = 2.5 x (Co+In+Pr-Wo)

A lists of the current lecturers involved in this programme can be seen on the SMNR website.

More information

Full information on the MSc programme in Sustainable Management of Natural Resources, the courses and lecturers, course material, application forms, support services and facilities, thesis topics etc. can be found on the MSc in SMNR website <http://vlir-iuc.uvs.edu/smnr/> and at the MOODLE website <http://moodle.uvs.edu/> [go to Faculty of Technology, choose SMNR]. Below is a summary of the most important things to know.

Management and staff

The management of the programme consist of the programme coordinator, the examination coordinator and the course secretary. The academic staff consist of highly qualified lecturers, with at least a PhD degree, from the Anton de Kom University of Suriname and foreign universities such as Flemish universities (Catholic University Leuven, University of Ghent, University of Hasselt, University of Antwerpen, Free University Brussel), the University of the West Indies, Universities in the USA en South Africa. A list of the contact addresses of the academic staff can be seen on the SMNR website.

Secretariat

The secretariat of the MSc in SMNR programme is located in Building 16 of the Faculty of Technology, Room 51-52. Distribution of books, lecturer notes, letters, marks of courses and other administrative works are handled by this secretariat. Opening hours are Mondays to Fridays from 8:00 am to 14:30pm.

Lecture rooms and research facilities

The MSc programme in SMNR is organised at the Faculty of Technology at AdeKUS, building 16, room 71. The didactical room is equipped with a black board, white board, beamer, computer and wireless internet. Research facilities are offered by different institutes at the AdeKUS campus such as the different



laboratories of the departments of the FTeW, the laboratories of FMeW and other relevant research institutes such as CELOS, the Hydraulic Lab, the Energy lab, and the Zoological Collection.

Computer room

Computer sessions are given in UCC at AdeKUS, building 7, room 3 - Palulu. This room is equipped with 25 pc's, a colour A3 printer, a A4 laser (black) printer and a scanner, all for you to use free of charge. The Pc's are also equipped with dedicated software. The computer room is available for students to do practical works or make assignments and reports, between 7.30-15.00 hr. The facilities can freely be used including printing. You have to register at the front desk if you want to use a pc in this room.



Library

All books which support the education and research in SMNR are available at the AdeKUS library. These can be searched through: <http://ub-uv.s.kit-ipp.org/>. The library also has a worldwide network to other information sources such as foreign libraries and many international journals.



Lecture notes, books and software's

Lecture notes, relevant course material (e.g. assignments) and software's of the different courses can be required at the MSc programme coordinator or at the Moodle website (<http://moodle.uvs.edu/>). Original books for each course are available in the AdeKUS library; 10 pieces per book. Students may copy these if they want. Lecture notes (e.g. ppt files) are provided by the lecturer. Visit the special SMNR collection in room 56, Building 16. A list of the required books will be sent to you. All required software's are installed at UCC, Room 3-Palulu. The estimated costs for copies of books/handouts are about 1,500 SRD per year.

Estimated costs for original books only are about 1,000 USD per year. You wish to have your own original book, place your order via msc-smnr@uvs.edu.

MSc thesis procedures

The regulations for the MSc thesis have been developed to assist students and academic staff of AdeKUS to start and complete the Master's thesis efficiently. It is also meant to prevent difficulties and disputes, and to assist in making justified decisions. Any issue that is not covered by these regulations will be decided upon by the programme coordinator. This document is also available from the website <http://ylir-iuc.uvs.edu/smnr/>. A MSc thesis information day will be organized to provide detailed information on procedures and the content of the MSc thesis.

Communication of courses

Courses of the MSc programme in SMNR will be placed on the "AdeKUS Digitale Leeromgeving" via <http://moodle.uvs.edu/>. Students are requested to check this website regularly. At the beginning of the year, you will receive your Moodle passwords and uvs email address. For more information on moodle and email services, contact UCC at the AdeKUS campus (phone: 465558 # 400, email: ucc@uvs.edu)

Photocopying

A copy machine is available at the office of the secretariat for urgent and small number of copies (FTeW, building 16, room 51).

Costs

The fees for this programme consist of the registration fee and tuition fee (includes insurance, costs for fieldwork, transport, MSc thesis research), excluding literature, international travel, visa costs, living costs, administration costs.

Request of letters

Students who require letters of their marks or registration should sent their request to: msc-smnr@uv.edu. All other general enquiries should be addressed to the programme coordinator in the first instance, unless students prefer to discuss matters with the student dean.

University regulations

At the registration at AdeKUS, students are provided with the general university regulations concerning examination regulations, library regulations, computer room regulations etc.

Notices

All announcements about the MSc in SMNR programme (e.g. start of courses, examinations) in the form of a time table (excel file) will be sent to you by email. You are required to open an email address. Students are also asked to check their email regularly since this medium will be used for important information about the programme, submission of course work, calls for meetings, etc. After registration you will received your AdeKUS ID card, moodle account and AdeKUS email address.

Scholarships

Many students may wish to seek financial assistance to cover all or part of the costs of this programme. The N.O.B. offers possibilities to finance your registration and tuition fee. The Hakrinbank offers also possibilities to finance your registration and tuition fee.

Contact: ntfm@hakrinbank.com or call 477722, and ask for the "Aanvraagformulier StudiePL" or visit www.hakrinbank.com/.

The Surinaamse Bank nv offers the "Studentenkrediet".

Contact: info@dsbbank.sr or call 471100 ext. 279, 307 or visit: www.dsbbank.sr. You can also contact the Finabank for their special offer.

Time of lectures and examinations

Courses are given from Monday to Friday from 13.00 till 17.30 hour including breaks. Excursions may be organized in the weekends. A detailed teaching timetable is issued via e-mail at the beginning of the academic year. Any timetable alterations are notified via email. Examinations are taken from 8.00-11.00 hour in IGSR. June is the examination period and October the re-examination period. September is holiday. Notice that some courses only offer one exam per year.

Evaluation of courses and programme

Evaluation assessments are organized annually with students and lecturers. Since 2012, the courses, and the academic programme and organization, are being evaluated through online response.



Graduation

Graduation takes places according to the guidelines of the FTeW in corporation with the FTeW masters examination committee. Two times a year (June and December) you can receive the masters Bul. After graduation, we will keep the alumni informed about new developments in this programme e.g. short courses. You will also receive the annual report of the MSc in SMNR programme. Holders of a MSc degree in SMNR can apply for a PhD study at the FTeW-SMNR.



Contact address

MSc in SMNR office

Faculty of Technology
Anton de Kom University of
Suriname
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Building 16, Room 56, 52, 51
Phone: (597) 465558
356, 355, 316, 220
Fax: (597) 495005
E: msc-smnr@uvs.edu

Opening hours: Wednesday 8:00 am to 15:00 pm (programme coordinator)

Opening hours: Monday to Friday 8:00 am to 14:00 pm (secretariat)



Programme coordinator

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FTeW Master examination committee

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THE LIBRARY OF THE ANTON DE KOM UNIVERSITY OF SURINAME

THE ACADEMIC LIBRARY AND RESEARCH: POWER OF SHARING INFORMATION

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UNIVERSITEIT VAN SURINAME

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The library is ready to contribute to your success.

Examination regulations

Approved Examination Regulations of the Faculty of Technology
(Nov 13, 2009) MASTER'S PROGRAMMES

INHOUDSOPGAVE

HOOFDSTUK 1: ALGEMEEN

Artikel 1. Begripsomschrijvingen

HOOFDSTUK 2. MODULES, EXAMENS, GELDIGHEIDSDUUR, TENTAMENS, EXAMENCOMMISSIE

Artikel 2. Modules, studielast en studiepunten

1. Modules
2. Studielast en studiepunten

Artikel 3. Examens

Artikel 4. Geldigheidsduur

Artikel 5. Toetsing

Artikel 6. Toelating tot tentamens

Artikel 7. Examencommissie

HOOFDSTUK 3: BEOORDELING: SLAGINGSNORMEN, NORMEN VOOR DOORSTROMING

Artikel 8. Beoordeling

1. Examinatoren
2. Wijze van examineren, inzagerecht, nabespreking
3. Hercorrectie
4. Beoordeling

Artikel 9. Slagingsnormen en judicium

Artikel 10. Normen voor doorstroming: studieduur en dispensatie

Artikel 11. Vrijstelling

HOOFDSTUK 4: FRAUDE

Artikel 12. Fraude bij tentamens

Artikel 13. Fraude bij onderzoek

Artikel 14. De vaststelling van fraude

Artikel 15. Plagiaat

Artikel 16. Sancties betreffende fraude en plagiaat

HOOFDSTUK 5: KLACHTEN, BEROEP EN SANCTIES

Artikel 17. Klachten

Artikel 18. Beroep

Artikel 19. Sancties betreffende toepassing van het
Examenreglement

HOOFDSTUK 6: INVOERINGS-, OVERGANGS- EN SLOTBEPALINGEN

Artikel 20. Invoeringsbepalingen

Artikel 21. Slotbepalingen

1. ALGEMEEN

Artikel 1. Begripsomschrijvingen

- a. Examinandus: degene die zich onderwerpt aan een tentamen of examen.
- b. Examinator: degene die de module (het vak) verzorgt c.q. begeleidt, de toets afneemt en beoordeelt en de uitslag vaststelt.
- c. Examenscommissie: een door het faculteitsbestuur ingestelde commissie die verantwoordelijk is voor de controle op en het bekrachtigen van examens, de organisatie en de coördinatie van de tentamens van de Faculteit dan wel van een door de Faculteit aangeboden opleiding of groep van opleidingen.
- d. Faculteit der Technologische Wetenschappen: de organieke eenheid belast met de verzorging van onderwijs, (onderzoek) en dienstverlening en het afnemen van tentamens zoals omschreven in artikel 21 van de Universiteitswet (G.B. 1966 no. 78).
- e. Fraude: het plegen van bedrieglijke handelingen door of ten behoeve van de student vóór, tijdens of na het tentamen met als doel het tentamen succesvoller te ronden.
- f. Module (vak of cursus): de onderdelen van de opleiding door middel waarvan het wetenschappelijk onderwijs verzorgd wordt.
- g. Opleidingscommissie: een door het Bestuur van de Universiteit ingestelde commissie die voornamelijk belast is met de bewaking van het wetenschappelijk niveau van het onderwijs.
- h. Studierichting: samenhangend geheel van modules, gericht op de verwijzenlijking van welomschreven doelstellingen op het gebied van kennis, inzicht en vaardigheden waarover degene die de opleiding voltooit, dient te beschikken.
- i. Student: degene die als zodanig is ingeschreven aan de universiteit als bedoeld in art. 3 van de wet.
- j. Studielast: de studieduur in werkuren (colleges, practica, voorbereiding op het onderwijs en op het tentamen) van de normstudent, geldend voor een bepaalde module.
- k. Studiepunt: maatstaf ter vaststelling van de studielast: 28 uren studie(arbeid).

- I. Tentamen: is een toetsing van kennis, inzicht en vaardigheden van de examinandus met betrekking tot een bepaalde module.
- m. Universiteit: de Anton de Kom Universiteit van Suriname, zoals omschreven in art. 2 van het Academisch Besluit (S.B. 1986 no. 39).
- n. Vakgroep: de organieke eenheid binnen de faculteit gericht op het onderwijs en de wetenschapsbeoefening op een bepaald wetenschapsgebied.
- o. Wet: de wet van 25 juni 1966 tot regeling van het Universitair Onderwijs in Suriname (G.B. 1966 no. 78) (de Universiteitswet).

2. MODULES, EXAMENS, GELDIGHEIDSDUUR, TENTAMENS, EXAMENCOMMISSIE

Artikel 2. Modules, studielast en studiepunten

1. Modules

Het wetenschappelijk onderwijs wordt verzorgd door middel van modules (vakken). Modules kunnen bestaan uit:

- a. Een cursus, zijnde een geheel van hoorcolleges, werkcolleges, werkgroepen, practica, of een combinatie daarvan, gedurende een studiejaar of een gedeelte daarvan;
- b. Stages en het verslaan daarvan;
- c. Het schrijven van papers, essays, leeronderzoeken, scripties werkstukken e.d.;
- d. Het schriftelijk rapporteren op grond van deelname aan seminars, congressen, symposia, excursies, e.d.;
- e. Het verrichten van literatuurstudie ter voorbereiding op tentamens, referaten en soortgelijke opdrachten;
- f. Elementen of combinaties van bovenstaande modules.

2. Studielast en studiepunten

- a. Teneinde de studielast zo objectief mogelijk aan te geven, wordt gebruik gemaakt van een studiepuntenstelsel. Hierbij wordt voor elke module de studielast bepaald.
- b. Een credit is gelijk aan 28 uren studie(arbeid).
- c. De totale studielast bedraagt minimaal 120 credits.
- d. Procedures en standaarden voor het bepalen van de reële studielast (zie artikel 2 lid 2a), worden gegeven door het faculteitsbestuur mede op advies van de opleidingscommissie.

Artikel 3. Examens

1. De Master's studie wordt afgesloten door het Master's examen of master thesis, ter afronding van de gehele studie.
2. De afronding van de gehele studie door de student wordt vastgesteld en bekrachtigd door de Examencommissie.

Artikel 4. Geldigheidsduur

De beoordeling voor een volledig afgeronde module (vak) waarvoor de student is geslaagd, is geldig tot 5 jaar na de afronding van de module (vak). Hierbij dient wel rekening gehouden te worden met het bepaalde in Artikel 9.

Artikel 5. Toetsing

1. De student die een cursus volgt kan beoordeeld worden via:
 - a. Schriftelijke tentamens
 - b. Cursusopdrachten, welke kunnen bestaan uit praktisch werk, papers, projecten, boekbesprekingen, en andere opdrachten.
 - c. Mondelinge tentamens (zie artikel 8.2a).
2. Aan het begin van elke cursus dient de docent de student een schriftelijk overzicht te geven van de wijze waarop het eindcijfer zal worden vastgesteld.
3. Aan een student wordt twee maal per cursusjaar de gelegenheid geboden een tentamen af te leggen.
4. In voorkomende gevallen kan door de examencommissie een extra gelegenheid geboden worden om een tentamen af te leggen.

Artikel 6. Toelating tot tentamens

1. Studenten worden geacht de eerst geboden gelegenheid voor een tentamen te benutten.
2. Tot tentamens worden diegenen toegelaten die voor het betreffende curriculumonderdeel hun financiële verplichting hebben voldaan.
3. Indien blijkt dat een student zonder aan de financiële verplichtingen te hebben voldaan, heeft deelgenomen aan een tentamen, wordt de uitslag aangehouden.

Artikel 7. Examenscommissie

1. Voor het vaststellen, bekrachtigen en controleren van examens en tentamens stelt het faculteitsbestuur ten behoeve van de Faculteit, ten behoeve van een door de Faculteit aangeboden opleiding of groep van opleidingen een Examenscommissie in.
2. De Examenscommissie treedt in overleg met het Faculteitsbestuur indien en zodra zulks nodig is. Zij verstrekken aan het Faculteitsbestuur alle gevraagde inlichtingen.
3. De Examenscommissie kan voorstellen doen aan het Faculteitsbestuur met betrekking tot aanwijzingen voor ordelijk verloop van tentamens.
4. De Examenscommissie heeft mede tot taak het jaarlijks evalueren van het examenreglement.
5. De examenscommissie brengt binnen twee maanden na het eerste semester een tussentijds verslag uit, en binnen twee maanden na aanvang van het nieuwe collegejaar een jaarverslag over haar werkzaamheden.
6. Het faculteitsbestuur benoemt de leden van de Examenscommissie uit de leden van het personeel dat met de verzorging van onderwijs aan de faculteit, in die opleiding of groep van opleidingen zijn belast.
7. De examenscommissie wordt voor twee jaar benoemd en krijgt voor de uitvoering van haar werkzaamheden ondersteuning van het faculteitsbureau.
8. De examenscommissie bestaat uit tenminste een voorzitter en een secretaris. De verdere samenstelling van de Examenscommissie wordt door het faculteitsbestuur vastgesteld.

9. Examinatoren, vakgroepen, disciplines en studierichtingen zijn gehouden de Examenscommissie alle gevraagde inlichtingen te verschaffen.
10. De examenscommissie adviseert het Faculteitsbestuur over de inrichting van de administratie van de tentamen- en examengegevens.

3. BEOORDELING: SLAGINGSNORMEN, NORMEN VOOR DOORSTROMING

Artikel 8. Beoordeling

1. Examinatoren

- a. Indien wegens bijzondere omstandigheden geen examinator beschikbaar is, wijst de Examenscommissie na overleg met de betreffende richtingscoördinator een examinator aan.
- b. Indien voor een bepaalde module meerdere examinatoren zijn, bepalen deze onderling wie van hen de beoordeling coördineert en de resultaten ervan doorgeeft aan het Faculteitsbureau.

2. Wijze van examineren, inzagerecht, nabespreking

- a. Mondelinge tentamens worden afgenoem door een examinator en tenminste nog een lid van het wetenschappelijk personeel van de desbetreffende vakgroep dan wel de opleiding.
- b. De examinator stelt terstond na het afnemen van een mondeling tentamen de uitslag vast.
- c. Van de gang van zaken van zowel het mondeling als het schriftelijk tentamen wordt een procesverbaal opgemaakt; dit wordt samen met de cijferlijst en tentamenbriefjes aan het faculteitsbureau afgegeven.
- d. De examinator dient tevens een verslag over de examenresultaten in te dienen volgens nader te geven richtlijnen door het Faculteitsbestuur in samenwerking met de Opleidingscommissie. In dit verslag wordt er behalve een kwalitatieve ook een kwantitatieve analyse gegeven

- e. Schriftelijke tentamens worden afgenoem en beoordeeld door de examinator. Papers, essays e.d. worden eveneens beoordeeld door de examinator.
- f. De beoordeling van schriftelijke tentamens geschieft aan de hand van een schriftelijk vastgesteld correctiemodel. De wijze van beoordeling is zodanig dat de examinandus kan nagaan hoe de uitslag van zijn tentamen tot stand is gekomen.
- g. Zo spoedig mogelijk, doch uiterlijk 15 werkdagen na afname van een schriftelijk tentamen, wordt de door de examinator vastgestelde uitslag via het faculteitsbureau bekendgemaakt. Perioden van ziekteverlof voorgeschreven door een medicus, vallen hier buiten.
- h. Uiterlijk 10 werkdagen na de bekendmaking van de uitslag van een schriftelijk tentamen vindt er inzage en nabespreking van het tentamenwerk plaats op een door de examinator te bepalen tijdstip en plaats. De mededeling hieromtrent dient minimaal vijf werkdagen vóór de dag van inzage en nabespreking via het faculteitsbureau te geschieden.
- i. Indien na het verstrijken van de genoemde termijn nog geen inzage en nabespreking van het tentamenwerk heeft plaats gehad, bepaalt de Examencommissie, op verzoek van de studenten, een tijdstip en plaats voor inzage en nabespreking van het tentamenwerk. Het verzoek van de studenten dient, binnen 10 werkdagen na het verstrijken van de termijn van 10 werkdagen, gedaan te worden.
- j. Op de dag van inzage en nabespreking van het tentamenwerk is de student in de gelegenheid kennis te nemen van de tentamenopgaven en van het schriftelijk vastgestelde correctiemodel.
Van elke beoordeling van een module of een deel daarvan ontvangt de student, via het Faculteitsbureau, een schriftelijk bewijsstuk. Een afschrift daarvan wordt op dit bureau bewaard.

3. Herbeoordeling

- a. Een student die ook na inzage en nabespreking niet akkoord gaat met de uitslag van een tentamen, kan de Examencommissie schriftelijk om herbeoordeling van het tentamenwerk vragen. De aanvraag om de herbeoordeling moet gemotiveerd worden.
- b. Bovengenoemd verzoek dient uiterlijk binnen 5 werkdagen na de dag waarop inzage en nabespreking heeft plaatsgevonden te worden gericht aan de Examencommissie.
- c. Tegelijk met het verzoek om herbeoordeling dient de student over te leggen een bewijs (kwitantie) waaruit blijkt dat hij een door het Faculteitsbestuur vastgesteld bedrag bij het Faculteitsbureau heeft gestort. De hoogte van dit bedrag zal vóór de aanvang van het nieuwe collegejaar door het Faculteitsbestuur worden bekendgemaakt.
- d. Bij een verzoek om hercorrectie zal de Examencommissie een interne of externe deskundige aanwijzen die met de herbeoordeling zal worden belast. Deze laatste rapporteert aan de Examencommissie die vervolgens na consultatie van de examinator de uitslag vaststelt.
- e. De herbeoordelaar dient binnen 10 werkdagen na ontvangst van het tentamenwerk het herbeoordeelde tentamenwerk met een schriftelijke toelichting aan de Examencommissie te doen toekomen. De student dient binnen 15 werkdagen na indiening van het verzoek, op de hoogte te worden gesteld van de uitslag en heeft recht te weten wie de herbeoordelaar is.
- f. Het resultaat na herbeoordeling is bindend.

4. Beoordeling

- a. De eindbeoordeling geschiedt door toekenning van een cijfer in de schaal van 1 tot en met 10. Bij het beoordelen van sommige modules kan hiervan worden afgeweken (bv. deelname aan werkgroepen).

De cijfers 1 tot en met 10 hebben de volgende betekenis:

| | |
|----------------------|--------------------|
| 1 = zeer slecht | 6 = voldoende |
| 2 = slecht | 7 = ruim voldoende |
| 3 = gering | 8 = goed |
| 4 = zeer onvoldoende | 9 = zeer goed |
| 5 = onvoldoende | 10 = uitmuntend |

- b. Aan de toetsing van een module is voldaan wanneer het desbetreffende cijfer met in achtneming van art. 8 lid 4a 6 (zes) of hoger bedraagt.
- c. Voor de geldigheid van een deeltentamen mag het desbetreffende cijfer niet lager zijn dan 5,0.
- d. Het cijfer voor een tentamen wordt, zonder enige afronding, tot op tienden berekend.
Deeltentamencijfers worden, zonder enige afronding, tot op tienden berekend. Het eindcijfer wordt, zonder enige afronding, tot op tienden berekend uit de desbetreffende deeltentamen-cijfers. De uitkomst wordt vervolgens afgerond op de wijze vermeld in lid 4 sub d van dit artikel. N.B. 5.45 wordt 5.
- e. Bij tentamens wordt het onderlinge gewicht van de vragen c.q. opdrachten op het tentamenblad vermeld. Indien dit niet is geschied worden alle vragen geacht hetzelfde gewicht te hebben.
- f. Een afgelegd tentamen kan opnieuw worden afgelegd. De laatste uitslag geldt.

Artikel 9. Slagingsnormen en judicium

- 1. Voor het halen van het Master's examen, zoals omschreven in artikel 3 lid 1 en 2, moet de student alle modules die voor het Masterexamen van de betrokken opleiding, verplicht zijn gesteld, succesvol hebben afgerond.
De resultaten en de modules waarvoor zij zijn behaald, worden vermeld op de resultatenlijst.
- 2. Heeft de student meer dan het vereiste aantal studiepunten en/of meer dan het vastgestelde aantal modules gehaald voor het examen, dan wordt dit apart vermeld op de cijferlijst.
- 3. Predikaten worden toegekend indien de student alle modules bij de eerste poging succesvol heeft afgerond, en anderhalf maal de nominale studieduur niet is overschreden.
 - a. Voor het Masterexamen wordt het predikaat "cum laude" toegekend indien aan lid 3 sub a. voldaan is , wanneer voor de modules het gemiddelde cijfer van 8,0 of hoger is behaald, en de beoordeling voor de master thesis minimaal 8,0 is.
 - b. Het predikaat "met genoegen" wordt toegekend wanneer aan lid 3 sub a. voldaan is en voor de modules het gemiddelde cijfer van minstens 7,0 is behaald

Artikel 10. Normen voor doorstroming: studieduur en dispensatie

- a. De student dient uiterlijk binnen vijf jaar (nominale duur msc studie zelf: 2 of 3 of anders jaar) na aanvang van de master's studie het master's examen behaald te hebben. Indien hij daartoe in gebreke blijft, kan hij door het Universiteitsbestuur van de opleiding worden afgeschreven. De mogelijkheid van vrijstelling bij een eventuele nieuwe inschrijving is in dit geval niet aanwezig.
- b. De student wordt geacht tijdens het eerste collegejaar, minimaal 60% van de in dit jaar aangeboden verplichte credits gehaald hebben. (bij MSc in SMNR is dat 100%, dan vindt toelating tot jaar 2 plaats) Bij het in gebreke blijven hiervan, kan het Universiteitsbestuur de student afschrijven.

Artikel 11. Vrijstelling

1. De Examencommissie kan een student gehele of gedeeltelijke vrijstelling verlenen voor modules behorende tot het studieprogramma, op grond van eerder, aan of buiten de universiteit, door de student behaalde cijfers voor respectievelijk de desbetreffende of overeenkomstige modules.
2. Het besluit tot het verlenen van vrijstelling wordt genomen, op basis van een daartoe strekkend schriftelijk verzoek van de student vergezeld van relevante bescheiden, aan de Examencommissie, en na advies van de desbetreffende docent c.q. examinator. De Examencommissie beslist binnen drie maanden.
3. Voor onderdelen waarvoor een student vrijstelling heeft gekregen is de datum van vrijstellingverlening bepalend voor toepassing van Artikel 4.

4. FRAUDE

Artikel 12. Fraude bij tentamens

Van fraude bij tentamens is sprake in onder andere de volgende gevallen:

1. het vóór het tentamen inzicht verwerven of proberen te verwerven in af te nemen tentamenopgaven;
2. het aanwezig hebben en/of gebruik maken van niet toelaatbare aantekeningen in tijdens tentamens gebruikte of te gebruiken boeken, jurisprudentie, hulpmiddelen en dergelijke.
Onderstrepingen, arceringen, accentueringen en anderszins markeren van teksten alsmede artikelverwijzingen en verwijzingen naar (gewijzigde) wetteksten vallen hier niet onder;
3. onder andere, het voorhanden hebben en/of gebruiken van boeken, jurisprudentie, stencils, aantekeningen etc. waar zijdens de examinator of surveillant geen uitdrukkelijke toestemming voor gegeven is;
4. Het gebruik maken van de zogenaamde spiekbriefjes;
5. Het tijdens tentamens overnemen van gegevens uit het tentamenwerk van een andere kandidaat c.q. het bieden van gelegenheid voor het laten overnemen;
6. Het tijdens tentamens mondeling dan wel schriftelijk (eventueel via de mobiele telefoon) vragen naar en/of ontvangen van niet toelaatbare gegevens;
7. Het zich tijdens het tentamen uitgeven voor iemand anders dan wel het zich op het tentamen door iemand anders laten vertegenwoordigen;
8. Het op enigerlei andere wijze door bedrieglijk handelen de gelegenheid om een juist oordeel omtrent zijn kennis, inzicht en vaardigheden geheel of gedeeltelijk onmogelijk maken.
9. Bij medeplichtigheid tot en bij fraude worden dezelfde sancties toegepast als bij fraude.

Artikel 13. Fraude bij onderzoek

Zoals te doen gebruikelijk is er sprake van fraude bij onderzoek, in de volgende gevallen:

1. Het opzettelijk verdraaien, verzinnen, of onverantwoord selectief weergeven van gegevens gebruikt voor of verkregen door het onderzoek.
2. Het met opzet verdraaid weergeven van standpunten, interpretaties en conclusies.

Artikel 14. De vaststelling van fraude

1. Van het vermoeden van fraude wordt, onder overlegging van eventuele bewijsstukken en/of verklaringen, schriftelijk melding gemaakt bij de Examencommissie.
2. In geval van fraude bij een tentamen dient dit te geschieden door:
 - a. De surveillant (die al dan niet de examinator is) onverwijld, in elk geval binnen vijf werkdagen na de tentamendatum, indien hij tijdens het tentamen op de vermoedelijke fraude stuitte
 - b. De examinator onverwijld, in elk geval binnen 15 werkdagen na de tentamendatum, indien hij na het tentamen (bijvoorbeeld tijdens het corrigeren van het tentamenwerk), fraude vermoedt
3. In geval van fraude bij onderzoek, dient de aangifte hiervan te geschieden door de examinator of begeleider van het onderzoek.
4. Bij de vaststelling van fraude is de Examencommissie gehouden te horen de examinator/de surveillant/de begeleider, de student en relevante personen.
5. Het Faculteitsbestuur stelt voor de Examencommissie de overige procedures en richtlijnen vast voor het behandelen van gevallen van fraude.
6. Onverlet het bepaalde in lid 5 dient de Examencommissie het proces van fraude-vaststelling binnen 7 werkdagen nadat dit kenbaar is gemaakt, af te ronden en het resultaat hiervan aan betrokkenen te hebben meegedeeld.
7. Alle besluiten ten aanzien van fraude behelzen de gronden waarop deze zijn gebaseerd.

8. In gevallen van fraude waarin dit reglement niet voorziet, beslist de Examencommissie. Men kan in beroep gaan tegen zo'n besluit bij het Faculteitsbestuur.

Artikel 15. Plagiaat

1. Onder plagiaat wordt zoals te doen gebruikelijk, verstaan:
 - a. Het nagenoeg woordelijk overnemen van passages uit het werk van een ander zonder bronvermelding
 - b. Het parafraseren van passages uit het werk van een ander zonder aan te geven dat het hier om de opvatting of gedachtengang van een ander gaat.
 - c. Het presenteren van het gedachtengoed of vondsten van een ander als te zijn de eigen gedachtengoed of vondsten.
2. Van het vermoeden van plagiaat wordt, onder overlegging van eventuele bewijsstukken en/of verklaringen, schriftelijk melding gemaakt bij de Examencommissie
3. De examencommissie stelt binnen 7 werkdagen schriftelijk vast of er sprake is geweest van plagiaat.
4. Bij de vaststelling van plagiaat is de Examencommissie gehouden te horen de examinator, de student en relevante personen.

Artikel 16. Sancties betreffende fraude en plagiaat

1. Ingeval van fraude door een student kan de examencommissie de volgende sancties toepassen:
 - a. Ongeldigverklaring van het betrokken tentamen;
 - b. Uitsluiting van tentamens in het desbetreffende vak voor ten hoogste drie opeenvolgende tentamenperioden nadat de fraude is geconstateerd;
 - c. Uitsluiting voor alle tentamens voor maximaal drie opeenvolgende tentamenperioden;
 - d. Ongeldigverklaring van alle tentamenresultaten van dat semester.
2. Ingeval van herhaling verklaart de Examencommissie de behaalde resultaten van alle modules van de betreffende fase, als te zijn vervallen. De student wordt tevens met onmiddellijke ingang voorgedragen voor afschrijving van de universiteit. De student mag zich gedurende 5 (vijf) jaren niet meer inschrijven

- voor het volgen van een studie aan de Universiteit. De mogelijkheid van vrijstelling bij een eventuele nieuwe inschrijving is niet aanwezig.
3. Bij constatering van plagiaat binnen 5 jaar na het afstuderen, kan het diploma worden ingetrokken.

5. KLACHTEN, BEROEP EN SANCTIES

Artikel 17. Klachten

1. Een student (dan wel een groep van studenten) kan een klacht over de gang van zaken tijdens het tentamen c.q. de beoordeling daarvan c.q. het niet of niet tijdig nakomen van verplichtingen voortvloeiende uit dit reglement, voorleggen aan de Examencommissie.
2. De klacht dient schriftelijk te geschieden.
3. De klacht wordt ingediend zo spoedig mogelijk maar uiterlijk 10 werkdagen nadat het tentamen is afgenoem en wel nadat de uitslag bekend is gemaakt, dan wel na het vermeend onjuist handelen of nalaten.
4. De Examencommissie zal binnen tien werkdagen in overleg met de examinator en de student een oplossing zoeken voor de klacht. Indien de student zulks wenst, wordt de studentencommissie eveneens geraadpleegd.
5. Bij overschrijding door de Examencommissie van de genoemde termijnen, kan het Faculteitsbestuur een besluit nemen.

Artikel 18. Beroep

1. Tegen een besluit van de Examencommissie staat beroep open bij het Faculteitsbestuur. Dit Bestuur beslist, gehoord de student.
2. Het beroep tegen een besluit van de Examencommissie, dient binnen een periode van 10 werkdagen nadat het desbetreffende besluit ter kennis van de belanghebbende is gebracht, schriftelijk te worden ingediend bij het Faculteitsbestuur.

3. Een besluit over het beroep is met redenen omkleed en dient binnen 20 werkdagen na de schriftelijke indiening ervan te zijn genomen en schriftelijk ter kennis van de belanghebbende(n) te zijn gebracht.
4. Beroep heeft geen schorsende werking.

Artikel 19. Sancties betreffende toepassing van het Examenreglement

Ingeval organen of personen zich (bij herhaling) niet houden aan de bepalingen van dit (dan wel voortvloeiende uit dit) reglement, kan het Faculteitsbestuur sancties treffen al dan niet op voordracht van de Examencommissie dan wel naar aanleiding van een advies op grond van een daartoe strekkend verzoek aan de opleidingscommissie.

6. INVOERINGS-, OVERGANGS- EN SLOTBEPALINGEN

Artikel 20. Invoeringsbepalingen

1. Dit examenreglement treedt in werking

Artikel 21. Slotbepalingen

1. In alle gevallen waarin dit reglement niet voorziet, beslist het Bestuur van de Universiteit na overleg met het Faculteitsbestuur en de daarvoor in aanmerking komende commissies en betrokken partijen
2. Deze besluiten worden daarna aan het examenreglement toegevoegd.

Aldus vastgesteld door het Bestuur van de Anton de Kom Universiteit van Suriname.

Appendix: only for MSc in SMNR

Art 5 lid 3: elk tentamen wordt 2x per jaar afgenoem.

Art 6 lid 2 en 3: niet van toepassing

Art 8 lid 3 c: niet van toepassing

Art 10 lid 1: toevoegen als artikel tussen a en b: de student kan zich als deeltijdse student inschrijven (max studieduur is 4 jaar) of als volttijdse student (max studieduur is 2 jaar). De nominale studieduur is 2 jaar en de maximale studieduur 4 jaar.

Art 10 lid 1 c: Deelname aan vakken van het tweede jaar is alleen mogelijk als 80% van het totaal aantal ECTS van jaar 1 is behaald

ADDED 25 June 2010:

The following corrections/additions have been agreed by the Flemish and AdeKUS programme coordinators to the "Dossier MSc in SMNR", July 2009.

1. MSc thesis - Regulations (see separate dossier). These regulations also contain the different forms and formats to be used for the MSc thesis.
2. An attendance list (date, time of arrival) will be introduced. This list will have to be filled in by each student every day for each course. Admission for the examination will be based on 80% full attendance of classes. In case this percentage is lower, the programme coordinator will take a decision, based on arguments of both the student and the lecturer. In case of practical sessions or group work, 100% attendance will be required.
3. The decision to start the MSc thesis will be given when 80% of all first year courses have successfully finished. The examination coordinator will then approve the form "Request form to start MSc thesis".

ADDED Sept 28, 2010:

1. Marks should be delivered within 4 weeks after having received the working papers of the students.

Description courses

Title: Advanced engineering mathematics

Semester: 2

Credit point (ECTS): 5

Learning objectives:

The main objective is providing the students with a bridge between mathematical theories and specialized engineering models. Therefore students are equipped with mathematical tools which engineers use to understand advanced models. These tools are ordinary differential equations, partial differential equations and numerical methods for these topics. Furthermore, the students are faced with applications which are mostly handled with MATLAB. An introduction to cellular automata is given.

Prerequisite knowledge:

Calculus, basis linear algebra, ordinary differential equations.

Methods of educations:

20 Co, 45 We.

Each day, a lecture (2 hours + 15' break), elaborating the fundamental theory, illustrated by numerous examples, is given, and is followed by a computer laboratory (3 hours) to illustrate the topics covered during the lectures. As such, the students get the opportunity to become acquainted with several numerical techniques, enabling them to solve a wide variety of ODE and PDE that might appear in subsequent courses or in practice.

Required facilities:

Lecture room with beamer and black board or white board. For the computer exercises a PC room with beamer and a white board is required. Mathematical software MATLAB with the partial differential equation toolbox and the symbolic toolbox.

Methods of evaluation:

At the beginning of the course a variety of topics that students can work on during this part of the MSc program will be made available. Students will be divided into groups consisting, preferably, of two students. Depending on the student's background and interests every group will be assigned a topic that has to be elaborated, and for which the principles and methods provided during the lectures and computer laboratories should be applied. At the end of the course each group has to present its work and submit a short paper illustrating the group's accomplishments that will be evaluated by the lecturers.

Literature:

1. Coleman, M., 2005. An introduction to partial differential equations with MATLAB. Chapman & Hall/CRC, Boca Raton, United States.
2. Kohler, W., Johnson, L., 2005. Elementary differential equations with boundary-value problems. Pearson Education, Inc., Upper Saddle River, United States.
3. Moore, H., 2007. MATLAB for engineers. Pearson Education, Inc., Upper Saddle River, United States.

Course content:

The following topics will be covered during the lectures.

1. Introduction to differential equations
 - 1.1 Introduction and examples
 - 1.2 Direction fields
2. First order differential equations
 - 2.1 Introduction
 - 2.2 First order linear differential equations
 - 2.3 Introduction to mathematical models
 - 2.4 Population dynamics and radioactive decay
 - 2.5 First order nonlinear differential equations
 - 2.6 Separable first order equations
 - 2.7 Exact differential equations
 - 2.8 The logistic population model
3. Second and higher order linear differential equations
 - 3.1 Introduction
 - 3.2 The general solution of homogeneous equations

- 3.3 Constant coefficient homogeneous equations
 - 3.4 Real repeated roots
 - 3.5 Complex roots
 - 3.6 Unforced mechanical vibrations
 - 3.7 The general solution of a linear nonhomogeneous equation
 - 3.8 The method of undetermined coefficients
 - 4. First order linear systems
 - 4.1 Introduction
 - 4.2 Existence and uniqueness
 - 4.3 Constant coefficient homogeneous systems
 - 4.4 Real eigenvalues and the phase plane
 - 4.5 Complex eigenvalues
 - 4.6 Repeated eigenvalues
 - 6. Nonlinear systems
 - 6.1 Introduction
 - 6.2 Equilibrium solutions and direction fields
 - 6.4 Stability
 - 6.5 Linearization and the local picture
 - 6.7 Predator-prey population models
 - 9. Second order PDE and Fourier series
 - 9.1 Introduction
 - 9.2 Heat flow in a thin bar
 - 9.5 Fourier series
- We conclude this course with an introductory session on cellular automata, a non-conventional alternative for PDE.

Computer laboratories

During the first computer laboratory the student should get familiar with the scientific computing environment MATLAB which is used throughout the course for implementing numerical solvers for (systems of) ODE, as well as PDE. The following topics will be covered in the computer laboratories, and serve to illustrate the material discussed during the lectures.

1. MATLAB tutorial

- 1.1 Configuration
- 1.2 Scripts and functions
- 1.3 Mathematical operations
- 1.4 Visualization

2. Direction fields and equilibrium points

- 2.1 Solving ODE analytically using Maple/MATLAB
- 2.2 Direction fields
- 2.3 Equilibrium points

3. Euler's method

- 3.1 Euler's method
- 3.2 Error analysis

4. Runge-Kutta method

- 4.1 Runge-Kutta methods
- 4.2 MATLAB functions for solving ODE
- 4.3 Stability of numerical methods
- 4.4 Focus on second order ODE

5. Systems of first order ODE

- 5.1 Direction fields
- 5.2 Equilibrium points
- 5.3 Euler's method for two-dimensional systems
- 5.4 Methods for n-dimensional systems
- 5.5 Stability of numerical methods
- 5.6 Higher order ODE

6. Partial differential equations

- 6.1 Finite difference approximations
- 6.2 Finite difference method

7. Cellular automata

Title: Advanced GIS

Semester: 3

Credit point (ECTS): 5

Learning objectives:

The aim of this course is to acquire a profound knowledge and understanding of advanced concepts and techniques used in modeling geographic reality and analysis of geo-data and acquire a capability to apply these techniques independently

Prerequisite knowledge:

Good computer skills and course Introduction in GIS (basic concepts & operational skills for data entry, data manipulation & analysis and production of interpretable output).

Methods of educations:

20 hours theory and 45 hrs of practical work (assignments).
Lecture with multimedia support. Lecture notes, presentations and assignments are available at the AdeKUS Electronische Leeromgeving at <http://moodle.uvs.edu/> and are also available at the secretary of the Masterprogram in SMNR, FTeW, Building 16, Room 56.

Required facilities:

Computer lab, beamer, white board, GIS software, RS software

Methods of evaluation:

Written examination, and assignments with final presentation by the students on a case study. Written exam (60%), practical exercises/assignments with case study (40%)

Literature:

Geographic Information Systems and Science, Longley, P., Goodchild et al, 2005, Wiley.

Software: (i) Free/Open Source software (Quantum GIS + GRASS + PostgreSQL/PostGIS) en (ii) Commercial/Closed Source software (Matlab en ArcGIS+ + Spatial Analyst, 3D-Analyst, Network Analyst extensies).

Course content:

Part I: Spatial Databases

Spatial data models (vector models, tessellation models, raster, TIN, etc); Data input techniques (digitizing, scanning, and V/R en R/V conversion); Planimetric integration (map projections and coordinate transformations); Spatial data modeling and spatial databases; Relational database management systems and database design; Object-relational database management systems; Working with ESRI's ArcGIS software in general and the ESRI's-geodatabase in particular; Exploring the PostGIS/PostgreSQL object-relational database system ; Practice spatial data modelling for hydrological applications using ESRI's geodatabases in the ArcSWAT-hydrological modelling framework. Applications are shown in ArcGIS.

Part II: Advanced concepts in GIS analysis

Spatial interpolation techniques: trend surface analysis, local interpolation techniques; Accuracy of spatial data analyses (errors and error propagation): *Evident sources of error, Errors in data or resulting from natural variations, Errors related to data processing: overlays of raster- and vector layers, Working with errors: fuzzy sets and Monte Carlo simulations*; Decision support: *Definitions, Multi-criteria evaluation, Multi-objective evaluation, Weighted linear combination and Ordered Weighted Averaging, Dempster-Shafer theory*; Network and cost analysis: *Network graphs and trees, Computing with networks: shortest path analysis, Raster environments: calculation of a cost surface and path, using anisotropic costs*. Applications are shown in IDRISI.

Part III: Algorithms for spatial analysis

Introduction to Matlab, Use of m-files, Setting up a simple programme: calculation of slope stability, Use of loops and conditional statements: reading and converting geo-files, Applications are shown in Matlab.

- Add:
- 1. Terrain modelling and analysis
 - 2. Data quality, metadata, SDI
 - 3. Geospatial databases and their management using SQL
 - 4. Cost-distance analysis, network analysis

Title: Applied statistics and data modeling

Semester: 1

Credit point (ECTS): 5

Learning objectives:

Teaching advanced statistical techniques needed to understand the statistical models. The software packages R (or SPSS) are introduced and will be used for the computational aspects of the course.

Prerequisite knowledge:

Basic statistics, basic linear algebra, basic calculus

Methods of educations:

25 Co, 35 We

Required facilities:

Lecture room with big black board, beamer and internet connection.
For the computer exercises a PC room with beamer and white board.
Statistical software R and SPSS.

Methods of evaluation:

Written open book exam, made behind the PC. Group paper, where statistical skills are applied on a case study.
Written exam (no open book).

Literature:

1. Neter J., Kutner M., Nachtsheim C. and Wasserman W. "Applied linear statistical models" McGraw-Hill/Irwin 1996. ISBN-13:9780256117363, ISBN: 0256117365.
2. Benjamin J. and Cornell C. "Probability, statistics, and decisions for civil engineers" McGraw-Hill education 1970. ISBN-13:9780070045491, ISBN: 0070045496.
3. Crawley M., "The R book", Wiley, Chichester 2007. ISBN:9780470510247(H/B).

Course content:

1. Probability distributions

- a. Refreshment on probability distributions
- b. Refreshment on confidence intervals
- c. Distributions used in reliability data analysis (applications)
 - i. Exponential distribution
 - ii. Gamma distribution
 - iii. Weibull distribution
 - iv. Raleigh distribution

2. Analysis of variance

- a. One-factor analysis of variance
- b. Two-factor analysis of variance, interaction

3. Regression

- c. Simple linear regression
- 1. Multiple linear regression
- 2. Non-linear regression
- 3. Logistic regression

4. Design of experiments

- 1. Planning of an experiment and data collection
- 2. Selection of statistical model
- 3. Sample size calculations
- 4. Case studies

Title: Aquatic and terrestrial ecology

Semester: 1

Credit point (ECTS): 5

Learning objectives:

To provide the students with basic knowledge of the structure and functioning of freshwater, coastal and terrestrial ecosystems.

Specific objectives freshwater ecosystems: To provide insight in the abiotic (physical and chemical) characteristics as well as the qualitative and quantitative composition of different biological communities, materials budget and interactions between living and non-living components. Salt intrusion and the effects of salt changes are also considered.

Practical training: to provide tools and skills for analysis of major biological communities in aquatic ecosystems (phyto- and zooplankton, periphyton, macrobenthos).

Specific objectives coastal ecosystems: To describe and illustrate the fundamental concepts and general processes of coastal ecosystems, to provide insight in the ecology of pelagic and benthic organisms, productivity of marine systems, exploration and management of marine ecosystems with the emphasis on mangrove forests, their interaction with other ecosystems. Social, economical value and services of mangrove forests and marine habitat management will also be reviewed.

Practical exercises are supported by field excursions and case studies

Specific objective terrestrial ecosystems: This course discusses exchange processes between living organisms and their terrestrial environment. The main terrestrial ecosystems and their characteristics are reviewed. Special attention is paid to plant-radiation interactions and the micro-climates in vegetations and soils.

The carbon, water and energy budgets of ecosystems are discussed in detail. Actual anthropogenic impact on terrestrial ecosystems (e.g. climatic change, stratospheric ozone problem) is also focused. Experimental set-up for terrestrial ecological research is discussed, and the theoretical knowledge is applied in calculation exercises.

Prerequisite knowledge:

Knowledge of biology, (environmental) chemistry, ecology, physics and mathematics.

Methods of education:

Theory: oral lecturers, case studies

Practical's: field visits and sampling, exercises, case studies,

Required facilities:

Environmental laboratory

Methods of evaluation:

Exercises: submission of reports and oral presentation.

Written exam

Literature:

Part 1: Freshwater ecology

J. Schwoerbel - Handbook of limnology. Ellis Horwood Ltd.
Chichester (1984). 228p

R.G. Wetzel - Limnology. Saunders College Publishing. Forth Worth (1983). 767p

Part 2: Marine ecology

R. Barnes, Invertebrate Zoology, Saunders College Publishing (1986)

J.W. Day et al, Estuarine Ecology, John Wiley and Sons (1989)

H. Thurman and H. Weber, Marine Biology, Merill Publ. Comp. (1984)

Part 3: Terrestrial ecology Physiological Plant Ecology (ed. W. Larcher), Springer, 4th edition, (2003), 513 p

Other references:

- Frissell, Christopher A.; Bayles, David. 1996. "Ecosystem Management and the Conservation of Aquatic Biodiversity and Ecological Integrity" *Water Resources Bulletin* **32(2)**:229-240
- Nielsen, D.L.; Brock M.A.; Rees, G.N; Baldwin D.S. 2003. "Effects of increasing salinity on freshwater ecosystems in Australia" *Australian Journal of Botany* **51**:655-665
- Odum, E. P. 1971. Fundamentals of ecology. 3rd edition. W. B. Saunders Co., Philadelphia and London. 544 p
- Alongi, D.M.; The Energetics of Mangrove Forests. Springer; 1 edition, (February 6, 2009), ISBN-13: 978-1402042706. 216 p

Course content:

Part 1: Freshwater

Distribution, age and genesis of inland water, Structure and physical properties of water, Physical relationships in natural water bodies, Chemical properties of water, dissolved gases and solids, salt water intrusion, organic solutes in natural waters, Associations of living organisms in inland waters, effects of the salinity changes (wetlands, lake, ponds and bogs, flowing waters). Material budget of inland waters (production, consumption, destruction and the role of bacteria, material transport and energy flux in aquatic ecosystems.

Part 2: Course content coastal ecosystems

General characteristics of the marine environment, differences between oceans and seas, zonations in the marine environment, physical and chemical factors, ecology of pelagic and benthic organisms, productivity of marine systems, exploitation of marine systems, Mangrove forests; distribution, faunal and floral biodiversity including morphological, physiological and ethological adaptations to intertidal and marine life, ecosystem function, ecological benefits, food webs and trophic relationships, ethno biology and anthropogenic impacts, social, economical and cultural value and services of mangrove forests and the impact of erosion. Monitoring, modeling and experiments in relation to marine tropical habitat management

Part 3: Course content terrestrial ecology

The main terrestrial ecosystems and their characteristics are reviewed. Special attention is paid to plant-radiation interactions and the micro-climates in vegetations and soils. The carbon, water and energy budgets of ecosystems are discussed in detail. Actual anthropogenic impact on terrestrial ecosystems (e.g. climatic change, stratospheric ozone problem) is also considered. Experimental set-up for terrestrial ecological research is discussed, and the theoretical knowledge is applied in calculation exercises.

Title: Biodiversity conservation

Semester: 3

Credit point (ECTS): 5

Learning objectives:

After this course the student has an overview of the objectives and methods of biodiversity conservation, is able to carry out a simple biodiversity assessment, and is able to design a monitoring program.

Prerequisite knowledge:

Basic biological knowledge (Botany and Zoology or Flora and Fauna) & Aquatic and Terrestrial Ecology

Methods of educations:

25 Co, 35 We

Required facilities:

Beamer. For practical work in the field: batteries, transportation to and lodging at field station, food during field part of course.

Methods of evaluation:

In writing: 50%. Presentation: 10%. Report of fieldwork: 40%

Literature:

Sodhi, N.S., B.W. Brook & C.J.A. Bradshaw, 2007. Tropical Conservation Biology. Blackwell.

Course content:

1. Introduction
 - What is biodiversity
 - A global biodiversity crisis
 - Human dependence on biodiversity
 - The Convention on Biological Diversity (CBD)
2. The shaping of the biodiversity of Suriname through space and time

3. International conventions and local legislation regarding biodiversity
4. Authorities, institutes and organization related to biodiversity in Suriname
5. CBD implementation in Suriname
6. Global and local threats to biodiversity
7. Methods of biodiversity management and conservation
8. Sustainable-use of biodiversity
 - Forestry
 - Extraction of ntfp's
 - Wildlife trade
 - Sustainable hunting/fishing and ranching
 - Eco tourism
 - Use of ecosystem services
9. Biodiversity assessment
 - General survey methods
 - Sampling, marking and other methods per taxonomic group
 - Biodiversity indexes
10. Biodiversity monitoring
11. Priorities in biodiversity research

Title: Climatology and hydrology

Semester: 1

Credit point (ECTS): 5

Learning objectives:

The aim of this course is that students get insight into the dynamic nature of the atmosphere, the basic concepts of meteorology, the measuring and processing of climatological parameters, understand the driving forces of global change, the possible causes of climate changes and their effect on natural resources, and the adaptation processes of global change on land use, food supply, energy supply, water resources etc. In the second part of this course, the hydrologic water cycle and processes will be discussed. Students should be able to deal with the classical hydrologic analysis and design procedures.

Prerequisite knowledge:

-

Methods of educations:

35 hours theory and 10 hrs of practical work (assignments)
Lecture with multimedia support. Lecture notes, presentations and assignments are available at the AdeKUS Electronische Leermgeving at <http://moodle.uvs.edu/> and are also available at the secretary of the Masterprogram in SMNR, FTeW, Building 16, Room 56.

Required facilities:

-

Methods of evaluation:

Oral exam (50%); assignments and report (50%).

Literature: -

Course content:

Climatology:

- Important phenomena and physical processes including gases that occur in earth's atmosphere, basic concepts and tools that are used to study atmospheric problems, climate, climate change, air pollution
- Newton's laws of motion; energy, equilibrium and stability; coordinate systems and forces; the equations of motion and simple force balances; and mass and energy conservation.
- Fundamental principles of radiation; absorption and emission of radiation; solar and terrestrial radiation; radiative transfer and heating rates; surface and global energy balances; atmospheric general circulation; natural climate variations; greenhouse climate change; stratospheric ozone depletion.
- Climate dynamics: survey of past climates; climate variability; heat and water budgets of the atmosphere, oceans and land surfaces; the general circulation;
- Driving forces of global change and adaptation processes
- Meteorological network: weather stations, instruments, monitoring, data collection
- Statistical analysis of meteorological data (accuracy, etc)
- Satellite and radar meteorology, hygrometry and climate modeling (satellite images and output of climate models will be used to illustrate the theory)
- Impact of climate change on natural resources and adaptation to climate change on natural resources

Hydrology:

- Concepts of the water cycle, hydrological system (surface hydrology, groundwater hydrology), runoff mechanisms and water balances, rainfall losses, human and natural interactions in the water cycle
- Natural system processes and interactions/terrestrial physical hydrology of rivers, wetlands, lakes and reservoirs, coasts (characteristics of these systems, types, geomorphology, water quality, salinity movement, processes, sediment, etc)

- Hydrological processes surface and ground water and modeling, stream flow estimation and routing
- Lakes and reservoirs: storage capacity, evaporation losses, etc
- Wetlands and swamps
- Rainfall analysis, discharge analysis (hydrographs), flood routing etc
- Water quality
- Hydrological networks: instruments, measurements, accuracy, data collection, evaluation, processing, monitoring)
- Hydrologic statistics (basic statistical concepts; probability distribution; moments of distribution; co variation; correlation and regression; frequency analysis; probability plots and goodness of-fit tests; methods of (stochastic) time series analysis, extreme value analysis)
- Introduction to hydrologic modeling (use, types, characteristics and examples), modeling climate change impacts and land use impacts on the hydrology of a basin.

Title: Coastal erosion and protection

Semester: 3

Credit point (ECTS): 5

Learning objectives:

The aim of this course is to give students an understanding of coastal processes, the interactions, monitoring techniques and the different aspects of coastal engineering (e.g. appropriate protection techniques)

Prerequisite knowledge:

All courses of the first year

Methods of educations:

25 hours theory and 35 hrs of practical work (assignments/exercises)
Lecture with multimedia support. Lecture notes, presentations and assignments are available at the AdeKUS Electronische Leeromgeving at <http://moodle.uvs.edu/> and are also available at the secretary of the Masterprogram in SMNR, FTeW, Building 16, Room 56.

Case study: students are divided into groups of maximum 3 persons to analyze a case study, and to prepare a report and presentation. The assignments and goals of each group are defined; and preparation of the reports, presentation in class and discussion of results. They make a diagnosis of a part of the coastal area and work on the following items are worked out: Resources of coastal zone, renewable and non-renewable, environment, mineral and biological resources. Use of coastal zone, functions of usage: vital (food production, water and energy production), social (living environment, recreation), economic (transport, extraction, industry), public (geopolitics and defense, wastewater treatment, environment and cultural heritage preservation).

Practical: students execute different hydraulic test in the field and lab.

Required facilities:

Boat (operational costs), transport, instruments (including operational) from Hydraulic Lab-AdeKUS.

Methods of evaluation:

Written and oral exams, home assignments including reports of experiments and excursions. Final mark: written exam 60%; field/laboratory experiments 20%; assignments with presentation/paper/report 20%.

Literature:

-

Software:**Course content:**

Coastal zone typology, limits, geomorphology and landscape elements, factors impacting coastal formation, dynamics of the processes, variations timescale, coastal erosion.

Coastal hydrodynamics (current and waves): linear wave theory, higher order wave theory, statistical description of waves (significant wave height, average period, energy spectrum, wave propagation, refraction, diffraction, tidal waves)

Coastal sediment transport: sediment-fluid interactions, mud bank migration, mangrove-mud-sea-interaction

Coast system: the 'natural' dynamic coast system: sea, sediment transport, ecology; 'artificial' coast defense: breakwaters, beach heads, harbors (location, protection, layout, entrance, infrastructure); impacts on the coast.

Coastal protection: scale of the problem, reasons, threats; coastal protection measures, international recommendations for coastal erosion minimization, EIA

Measuring techniques, data analysis and processing data.

Modeling: physical models, numeral models

Concept of coastal zone management: coastal zone as an integral nature- social-economic system, organizational, law, conflicts, financial and implementing systems, the role and responsibility of stakeholders, legal and financial conditions.

Title: Economy and valuation of natural resources

Semester: 1

Credit point (ECTS): 5

Learning objectives:

The aim of this course is to provide students an understanding of the role of economic analysis, valuating techniques, and the use of economic instruments in guiding resource management decisions to achieve sustainable development under global changes on earth.

Prerequisite knowledge:

-

Methods of educations:

20 hours theory and 10 hrs of practical work (assignments)

Students are divided into groups of maximum 3 persons to analyze a case study, and to prepare a report and presentation. The assignments and goals of each group are defined; and preparation of the reports, presentation in class and discussion of results.

Lecture with multimedia support. Lecture notes, presentations and assignments are available at the AdeKUS Electronische

Leeromgeving at <http://moodle.uvs.edu/> and are also available at the secretary of the Masterprogram in SMNR, FTeW, Building 16, Room 56.

Required facilities:

-

Methods of evaluation:

Written/oral examination and assignments.

Students read a papers from the references below and present there critical vision to the class e.g. water, energy (see different chapters in books)

Literature:

1. Environmental and natural resource economics, F. A. Ward, New Mexico State University, Prentice Hall.
2. Environmental and natural resources economics (no author)
3. The economics of the environment and natural resources, Crafton, R. Q., et al, Black Well Publishing
4. Natural resources and environmental economics, R. Perman, et al., Pearson Addison Wesley.

Course content:

An introduction to natural resources and environmental economics including projections of the development of natural resources : global trends in natural resource use, global environmental problems, and relationship with other global issues (population growth, industrialization, climate change, carbon credits, food security, energy security, water scarcity, environmental pollution - water, air, land pollution, etc) (chapter 10, 11, 13, 15 of (no author)), (chapter 1 of F.A. Ward), (chapter 1 of Perman, R.), Part II, chapter 10 of Perman, R.)

Economic theory (chapter 3 of (no author))

Decision support for environmental policy (chapter 5 of (no author))

The discount rate (chapter 6 of (no author))

Valuing the environment (chapter 7 of (no author)), (chapter 2, 3 of F.A. Ward)

Natural resources exploitation (PART IV, chapter 14, 15, 16, 17, 18, 19 of Perman, R., chapter 7, 8, 9, 10, 11, 12, 13 of F.A. Ward)

[students cases reading these chapters and present to class]

Project appraisal (PART III, chapter 11, 12, 13 of Perman, R.)

Natural resources, economic growth, and policies for sustainable resource-based development (chapter 22, 23, 24 of F.A. Ward)

Title: Electrical energy technology

Semester: 3

Credit point (ECTS): 5

Learning objectives:

The aim of this course is to oversee the implementation and exploitation of electrical energy systems, to understand the generation, transmission, distribution and utilization of electric energy, to recognize the main factors affecting power system control and operation, to be able to analyze the organization of electricity markets, the changes currently taking place and the developments that could lead to alternative power systems in the future, and to manipulate computer models of energy systems to determine the likely effect of varying input parameters on energy output or economic viability

Prerequisite knowledge:

-

Methods of educations:

35 hours theory and 10 hrs of practical work (assignments)
Lecture with multimedia support. Lecture notes, presentations and assignments are available at the AdeKUS Electronische Leermgeving at <http://moodle.uvs.edu/> and are also available at the secretary of the Masterprogram in SMNR, FTeW, Building 16, Room 56.

Required facilities:

Pc with simulation software (ETAP), test system

Methods of evaluation:

Report.

Literature:

1. Electrical Power System Essentials; Pieter Schavemaker and Lou van der Sluis.
2. Sustainable Energy Futures, SHELL-report; 2001 (ISBN: 9780749227135)

Course content:**EXPLOITATION AND PLANNING OF POWER PRODUCTION**

Characteristics of the production of electric energy

Characteristics of the demand of electric energy

Balancing supply and demand

Frequency management and exchange programmes

Demand Side Management

Storage technology

BASIC CALCULATIONS FOR AN ELECTRICITY GRID

Choice of size and nature of voltage

Description of the HV circuit grid and of the distribution grid

Basic principles of regulating voltage on HV, MV and LV

Electrical line parameters and line equivalents

Calculation of voltage drop in a distribution grid

Principles of the calculation of laced grids

Classification of loads/demand

SECURE GRID OPERATION

Network operation and stabilization

Securing against overflows (selectivity, maximum current relay, distance relay, differential relay)

Special questions (earthing the zeropoint, I-limitation, fast re-switch)

Securing against over-voltage, including earth conductors

Coordination of isolation

Reliability of electrical energy supply

Power Quality (Harmonic transformation, Tension dips, Flicker)

Electricity meters

Title: Energy management

Semester: 1

Credit point (ECTS): 5

Learning objectives:

The aim of this course is that students understand the energy production chain, use their knowledge on energy policy and law, related to energy market decisions, discuss the sustainability problems associated with energy use and how they might be resolved by technological and social measures, and undertake an elementary economic analysis of an energy project, taking into account the effect of such factors as discount rates and project lifetimes

Prerequisite knowledge:

-

Methods of educations:

35 hours theory and 10 hrs of practical work (assignments)
Lecture with multimedia support. Lecture notes, presentations and assignments are available at the AdeKUS Electronische Leeromgeving at <http://moodle.uvs.edu/> and are also available at the secretary of the Masterprogram in SMNR, FTeW, Building 16, Room 56.

Required facilities:

Internet facilities, Pc

Methods of evaluation:

Presentation and paper.

Literature:

Energy Systems and Sustainability, power for a sustainable future;
Godfrey Boyle, Bob Everett and Janet Ramage (ISBN 0-19-926179-2)

Course content:

Principles of Energy policy and law
Energy planning
Energy production chain
Supply side vs demand side management
Integrating resource planning
Energy markets
Stakeholders
International agreements and contracts and development cooperation
Environmental governance: e.g. emission trading
Environmental and social impact assessment methods

Title: Environmental law

Semester: 2

Credit point (ECTS): 3

Learning objectives:

This course will provide students with a working knowledge of the philosophical bases of environmental management. It will provide the key principles of environmental management and general sources of environmental law. It will describe specific sector regimes, enforcement of environmental laws and international and regional environmental law.

Prerequisite knowledge:

-

Methods of educations:

Interactive lectures and case discussions

Required facilities:

-

Methods of evaluation:

These will include: lectures, lecture/discussion, group work/presentations, preparation of case studies. Students will be expected to attend classes and to be prepared for each class by reading all required materials beforehand. Students are expected to come prepared to participate in class discussions as class preparation and participation will contribute to the student's final grade.

| Assessment methods | Weighting |
|---|------------------|
| Written Group Case Study | 40% |
| Group case study presentation | 30% |
| Preparation and participation in class discussion | 30% |

Case studies will be prepared in advance by the various groups and presented to the lecturer and the rest of the class on specified dates. To enable students to obtain maximum benefit from projects, the assessment of projects will be based on the formal group document and the participation of individual members of the group presenting the project.

Literature:

R. Ramlogan, *The Developing World and the Environment: Making the Case for Effective Protection of the Global Environment* (2004: University Press of America, Maryland).

R. Ramlogan, *Sustainable Development: Towards a Judicial Interpretation* (2010, Martinus-Nijhoff).

Reference Texts:

P. Birnie, A. Boyle & C. Redgwell, *International Law & the Environment* (3rd ed. Clarendon Press, 2009)

International Environmental Law and Policy (Casebook) by Edith Brown Weiss, Stephen C. McCaffrey, Daniel Barstow Margraw, and A. Dan Tarlock (Dec 19, 2006)

P. Sands, *Principles of International Environmental Law*, vol 1. (Manchester in Press, 1995)

E. Brown Weiss, *International Environmental Law: Basic Instruments and References* (1992-1999)

Yearbook of International Environmental Law (2000)

A. Kiss & D. Shelton, *International Environmental Law*, 2nd ed. (2000)

E. Brown Weiss, *International Environmental Law & Policy* (1998)

A. Gillespie, *International Environmental Law, Policy & Ethics*, 2nd ed. (2000)

Internet Resources:

<http://www.academicinfo.net/lawenviron.html>

Course content:

This course will provide a fundamental knowledge of the sources of environmental laws and as such it will provide the legal framework within which the science and environmental management sit.

The course will then articulate this regional framework within its international context. It will examine the ways in which human behaviour with respect to the environment is regulated at the international level. This will involve a review of the legal and institutional framework within which international law making on the environment takes place. The course will introduce students to some of the factors that surround and influence the processes that pertain to the negotiation and implementation of international environmental law.

It is acknowledged that the law is a key instrument in environmental management and therefore it is important to understand the general legal framework which governs the environment and what are the values, assumptions, and guiding principles which underlie this framework.

Title: Environmental pollution and sanitation

Semester: 2

Credit point (ECTS): 5

Learning objectives:

The main aim of the course is to present insight in the most important environmental (water and sediment, soil and air) problems, sources and threats. Attention is also given to solid waste (types and treatment technologies). Preventive or sanitation measures are discussed, providing the skills to assess, plan, execute and implement programmes of sustainable environmental management.

Prerequisite knowledge:

Knowledge of chemistry, physics and mathematics.

Methods of educations:

Theory: oral lectures, case studies

Practical's: field visits and sampling, excursions, exercises with simple models

Required facilities:

Environmental laboratory, computer room for model application.

Methods of evaluation:

Theory: written exams

Term paper

Theory: Period aligned evaluation

Exercises: submission of reports

Literature:

• Part water and soil:

- Collegediktaat Milieutechnologie, Prof. Dr. ir. W. Verstraete,
2008-2009, Lab. Microbiele Ecologie & Technologie
(LabMET)

- **Part soil:**

- Everzwijn, T.S., Hoffman, F.R., Ramhit, H., Schultz, C.E. and Verwaart, J.W.A. 1992. Bodemreinigingstechnieken- Aanpak van vervuilde droge en waterbodems, Boom, Antwerpen, 141 p.
- Van Dwynze, J., Gevaerts, W., Lauryssen, K., Vancolen, D., Pyls, Wiepkema, J. and Dijkmans, R.. 1998. Gids Bodemsaneringstechnieken, Academia press, Gent, 213 p.
- Van De Steene, J., Van Vooren, H., Verplancke H., De Becker, G. & Pensaert, S. 2003. Petroleum hydrocarbon remediation in biopiles: optimizing aeration and heating. Proceedings of the Seventh International In Situ and On-site Bioremediation Symposium, Orlando, Florida, June 2-5, 2003. Part O: Landfarming, biopiles, composting and bioreactors.

- **Part: Solid waste**

- Sabbas et al. 221, Management of municipal solid waste incineration residues, Waste Management 23 (2003), 61-88. College diktaat Tom van Gerven (Leuven)
- George Tchobanoglous., 1993. Integrated Solid Waste Management, Mc Graw-Hill, 978 p, ISBN 0-07-063237-5

- **Other references:**

- Environmental Microbiology By Raina M. Maier (editor), Ian L. Pepper (editor), Charles P. Gerba (editor) Academic Press (2000) ISBN 0-12-497570-4
- Biodegradation and Bioremediation By Martin Alexander Academic Press (1999). Second edition ISBN 0-12-049861-8
- Water Quality and Treatment Handbook By Raymond D. Letterman (editor), Larry W. Mays (editor) American Water Works Association (1999). Fifth edition ISBN 0-07-001659-3
- Global Environmental Change: Research Pathway for the Next Decade National Academic Press (1999) ISBN 0-30-906420-1
- Standard Methods for the Examination of Water and Wastewater (21st Ed.) Edited by Lenore S. Clesceri, Arnold E. Greenberg and Andrew D. Eaton ISBN 0-87553-047-8
- Constructed Wetlands for Water Quality Improvement Edited by Gerald A. Morishi ISBN 0-87371-550-0

- Treatment Wetlands Robert H. Kadlec & Robert L. Knight ISBN 0-87371-930-1
- Wastewater Treatment, Plant Dynamics and Management in Constructed and Natural Wetlands (Hardcover) Jan Vymazal (Editor) ISBN: 978-1402082344
- Natural Wastewater Treatment Systems (Civil and Environmental Engineering)
Ronald W. Crites, E. Joe Middlebrooks, Sherwood C. Reed
ISBN: 978-0849338045
- Natural Systems for Wastewater Treatment
(Paperback) Water Environment Federation ISBN: 978-1572781658

Course content:

Part 1: Water

Pollution sources, threats and remediation techniques

Keywords: Physical and chemical properties of water, water resources and water quality parameters, ecology of flowing waters, water pollution sources, pollution by means of sediment, self purification of waters, oxygen sag curve analysis, impounded water and threats, water quality modeling (simple models), remediation techniques, laws and regulation, water pollution surveys.

Physical and chemical properties of water, water resources and water quality parameters; Drinking water , surface water and groundwater, important water quality parameters, comparison with international guidelines and norms, water ecology and ecology of flowing waters; saltwater life zones (oceans, coastal zone: estuary, wetlands, swamps)and freshwater life zones; threats: over-consumption, pollution, acidification , wet and dry deposition, desertification, water pollution, sources (Industrial, domestic, point, diffuse), self purification of rivers, oxygen sag curve analysis, single variable and two variables diagram, ecology and threats of lakes and impounded waters; Eutrophication; prevention and management (clean technologies), significance and use of phosphorous loading, water resources and soil (interaction between water and soil), remediation techniques, laws and regulation; transboundary

regulations, national standards, international standards etcetera, , water pollution surveys and modeling (e.g. Streeter and Phelps model, Mc Kay models, Visual Minteq, Phreq C).

Part 2: soil and groundwater;

Pollution sources, threats and remediation techniques

Keywords: Soil profile, soil types, physical and chemical properties of soil, soil and ground water pollution sources, distribution mechanism of pollutants, organic pollutants (Non aqueous phase liquids (NAPL's) and DNAPLs, POPs,) heavy metals and threats, the unsaturated zone, modeling transport and degradation reaction in the soil, remediation techniques and discussion on the choice of best option, laws and regulations (national and international).

Definition, distribution between solid and liquid phases, sorption and desorption, distribution between different compartments, NAPL's, heavy metals, presence, behavior and threats (Mercury, special case), Organic pollutants (e.g. pesticides and POP's), presence, behavior and risk of organic pollutants,), pollutants transport and degradation in soil, Impact of landfills, biological indicators, modeling transport and reaction in the soil (e.g. pesticides), remediation techniques for soil and groundwater pollution (e.g. Adsorbent for mercury). Biotechnological versus physical chemical methods, laws and regulation (national and international).

Part 3: Air :

Pollution sources and abatement techniques

Key words: Importance of the atmosphere, physical characteristics, sources of air pollution(natural, anthropogenic), current issues of the atmosphere, types of air pollutants (atmospheric behavior and composition), modeling air pollution and effects on environment, chemical and photochemical processes (self purification of the atmosphere), indoor air pollution control techniques, outdoor air pollution control techniques, Laws and regulations

Introduction to air pollution, stratification, transfer of pollutants, energy transfer, movement of air masses, global circulation, ambient air quality, criteria and non criteria air pollutants, origin and fate of air pollutants, , air pollutants and their effects, health effects, photochemical oxidants, chemical and photochemical processes, self

purification of the atmosphere, air pollution control, indoor and outdoor air pollution control, ventilation types, IAQ standards, dilution and control at the source, control devices for: (operation principles, advantages and disadvantages of mechanical collectors, electrostatic precipitators, bag houses, particulate scrubbers. Gaseous contaminants: scrubbers, NO_x control, VOC abatement, Acid gas/SO₂ control, mercury control, dioxin and furan control, biological techniques (biofilter, bioscrubber and biotrickling filters). Kyoto protocol, Rotterdam convention, IPCC guidelines etc.

Part 4: Solid waste

Key words: Waste streams and their treatment

Types of solid waste streams: household, industrial and specific waste streams

Treatment of waste streams: sorting, prevention, recycling, incineration, land filling.

Title: Forest management

Semester: 3

Credit point (ECTS): 5

Learning objectives:

The general objective is to introduce students to current issues of forest management in Suriname. The course should provide a solid background for those students who wish to work on a Master thesis subject related to Suriname's forest management issues. The specific learning objectives include knowledge of (Suriname's) tropical forest resources and its assessment, the application of the sustainability principle (including spin offs such as certification) to Surinam's forest resources, the knowledge of the national and international key players on sustainable forest management issues, and awareness of ecosystem services provided by Suriname's forests and forest products.

Prerequisite knowledge:

Terrestrial and aquatic ecology

Lecturer (s):

Rob De Wulf

Methods of educations:

30 Co, 20 We

Required facilities:

Classroom facilities, field trips and visits to key stakeholders

Methods of evaluation:

Written exam and report case study

Literature:

Recent literature list on forest management will be supplied.

Course content:

- Typology of the forests in the Guiana shield
- Status of the tropical rainforest (incl. direct and indirect causes of deforestation and forest degradation)
- The sustainability concept in forestry
- Forest assessment (basics)
- Main world players in forest assessment, policy and conservation (FAO, ITTO, CIFOR, Cirad Forêts, CATIE, IUFRO, WWF,...): mission, approach, usefulness, resources
- Basics of polycyclic forest management (centered around the CELOS Management system)
- Ecosystem services of Suriname's forests: typology, identification, quantification,...(incl. a considerable component on the human ecology issue of Suriname's forest-dependent population) and the effect of anthropogenic actions
- Certification of forests, forest management and chain of custody
- International forest policy and campaigns (REDD+, PES schemes, FLEGT...)
- Forests and climate change

Title: Geostatistics

Semester: 2

Credit point (ECTS): 5

Learning objectives:

The student learns to have a better insight in spatial correlations of natural parameters.

The student understands the importance of the supporting volume on average values and is able to quantify this.

The student is able to apply geostatistics to estimate natural parameters in a point, over a surface area or in volume, and this by taking the spatial correlation into account.

Prerequisite knowledge:

Basic statistical techniques and mathematical integration methods.

Methods of educations:

20 hrs of lectures and 10 hrs of exercises

Required facilities: lecture room, pc-s with dedicated software

Methods of evaluation:

Written exam and assignments/report.

Literature:

-

Course content:

Geostatistics was developed during the past decades to estimate ore reserves. This is still an important area of application, but geostatistical techniques are also used in the oil industry, for environmental problems, in soil sciences, agricultural engineering and in structural geology. The starting point of geostatistics is that there is a spatial dependence between the measuring points, but that this dependence is unknown as a functional relation.

The following topics are covered:

- regional variables and definition of the semivariogram
- calculating an experimental semivariogram and co-variogram
- regularized semivariogram
- estimating point values or averages over surface areas or volumes
- best linear unbiased estimator (basic kriging and other sub-methods)
- conditional and non-conditional simulations

Title: Hydrogeology and modeling

Semester: 3

Credit point (ECTS): 5

Learning objectives:

The aim of this course is to

- To give the student a fundamental understanding of the principles and practical applications of groundwater occurrence and behavior, such that the student will be able to interpret observations in a correct way, calculate and predict groundwater amounts and movement, determine the groundwater quality and possible pollution, and in general be able to manage groundwater in a safe and sustainable way.
- The graduate student has technological knowledge of treatment processes applied for production of drinking water from groundwater resources

The exercises are intended to reflect real world problems that students might encounter later in their professional careers, and which will enable to reflect on the applicability, usefulness and reliability of the theoretical aspects. The assignment is intended to bring students into contact with real world groundwater problems, practical applications and scientific developments, and to increase their awareness of groundwater vulnerability and sustainability in relation to human impact.

Prerequisite knowledge:

All courses of the first year.

Methods of educations:

35 hours theory (classical lectures) and 10 hrs of practical work (exercises).

Students are divided into groups of maximum 3 persons to analyze a case study, and to prepare a report and presentation. The assignments and goals of each group are defined; and preparation of the reports, presentation in class and discussion of results.

Excursions

Lecture with multimedia support. Lecture notes, presentations and assignments are available at the AdeKUS Electronische Leeromgeving at <http://moodle.uvs.edu/> and are also available at the secretary of the Masterprogram in SMNR, FTeW, Building 16, Room 56.

Required facilities:

Beamer and board, laboratory facilities, transport for excursions.
Software: Matlab

Methods of evaluation:

Oral exams, group/home assignments including reports of experiments. Final mark: exam 50%; field/laboratory experiments 20%; assignments with presentation/paper/report 30%.

Assignments with report and presentation: e.g.

Doing a water demand analysis and future projection using models
Excursion:

Surinaamse Waterleiding Maatschappij (SWM), drinking water supply station van Hattenweg, district Wanica: drinking water supply from groundwater resources and treatments processes (3 hours)

Literature:

1. Applied Hydrogeology, C. W. Fetter, 4th ed., Prentice-Hall, New Jersey, 200, ISBN: 0-13-122687-8
2. Drinking water-principles and practices, by PJ de Moel, JQJC Verberk, JC van Dijk
3. Water Supply and Sewerage, Steel and Mc. Ghee
4. Water and Waste water Engineering, Fair Geyer, Okun

Course content:

- Fundamentals: groundwater and the hydrologic cycle, water balance of an area, occurrence of underground water, dehydration curve, basic properties of ground bearing layers: porosity, water content, groundwater potential, flux and velocity, Darcy's law, measurement techniques for groundwater potential and conductivity;

- Advantages and disadvantages of groundwater, definitions, groundwater in the world, groundwater in Suriname, trends in groundwater use and depletion.
- Natural groundwater flow: hydrogeological classification of ground layers, aquifer types, groundwater flow systems, unsaturated zone, saturated groundwater flow and storage in artesian and phreatic aquifers and in aquitards, the hydraulic groundwater flow approach and the flow net theory;
- Hydrogeological qualities and current comparisons: R.E.V. concept, porosities, permeability, hydraulic conductivity, transmissivity, specific storage, storage coefficient and the law of Darcy
- Groundwater flow equations and useful solutions: *mass balance equation, general groundwater flow equation in three dimensions and boundary conditions, hydrostatics, unsaturated flow, saturated flow and water table boundary conditions, the horizontal flow approach, Dupuit equation*
- Groundwater abstraction techniques: advantages of groundwater use, abstraction techniques: wells and galleries, principles of well flow: drawdown, cone of depression, radius of influence, maximum and specific capacity, interference between wells and aquifer boundaries, design of well fields, safe yield and groundwater management;
- Groundwater measurement and monitoring: reconnaissance survey, surface investigation methods, subsurface investigations including test drilling, resistivity logging, radiation logging, temperature logging, velocity measurement and other methods, GIS, observation network, selection of sites for the observation network, installation of observation wells and piezometers, water table fluctuation,
- *Pump tests and recovery tests: Steady state flow [confined aquifers: method of Thiem-Dupuit, phreatic aquifers: method of Thiem-Dupuit], transient flow [the method of Theis, Jacobs], recovery curve and superposition principle, other methods [transient (confined aquifer - leakage without change in storage in a confining layer), pump test in an anisotropic environment, injection tests].*

- Transport of dissolved substances in groundwater: introduction, various types of pollutants, transport processes [diffusion, advection/convection, dispersion,, adsorption-desorption, degradation], transport equations[only diffusion; only advection/convection; advection/convection and dispersion; advection/convection, dispersion and diffusion; advection/convection, dispersion, diffusion, adsorption/desorption and degradation]. Mass transport in saturated media: processes, equations and modeling, flow and mass transport in the unsaturated zone.
- Vulnerability of groundwater and vulnerability maps: definition, methodology, examples of various methods. Issues in sustainable aquifer management
 - Groundwater protection zones in Suriname: legal aspects and hydrogeological aspects.
 - Introduction to groundwater models: basics of finite difference techniques, finite difference solution for aquifer flow, basics of finite element techniques, finite element solution for aquifer flow, introduction to well known groundwater flow models
- Groundwater flow modeling (simple models)
- Water quality aspects of drinking water from groundwater resources (parameters (microbiological, chemical), water quality standards (WHO-Guidelines))
- Drinkable water treatment schemes and techniques from ground water resources
- Drinking water demand management, water supply planning/forecasting, water resources systems operation, development and conservation of water resources for drinking water supply, water distribution (water demand, water losses, systems water transport (pipes, valves....), pumping (hydraulic, types, characteristics), storage (types, dimensioning))
- Human and natural impacts on groundwater and water reuse

Practical

Laboratory and fields measurement techniques: determination of porosity, water content, density, hydraulic conductivity and permeability of soil samples, field measurement techniques for determining hydraulic conductivity: interpretation of slug tests in auger holes and piezometers;

- Flow net analyses using piezometric data and field reconnaissance for hydrogeological mapping and interpretation; Analyses of groundwater flow and balance in confined and phreatic aquifers using piezometric readings and solutions of groundwater flow equations;
- Analyses and interpretation of drawdown around pumping wells and influence of well interference, aquifer boundaries, and induced recharge by rivers; Design of groundwater sustainable pumping wells and well fields; Analyses of pumping test experiments: application of graphical techniques for the Theis and Jacob methods, graphical interpretation technique for a recovery test; and
- Interpretation of groundwater chemical data: representation in Stiff and Piper diagrams, classification of water types and identification of chemical evolution, estimates of pollution spreading.

Title: Integrated pest management

Semester: 3

Credit point (ECTS): 5

Learning objectives:

- The students can describe and recognize the most important pests and diseases in agriculture
- Students are able to analyze the biology and ecology of important pests for implementation of preventive and control measures.
- The students have knowledge of current pest management practices (prevention, monitoring, biological control, trapping techniques, modified atmospheres).
- The students can enumerate the advantages and disadvantages of the different crop protection techniques
- The students can set up a simple experiment about integrated pest management.

Prerequisite knowledge:

Biology, chemistry, ecology

Methods of educations:

25 hours theory and 35 hrs of practical work

Required facilities:

Experimental fields with a crop, traps for insects, simple spraying unit

Methods of evaluation:

Oral exam with written preparation (3/5), paper and presentation (2/5)

Literature:

1. Vincent, C., Goettel, M. S., Lazarovits, G. 2007. Biological Control, a global perspective. Cabi International, Oxfordshire, 440 p. ISBN: 978 1 84593 265 7

2. Carlile M., Watkinson, S. , Graham, G. 2001. The Fungi, 2nd Edition. Academic Press, London, 588 p. ISBN 0-12-738445-6
3. Maredia, K.M., Dakouo, D., Mota-Sanchez, D. 2003 Integrated pest management in the global arena. 2003. Cabi International, Oxfordshire, 512 p. ISBN: 0 85199 652 3
4. Hajek, A E. 2004. Natural enemies : an introduction to biological control. Cambridge University Press, Cambridge 378 p. ISBN: 0521652952
5. Upadhyaya, M. K. Blackshaw, R. E. 2007. Non-chemical weed management : principles, concepts and technology Cabi International, Oxfordshire, 440 p. ISBN: 978 1 84593 290 9
6. Roossinck, M. J. , 2008. Plant Virus Evolution. Springer-Verlag Berlin Heidelberg, 224 p. ISBN: 978-3-540-75762-7

Course content:

1. Introduction:

What is IPM (keywords: prevention (practical strategies), observation (monitoring and decision-making) and intervention (cultural and physical, biological and chemical control) with the emphasis on sustainability) and why can pests and diseases become a problem in a agro-ecosystem

2. Part 1: pests, diseases, weeds and population development

The most important causes of crop protection problems will be described:

- Pests: insects and mites, nematodes, rodents
- Diseases: fungi, bacteria, viruses
- Weeds

Problems can only be solved if they are recognized, so identification, monitoring and population development will be studied with special attention to sustainable development. Evaluating the dimension of the population and determine an action threshold are important themes.

3. Part 2: crop protection techniques

The most important techniques will be studied. Advantages, disadvantages and the sustainable character of every technique will be studied. These techniques are:

Sanitation and cultural measures

Resistance

Chemical crop protection

Biocontrol (including research and biotechnology)

Integrating all the techniques

Practical

One of the following topics can be chosen:

- Monitoring insects: Insects will be monitored by using several traps (food, visual lures, chemical attractants and pheromones, knock trap)
- Population development: in two different fields the same insect will be monitored
- Disease control: in two different fields a pathogen will be controlled by as much as possible available techniques

Title: Integrated project

Semester: 3

Credit point (ECTS): 5

Learning objectives:

The aim of this course is to expose the students to the execution of an integrated project and to obtain expertise in most of the offered aspects of sustainable management of natural resources. The goal is to increase the students understanding of the interactions between the different technical and non-technical relations in managing natural resources in rural as well as in urban areas. And, To educate students in analyzing a case study, to identify environmental and social impacts as well as deficiencies that may exist in a project.

Prerequisite knowledge:

Courses of the first year.

Lecturer (s):

-

Methods of educations:

15 hours theory and 60 hrs of practical work (assignments)

The integrated project allows students to explore an intellectual question, to relate their research to a work situation, or to engage a community problem. Theoretical and empirical approaches should draw from the student's course work and demonstrate an integrative approach to knowledge creation.

Students are divided into groups of maximum 3 persons to analyze a case study, and to prepare a report and presentation. The assignments and goals of each group are defined; and preparation of the reports, presentation in class and discussion of results.

Applied multidisciplinary activities are: resources survey, survey design data collection, data and field analysis, synthesis,

assessment of findings and ability to take management decisions, formulation of conclusions, presentation of results.

A written and oral report is expected, that must be understandable and useable by an engineer without specific prior knowledge on the topic. The date of the exam is set in the time table.

It is possible that guest lecturers related to SMNR (e.g. EIA) are organized.

Lecture notes, presentations and assignments are available at the AdeKUS Electronische Leeromgeving at <http://moodle.uvs.edu/> and are also available at the secretary of the Master program in SMNR, FTeW, Building 16, Room 56.

Required facilities:

Classroom, computer, laptop, LCD projector

Methods of evaluation:

Group report and presentation.

Literature:

[http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTTRANS
PORT/EXTROADSHIGHWAYS/0,,contentMDK:20457855~menuPK:
1459669~pagePK:148956~piPK:216618~theSitePK:338661,00.html](http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTTRANS PORT/EXTROADSHIGHWAYS/0,,contentMDK:20457855~menuPK:1459669~pagePK:148956~piPK:216618~theSitePK:338661,00.html);
http://eia.unu.edu/course/?page_id=173

Course content:

PART I:

The integrated project requires that the students apply in an integrated way the knowledge and competences acquired during their first year of the MSc in SMNR in order to (1) identify problems or issues related to SMNR in the study area and formulate a problem analyses, problem statement, and define objective(s), (2) collect relevant data, prior to going into the field, including in the field, to increase the understanding in SMNR, (3) set up field experiments and questioners, and execute them, (4) make an analyses of the collected data including maps, (5) identify and document possible solutions, (6) work them out, and (7) make a critical evaluation of the chosen solution.

Students are encouraged to use as much as possible scientific tools for analyses (e.g. statistical methods, software packages, instruments and norms), graphical methods (e.g. GPS, CAD) and the technology (e.g. areal photographs) available in preparation of their report and presentation.

The various SMNR aspects have to be covered taking into account the integrated aspect defined in SMNR and the multidisciplinary approach of sustainable development. The project reflects the complexity of a similar problem that may be encountered during their future professional careers. Students are encouraged to consult experts within the frame of the project.

PART II (EIA study):

Theory: Introduction, and Objectives, Purpose and EIA process, Impact identification, Mitigation and impact management, Role and Purpose of EIA Review, Review Procedures, Review of case study – Project description, Review of case study - Description of environment. Field visit based on case study, Review of case study - Environmental impacts and mitigation measures, Review of case study – Environmental, management and monitoring plan, Planning Community Consultations, Field visit (excursion).

Preparations before field trip

The place of the field trip will be announced 6 weeks before leaving to the field. This allows students to collect relevant materials before going to the field. The lecturers of the course prepare a list of possible field surveys for each SMNR theme including required instruments. Before leaving to the field, a session is organized to discuss the work that has to be done, personal travel accessories, and the detailed preparations that have to be done by the students before leaving to the field, in the study area and after the field visit. Groups are formed from the beginning of this course.

Field trip

This course consists also of a one week field trip to a rural area (coastal zone) or an area in the interior of Suriname. Transportation to the study area can be a combination of land, water and air transport. In the study area, local experts and lecturers will introduce most of the themes of SMNR during a few visits in the study area. During the other days, the groups conduct their field work. Students should compare their theoretical knowledge to field cases and current practices in their overall complexity. During this field trip, students are encouraged to consider the SMNR themes in an integrated manner. The students interact regular with the local experts and lecturers.

Support

The VLIR-AdeKUS-IUC projects 4 and 5, through the MSc in SMNR programme, support as much as possible the costs involved in all the required work that has to be done, but most important the production of high quality scientific work.

Title: Land use development and management

Semester: 2

Credit point (ECTS): 5

Learning objectives:

The aim of this course is to provide students insight a) in complex land use requirements in open spaces and in rural areas, b) in interactions between land use categories and between urban, rural and natural land use modes, and c) in spatial organizational guidelines towards sustainability. This course will also provide specific analytical and evaluation tools to assess land use in specific geographical settings.

Prerequisite knowledge:

Bachelor course(s): Geology, Soil Science.

Methods of educations:

35 hours theory and 10 hrs of practical work (assignments/exercises)
Lecture with multimedia support. Lecture notes, presentations and assignments are available at the AdeKUS Electronische Leeromgeving at <http://moodle.uvs.edu/> and are also available at the secretary of the Masterprogram in SMNR, FTeW, Building 16, Room 56.

Case study: students make a diagnosis of a relevant land issue in Suriname (e.g. development of a large scale oil plantation in the interior in Suriname, wetlands in coastal zone of Suriname). Students are divided into groups of maximum 3 persons to analyze a case study, and to prepare a report and presentation. The assignments and goals of each group are defined; and preparation of the reports, presentation in class and discussion of results.

Required facilities:

For the case study the following facilities are required: access to basic datasets (census data, GIS, aerial photographs and/or satellite imagery), access to key stakeholders, and physical access to the site of interest

Methods of evaluation: Oral examination. Group report and presentation of case study. Oral exam (60%), Case study (40%)

Literature:

ISBN: 929355-97-0; 471-85434-4; 471-43500-7; 1-892769-01-8

Course content:

1. Basic concepts

- Land use, functions and services, with interpretation trajectories over time
- Theories of space territories; urban, rural and natural spheres and mixed spheres
- Theories of rurality, and review of principles and policies of rural development
- Entries in land use planning and development: resources, functions, stakeholders and land rights, technology, economy, policies, and development tools
- Land use and sustainability theories; the DPSIR framework

2. Development of land-bound functions and services

- Land requirements for farming and forestry
- Land requirements for nature conservation
- Land requirements for residential and recreation functions
- Land requirements for mineral extractions
- Land requirements for water management and environmental conservation

3. Access, transport and infrastructures

- Access as condition for rural development
- Requirements for different functions and services
- Basics of traffic modelling
- Impacts of infrastructures and traffic

4. Policies and tools

- Principles, policies and instruments of land use and spatial planning, with reference to different countries
- Evaluation tools: monitoring, environment impact assessment, life cycle analysis
- Implementation tools: zoning, land consolidation, support tools....

5. Demonstration cases (examples)

- A land consolidation project
- A land rehabilitation project
- A rural development project

Title: Mineral resources management

Semester: 3

Credit point (ECTS): 5

Learning objectives:

To give the participant an understanding of the mineral resource management process as well as the skills and competencies for effective mineral resource management.

Outcomes:

Upon successful completion of the course the student should be able to:

- Have a broad understanding of the functional and technical components and roles within MRM
- Understand geological ore body models in the strategic, tactical and operational context.
- Be able to define business objectives and translate them into a business plan.
- Understand the stages of planning and linkages to feasibility studies.
- Interact and participate in the MRM team
- Understand the mining value chain

Insight into the practical and economic aspects of mining and into the economics that govern the exploration and exploitation of mineral deposits

Insight into the principles of sustainable development, applied within the mineral resources industry. The principles of sustainable development aim to combine the social, economic and environmental impact into one integrated approach, whereby the effect of current activities or decisions should not have an effect on future generations.

The student is able to make a choice between the different mining methods for the exploitation of mineral resources.

Prerequisite knowledge:

-

Lecturer (s):

-

Methods of educations:

35 hours theory and 10 hrs of practical work (assignments)

Lecture with multimedia support. Lecture notes, presentations and assignments are available at the AdeKUS Electronische Leeromgeving at <http://moodle.uvs.edu/> and are also available at the secretary of the Masterprogram in SMNR, FTeW, Building 16, Room 56.

Required facilities:

-

Methods of evaluation:

Written or oral exams, and home assignments including reports of excursions. Final mark: written exam 60%; field/laboratory experiments 20%; assignments with presentation/paper/report 20%. Assignment and final presentation by the students on case study.

Literature:

-

Course content:

- What is the asset's capability?

The changing environment

Samrec compliance

Mineral Asset management

Translating top down goals

Strategic Mine Planning

- What is the asset worth?

Integrated Mine Planning

Valuation and value metrics

Value chains

Exploration and development

- What is the asset availability?

- Optimisation
- Cutoff grades and optimisation
- Enterprise optimisation

- What is the asset performance?

- Process optimisation
- Mine Call factor
- Reconciliation
- Mine to mill optimisation
- Capacity utilisation

- What are the asset risks?

- Governance and compliance issues

Planning and management in mining activities; organization and economics of prospecting, exploration, development, exploitation; unit operations of mining; principles of processing minerals, including classification, size reduction, mineral liberation, dewatering and tailings disposal; economic analysis of mineral commodity, global and domestic perspectives and markets; international resource environment and trade patterns.

Impact of mining on future resources (sub-topics: optimization of mining method, evolution of cut-off grade, etc.). Economic and social aspects of mining (sub-topics: distribution of benefits and costs, short and long term, community aspects, small scale mining vs. industrial operations, etc.). Impact of mining on health and environment during mining (sub-topics: environmental risk assessment, air, water and ground pollution, chemical processing/leaching, mine drainage, effluent storage, ecological impact, environmental impact monitoring, etc.). Impact of mining on health and environment in the long term (sub-topics: waste disposal, subsidence, landform design, vegetation and habitat rehabilitation, etc.). Life cycle engineering and possibilities of recycling.

Various exploitation techniques are discussed (geophysical methods, sampling methods, etc) and their importance for future exploration is studied.

The commonly applied and conventional mining methods are discussed, taking into account the characteristics of the ore body, economical considerations and rock mechanical aspects. Based on this discussion, the students are trained to make an optimal selection of a mining method for a particular orebody. One aspect of modern mining is that more and more is mechanized or that one tries to mine orebodies without physically going underground. Such methods are e.g. in-situ leaching, solution methods, etc. These methods are also discussed. Finally, the optimisation of exploitation plans is studied.

Title: Nature conservation management

Semester: 3

Credit point (ECTS): 5

Learning objectives:

After this course the student has an overview of the objectives, methods, international and national context of nature conservation management.

Prerequisite knowledge:

Conservation of biodiversity

Methods of educations:

30 Co, 20 We

Required facilities:

Beamer. For field excursions: transportation, lodging, food

Methods of evaluation:

In writing: 50%. Presentation: 10%. Report of fieldwork: 40%

Literature:

M. Borgerhoff Mulder & P. Coppolillo, 2005. Conservation: Linking Ecology, Economics and Culture. Princeton University Press.

Course content:

1. Introduction
2. The purpose of nature conservation
3. Methods in nature conservation
4. International conventions and organizations regarding nature conservation
 - Convention on Biological Diversity (CBD)
 - IUCN specialist groups, categories of protected areas
 - UNESCO, Man and Biosphere Reserves
 - CITES

- Conservation NGO's, WWF, CI and others
- 5. Surinamese legislation regarding nature conservation**
 - The Game Law
 - The Nature Conservation Law
 - The Forest Act
- 6. History of nature conservation in Suriname**
- 7. Authorities, institutes and organization related to nature conservation in Suriname**
- 8. The present day protected area system**
 - Detailed overview
 - A representative system for biodiversity?
- 9. Management plans**
- 10. Zoning for nature conservation**
- 11. Research and monitoring for nature conservation**
- 12. Working with the local communities**
- 13. Recreational hunting and fishing**
- 14. Subsistence hunting and fishing and the bush meat trade**
- 15. Wildlife trade**
- 16. Nature conservation management and eco tourism**
- 17. Education and awareness**
- 18. Databases for nature conservation management**
- 19. Improving nature conservation management in Suriname**

Title: Pharmaceutical biology

Semester: 3

Credit point (ECTS):5

Learning objectives:

At the end of this course, the student will be able to go into the depth of one topic in the field of natural products and medicinal plants by writing an essay based on a literature search.

Prerequisite knowledge:

-

Methods of educations:

20 Co, 10 We

Required facilities:

Auditorium, Laboratory facilities

Methods of evaluation:

The student has to write a review on a specific subject in the context of current literature, based on personal experience.

Literature:

Will be supplied

Course content:

Natural product derived pharmaceuticals

Investigation of problems of interest in Pharmacognosy.

An in-depth discussion of advances in knowledge of plant and animal materials with biological properties of interest to pharmaceutical scientists.

Techniques used for identification and determination of structure of substances of natural origin.

Quality and Efficacy of Herbal Medicinal Products

Quality of herbal medicinal products from a regulatory perspective

Methods in Natural Product Drug Discovery
Anticancer Drugs from Plant and Microbial Sources
Bioassays in Pharmacognosy
Quality Control of Herbal Medicines
Resources, searching methodology and evaluation of scientific information of medicinal plants. Conduct a specific study in designated topics under supervision.

Title: Project management

Semester: 3

Credit point (ECTS): 3

Learning objectives:

The aim of this course is to provide students with an overview of techniques and means that are available for the starting, executing, follow up and adjusting of research projects.

Prerequisite knowledge:

-

Methods of educations:

20 hours theory and 10 hrs of practical work (assignments).
Students are divided into groups of maximum 3 persons to analyze a case study, and to prepare a report and presentation. The assignments and goals of each group are defined; and preparation of the reports, presentation in class and discussion of results.
Lecture with multimedia support. Lecture notes, presentations and assignments are available at the AdeKUS Electronische Leeromgeving at <http://moodle.uvs.edu/> and are also available at the secretary of the Masterprogram in SMNR, FTeW, Building 16, Room 56.

Required facilities:

-

Methods of evaluation:

Assignment and final presentation by the students on case study.

Literature:

Jack R. MEREDITH and Samuel J. MANTEL. PROJECT MANAGEMENT : A Managerial Approach (7th ed) (International Student version), John WILEY & Sons, 2010 (ISBN 978-0-470-40026-5)

MSProject software

Course content:

- General concepts of project management; Project planning, scheduling and controlling by deterministic models and by probabilistic models; Use of computer software in project management and planning; Project budget; Management of resources; Project control; Project evaluation techniques; Cost benefit analysis; Valuing the environment; Irreversibility, risk and uncertainty.
- Writing project proposals

Title: Remote sensing

Semester: 3

Credit point (ECTS): 5

Learning objectives:

The aim of this course is to acquire the most appropriate remote sensing data and extract geo-information from such data and create a firm basis for successful integration of remote sensing in the field of natural resources. This course gives the state of the art of earth observation techniques and image processing methods, applied to natural resources management problems

Prerequisite knowledge:

Good computer skills

Methods of educations:

20 hours theory and 10 hrs of practical work (assignments).
Lecture with multimedia support. Lecture notes, presentations and assignments are available at the AdeKUS Electronische Leeromgeving at <http://moodle.uvs.edu/> and are also available at the secretary of the Masterprogram in SMNR, FTeW, Building 16, Room 56.

Required facilities:

Computer lab, beamer, white board, GIS software, RS software

Methods of evaluation:

Written examination, and assignments with final presentation by the students on a case study. Written exam (60%), practical exercises/assignments with case study (40%)

Literature:

1. Remote sensing and image interpretation, Lillesand T.M., Kiefer, R.W. and Chipman, J.W., 2003,Wiley (ISBN: 471-25515-7)
Software: Idrisi, ArcGIS, Matlab

Course content:

1. Background principles of tele-detection: why remote sensing, physical principles of earth observation, energy sources, radiation principles, energy interactions, data acquisition and interpretation
2. Sensors and systems: physics, sensors and platforms; aerial cameras and photography; multi-spectral scanners: whiskbroom and push broom
3. Remote sensing scanning techniques: optical spectrum, multispectral, thermal, and hyperspectral
4. Data used in remote sensing, image classification, processing, interpretation and corrections
5. Visualization and analysis: image enhancement and visualization; visual image interpretation; digital image classification

Title: Renewable energy systems

Semester: 2

Credit point (ECTS): 5

Learning objectives:

The aim of this course is that students are able to assess the impact of using technical systems for renewable energy systems, to achieve knowledge of unconventional energy converters, to evaluate the use of renewable energy technology in relation to the resource usage, to manipulate computer models of energy systems to determine the likely effect of varying input parameters on energy output or economic viability.

Prerequisite knowledge:

Physics, electrical energy and power

Methods of educations:

20 hours theory and 45 hrs of practical work (assignments)
Lecture with multimedia support. Lecture notes, presentations and assignments are available at the AdeKUS Electronische Leeromgeving at <http://moodle.uvs.edu/> and are also available at the secretary of the Masterprogram in SMNR, FTeW, Building 16, Room 56.

Required facilities:

Pc with simulation software, test system

Methods of evaluation:

Written or oral exam, test reports, project paper.

As part of your project you will have experience of writing a detailed feasibility study of an energy project, including an assessment of its technological, economic and environmental aspects.

Literature:

1. Renewable Energy, Power for a sustainable future, Godfrey Boyle
(ISBN 0-19-926178-4)
2. Study guide: Renewable Energy (ISBN: 978079227111)

Course content:

Thermodynamics of Energy conversion
Latent heat state changes
Chemistry and biology of biomass and biofuels
Physics of wind energy
Physics of solar energy
Physics of other sources of energy: waves, tides, hydro, geothermal energy
Technical systems for solar energy utilization
Thermal collectors
Operation
Operating characteristics of photovoltaic systems
Operating characteristics of wind systems
Operating characteristics of hydro systems
Operating characteristics of bio-fuels
Operating characteristics of hybrid systems
Sizing renewable energy systems with the help of simulation program
Simulation of thermal solar
Simulation of photovoltaic systems and/or wind power and/or fuel cells
Greenhouse gas limiting technologies
Co-generation, Capturing and sequestering CO₂

Title: Sustainable farming systems

Semester: 3

Credit points (ECTS): 5

Learning objectives:

- to be familiar with the term *sustainability* and *sustainable development* (definitions and history) and its three dimensions: ecological, economic and social;
- understanding economic, environmental and social impact of agricultural cropping systems;
- focusing on *economical aspects*:
 - understand how sustainable practices can affect farm profitability (especially with respect to – domestic and export – markets for sustainable production);
 - being able to evaluate hidden costs of conventional, mono-cropped, high-input agricultural systems (environmental and social externalities);
- focusing on the *environment*:
 - understand principles of agro-ecology and biodiversity
 - understand ecological assessment and interactions in the agro-ecosystems;
 - being able to perform ecological analysis to cropping systems (introducing the DPSIR-model: Driving Forces, Pressure, State, Impact and Response);
 - introduce key agro-ecological management practices, including soil and fertility management, crop rotation and integrated pest management
- focusing on the *society*:
 - understand impact of different cropping systems on health and livelihoods of agricultural producers;
 - learn how different cropping systems affect global and local nutritional status problems of malnutrition, diet diversity);
- focusing on the *institutional framework*:

- understand the role of national and international NGO and government bodies in promoting or impeding sustainable cropping systems;
- Discussing case studies:
 - understand sustainability aspects of genetically modified organisms (GMO) and discuss the major arguments for and against the use of GMO;
 - to be able to make a sustainability assessment of real-life and local cropping systems;
 - to build teamwork and use technological skills in the development of a (hypothetical) sustainable farming system in the national context.

Prerequisite knowledge:

Crop production, Livestock production, ecology, soil fertility, soil microbiology, pest control, plant physiology, agro-economy

Lecturer (s):

Lydia Ori, Ph.D.

Teaching Methods:

Lectures, discussions, you-tube clips, videos, case studies
25 hours lectures and discussion, 20 hours lab/field trips

Required facilities:

Classroom, field trip, experimental plot/site

Evaluation methods:

3 reading assignments each will contribute to 15 % of the final grade;
1 group project (30%); individual paper on a selected topic on integrated farming systems (40%).

Required Textbook(s):

National Research Council. Sustainable Agriculture and the Environment in the Humid Tropics .

Hatfield, J.L. & Karlen, D.L. (1993). Sustainable Agriculture systems.
Required Literature Readings:

Board on Agriculture & Natural Resources. (2010) Toward Sustainable systems in the 21st Century.

Hatfield, J.L., and Karlen, D.L. (1993). Sustainable Agriculture Systems.

International and Pan-American Convention. (2005). Millenium Ecosystem Assessment.

Mikkelsen, K.O. (2005). Sustainable Agriculture. A Natural Farming System in the Tropics.

Teja Tscharntke et.al. (2005). Landscape Perspectives on Agricultural Intensification and Biodiversity-Ecosystem Service Management. *Ecology Letters* 8.

Athanasiou et al. (2012). Sustainable Farming Systems vs Conventional Agriculture. FEI of Western Macedonia, Florina Branch, Florina, Greece.

Course content:

Introduction to sustainable development; Aspects of sustainable cropping systems: Economics of sustainable agriculture
Social and ecological impact of cropping systems
Use of eco-systemic services
Concepts & principles of agro-ecology
Use of biodiversity to manage resource availability and pest management
Criteria to design next cropping systems
Policy issues in sustainable agriculture
Ethics and agriculture

Title: Scientific communication

Semester: 2

Credit point (ECTS): 3

Learning objectives:

The aim of this course is to develop students' writing and reporting skills for scientific and non-scientific purposes.

Prerequisite knowledge:

-

Methods of educations:

15 hours theory and 20 hrs of practical work (assignments)

Lecture with multimedia support. Lecture notes, presentations and assignments are available at the AdeKUS Electronische

Leeromgeving at <http://moodle.uvs.edu/> and are also available at the secretary of the Masterprogram in SMNR, FTeW, Building 16, Room 56.

Required facilities:

-

Methods of evaluation:

Five assignments: a prepared/discussed thesis work, paper, poster, presentation, research proposals.

Literature:

1. Davis, M. (2005). Scientific Papers and Presentations. USA, Massachusetts, Academic Press, 356p.
2. Luellen, W.R. (2001). Fine-Tuning your Writing. USA, Madison, Wise Owl Publishing Company, 346.
3. Malmfors, B., Garnsworthy, P. & Grossman, M. (2002). Writing and Presenting Scientific Papers. Nottingham, UK, Nottingham University press, 133p.

4. Chicago (The) Manual of Style (2003). 15th Edition, USA, Chicago, The University of Chicago Press, 956p.
5. Ebel, H.F., Bliefert, C. & Russey, W.E. (1990). The Art of Scientific Writing. Germany, Weinheim, VCH, 493p.
6. Gibaldi, J. (2003). MLA Handbook for Writers of Research Papers. USA, New York, The Modern Language Association, 361p.
7. Guidelines for the Composition of Essays, Theses and Dissertations (2007 edition),
<http://theo.kuleuven.be/docs/Guidelines23.06.2005.pdf>

Course content:

Scientific writing and manuscript analysis, research methodology and research methods;

Guidelines for research papers and poster presentation: an academic writing style emphasizing clarity, accuracy, and logic; basic principles of organization and development in academic writing; structure and organization of research papers; and proper attribution of source material;

Guidelines for oral presentation;

Writing research and grant proposals;

Ethics, plagiarism-falsification-fabrication;

Conversations and meetings: conversational techniques (relationships in a conversation, verbal and non-verbal signals, good/bad news conversation, the evaluation conversation), meeting style

Title: Sustainable development

Semester: 1

Credit point (ECTS): 3

Learning objectives:

The aim of this course is to introduce students in the concepts, policies and regulations of sustainable development, sustainable development of natural resources, to the ways in which the international community reacts to environmental problems and other world issues (e.g. global climate change, food security, energy security, water security, biodiversity, climate politics and shifting energy regimes, desertification, environmental degradation and violent conflicts) including political, social and economic aspects in SD.

Prerequisite knowledge:

-

Methods of educations:

20 hours theory and 10 hrs of practical work (assignments)
Lecture with multimedia support. Lecture notes, presentations and assignments are available at the AdeKUS Electronische Leeromgeving at <http://moodle.uvs.edu/> and are also available at the secretary of the Masterprogram in SMNR, FTeW, Building 16, Room 56.

Required facilities:

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Methods of evaluation:

Assignment 1: write a paper (max 3 pages) that addresses the questions on the case of '*Sustainable Development Policy*'

Literature:

- Natural resources and environmental economics, Perman, R. et al, Pearson Addison Wesley.
- Achterberg, W., Samenleving, Natuur en Duurzaamheid. Een inleiding in de milieufilosofie. Van Gorcum, 1994.
- Beck, U. De wereld als risicomaatschappij. Essays over de ecologische crisis en de politiek van de vooruitgang. De Balie, 1997.
- Brandt, W., 'North-South: A Program for Survival'. In: Report of the Independent Commission on International Development Issues. Cambridge, Massachusetts, MIT Press, 1980.
- Carson, R., Silent Spring. Greenwich, Connecticut, Fawcett Publications, 1962.
- Cech, J., 'Media en duurzame ontwikkeling'. In: Voorbereidende tekst voor het FRDO-symposium Rio+10 in België: de kloof tussen verbintenissen en beleid. Brussel, 14 juni 2001.
- Daly, H.E., Toward a Study-State Economy. San Francisco, Freeman, 1973.
- Derkse, W.F.C.M., 'Duurzame ontwikkeling? Reflecties rond een missie'. In: Inaugurele rede. Technische Universiteit Eindhoven, 1995.
- Ehrlich, P.R., The Population Bomb. New York, Ballantine Books, 1968.
- Glasbergen, P. and R.J.M. Cörvers, 'Environmental problems in an international context', In:
- Glasbergen, P. and A. Blowers (eds.), Environmental Policy in an International Context.
- Perspectives. London, Arnold, 1995.
- Goldsmith, E. et al., A Blueprint for Survival. Penguin Books, Harmondsworth, 1972.
- Groene, A. de, 'Bewustwording en betrokkenheid. De rol van hoger onderwijs in transities naar een duurzame samenleving'. In: Inaugurele rede Hogeschool Zeeland, 2003.
- IUCN, UNEP, WWF, World Conservation Strategy. Living Resource Conservation for Sustainable Development. Gland, Switzerland, IUCN, UNEP, WWF, 1980.
- IUCN, UNEP, WWF, Caring for the Earth. A Strategy for Sustainable Living. Gland, Switzerland, IUCN, UNEP, WWF, 1991.

- Jacobs, M., 'Sustainability and "The market". A typology of environmental economics'. In: Eckersley, R. (ed.), Markets, the State and the Environment: towards integration. London, Macmillan, 1995.
- Kasteren, J. van, 'Duurzame technologie. Ontwikkeling van een houdbare wereld'. In: De Wetenschappelijke Bibliotheek van Natuur & Techniek, 2002.
- Korthals, M., Duurzaamheid en democratie (inaugurele rede). Landbouwuniversiteit Wageningen, 1994.
- Lijmbach, S., M. Broens en D Hovinga in samenwerking met M. Margadant-van Arcken, Duurzaamheid als leergebied.
- Conceptuele analyse en educatieve uitwerking. Universiteit Utrecht, 2000.
- Meadows, D.H. et al., De grenzen aan de groei, Rapport van de club van Rome. Utrecht, Spectrum, 1972.
- Mishan, E.J., The Costs of Economic Growth. London, Staples Press, 1967.
- Opschoor, H., Na ons geen zondvloed. Voorwaarden voor duurzaam ruimtegebruik. Kampen, Kok Agora, 1989.
- Ponting, C., Een groene geschiedenis van de wereld. Amsterdam, Amber, 1992.
- Reijnders, L., Naar een duurzamere technologische ontwikkeling.
- Inaugurele rede Open Universiteit Nederland, 1999.
- RMNO, Duurzame ontwikkeling in onderwijs en onderzoek, Advies - van de RMNO, nummer 149. Rijswijk, 2000.
- Verbruggen, H. Mondiale duurzame ontwikkeling: efficiëntie en verdeling (inaugurele rede). Amsterdam, Vrije Universiteit, 1995.
- Vlasman, A. en I. Dankelman, 'Denkraam voor Duurzame Ontwikkeling. Duurzame ontwikkeling en toekomstdenken. Een inleiding'. In: Vakreview duurzame ontwikkeling. Netwerk Duurzaam Hoger Onderwijs, UCM/KUN, 2002.
- Vroemen, J.J.G.M., 'Milieuvoortlichting via de massamedia'. In: Cövers, R.J.M. et al., Milieucommunicatie. Heerlen, Open Universiteit Nederland, 1996.
- VROM, Nationale Strategie voor Duurzame Ontwikkeling. Verkenning van het Rijksoverheidsbeleid. Den Haag, 2002a.

- VROM, Nationale Strategie voor Duurzame Ontwikkeling. Maatschappelijke Verkenning. Den Haag, 2002b.
- Wiersma, D., 'Milieu-economie: gedragsbeïnvloeding door prikkels'. In: Cörvers, R.J.M. et al., Basiscursus milieukunde. Heerlen, Open Universiteit Nederland, 1993. World Commission on Environment and Development (WCED), Our Common Future. Oxford University Press, 1987.

Course content:

Concepts of sustainability and sustainable development (PART 1, chapter 4 of Perman, R.)

Origins of the sustainability problem (PART 1, chapter 2 of Perman, R.)

Ethics, economics and the environment (PART 1, chapter 3 of Perman, R.)

Concepts, policies and regulations of SD

The emergence and growing global acceptance of sustainable global development is outlined on the basis of the 'milestones': Limits to Growth, United Nations Conference on the Human Environment, Brundtland-rapport Our Common Future, United Nations Conference on Environment and Development, World Summit on Sustainable Development.

The multi-dimensional nature of sustainable development is elaborated departing from an ecological, an economic and a socio-cultural dimension, with inclusion of core empiric knowledge concerning the Surinamese situation.

The Brundtland definition of sustainable development is discussed, along with an explanation why the quest for sustainable development, in addition to objective knowledge, is a matter of normative principles and reasoned choices. These principles are not separate from a civil and structural framing, and from the need to local adaptation. Guiding principles for achieving a sustainable society are identified.

The role of the actors in the change towards sustainable development (governments, producers, consumers, non-governmental organizations, educational institutions, media, citizens)

is explained. The following terms are defined: sustainability, development, sustainable development, environmental limits, social needs, uncertainty issues, development issues, distribution issues, education, sustainable development and community development concepts and participatory decision-making.

There is a current picture of the Surinamese situation regarding sustainable development and the vision of sustainable development as a systematic model for environmental issues.

Title: Thesis

Semester: 3-4

Credit point (ECTS): 30

Learning objectives:

The aim of this course is to conduct a small-size research project, to oblige students in conducting a review of related literature, to collect data and/or analyze data or critically evaluate secondary data, to process and interpret data or evaluation, and to summarize the objectives, methods, materials, results and discussions into a dissertation (research report).

Prerequisite knowledge:

-

Methods of educations:

240 hrs of practical work (master thesis research).

A research topic is chosen in close deliberation with the responsible staff. All students will be subjected to the process of conducting a research project and writing a dissertation. Lecturers make every year a lists of possible research topics, linked to on-going research within AdeKUS. They provide a short description of these topics to the students, who make a choice out of them. Course web-site:
<http://moodle.uvs.edu/>

Required facilities:

-

Methods of evaluation:

Quotation on submitted thesis and oral presentation.

Literature:

-

Course content:

Students get familiar with research methodology and are able to independently set up research projects by formulating: the state of the art; problem statement (background and justification); hypothesis and objectives of the work; setting up a research design; data demands and information sources, carrying out the experimental work, methods and procedures; data analysis; interpreting the data; expected results and finally writing a research report worthy of publication in a peer reviewed journal. Students prepare an oral presentation based on these findings and present it at a (scientific) public meeting.

Title: Water resources management

Semester: 3

Credit point (ECTS): 5

Learning objectives:

The aim of this course is to educate students of methods used in water resources management and obtains interdisciplinary understanding of integrated water resources management.

Prerequisite knowledge:

BSc: hydrology, watervoorziening en zuivering, geohydrology, statistiek, numerieke analyse

MSc: climatology and hydrology, environmental pollution and sanitation, applied mathematics, applied statistics

Methods of educations:

35 hours theory and 10 hrs of practical work (assignments)

Lecture with multimedia support. Lecture notes, presentations and assignments are available at the AdeKUS Electronische Leeromgeving at <http://moodle.uvs.edu/> and are also available at the secretary of the Masterprogram in SMNR, FTeW, Building 16, Room 56.

Required facilities:

-

Methods of evaluation:

Written exams, lab and home assignments including reports of excursions. Final mark: written exam 60%; field/laboratory experiments 20%; assignments with presentation/paper/report 20%. Assignment and final presentation by the students on case study.

Literature:

Textbooks:

Water resources systems planning and management - An introduction to methods, models and applications, D. L. Loucks and E. van Beek, WL-Delft hydraulics, 2005, Unesco
Integrated water resources management plans - training manual and operational guide, March 2005, Cap-Net, GWP, UNDP
(http://www.cap-net.org/TMUuploadedFiles/FileFor67/IWRM_Plan.doc)
World Bank, Water Resources Management, a World Bank Policy Study, 1993
(ISBN 0-8213-2636-8)
Principles of Water Resources: History, Development, Management, and Policy., Cech, T.V., 2003. Wiley: NY.
World Bank's 2003 Water Resources Sector Strategy
Heathcote IW. 1998. Integrated Watershed Management: Principles and Practice. Wiley.
Debarry, PA. 2004. Watersheds: Processes, Assessment and Management. Wiley
EPA 2006. Handbook for Developing Watershed Plans to Restore and Protect Our Waters. United States Environmental Protection Agency, Office of Water, 30 Nonpoint Source Control Branch, Washington, DC 20460

Assignments with report and presentation:

Preparing a water budget for a watershed using a water balance model

Complete analysis of an existing watershed (e.g. water resources related problems identification, data collection, analysis, mapping, GIS, modeling, system analysis, economic valuation, IWMR data, planning of water projects, waste water treatment plant etc).

Doing a irrigation demand analysis and future projection using models

Hydrological measurements and analyses of data

Software models:

Water balance model WatBal, CROPWAT

Video's: GWP

Other tools:

- Virtual CAmpus In hydrology and water REsources management (Vicaire): Basic and applied hydrology for engineers
<http://hydram.epfl.ch/VICAIRE/>
- IWRM resources management: <http://www.gwptoolbox.org>

Course content:

1. Overview:

- History of global water resource development: ancient water systems, trends in water use (irrigation development, green revolution and irrigation expansion, industrialization, blue revolution), factors determining water demand and management (e.g. population growth, land use changing, urbanization, intense agriculture, farming, and industrialization), water scarcity, water values, water use efficiency, reclaimed water, rainwater and floodwater harvesting techniques, grey-water use of recycled water and recycling systems, non-conventional water, re-use of wastewater, conservation of water
- Surface and ground water resources utilization and potential, type of water uses and the balance of supply with the demand for drinking, irrigation, industry, ecological-forest systems (wetlands, biodiversity), major sustainability issues, in Suriname.

2. Water resources planning and management:

- Concepts of sustainable water resources management, sustainable use of water resources (household, agriculture, urban areas and industries: principles and concepts of efficient water use, techniques and systems of water use efficiency)
- System components, planning scales, sustainability
- Strategy for sustainable water management for groundwater, lakes, rivers, coastal waters in a resource perspective, urban, rural and industrial water use and management.

3. Tools and techniques in water resources management:

- Instruments, networks, data sampling, data collection, data analyses, GIS applications
- Introduction to water resources system modeling:

- Modeling of water resources systems: types of models, data needs, integration of sub models of different water system components
- Modeling methods and simulations for evaluating alternatives, optimization methods, fuzzy optimization
- Post-processing of model simulation results (in support of the decision making process) based on concepts in probability, statistics and stochastic modeling, model sensitivity and uncertainty analysis, model performance evaluation
- Methods for real-time forecasting and control

4. River basin planning, modeling and analysis:

- Physical and terrestrial systems of basins, land use impacts (forestry, agriculture, mining, dams and diversions, urbanization, transport development)
- Basin concepts, modeling the natural resources system and infrastructure, modeling the socio-economic functions in a basin, river basin analysis
- Conservation and planning of river basins

5. Agricultural water management:

- Sources of irrigation water (reservoir, groundwater, surface water); water loss, conveyance (earth and concrete channels, pipelines); sprinkler, drip technologies, Rain fed agriculture. Optimization potential of agricultural water use; rainwater harvesting and storage, soil water management, Irrigation and drainage: technologies and management
- Irrigation methods, costs, efficiencies, water losses, impacts (terrestrial, surface water, groundwater), Salinization: Process, mitigation, management, Irrigation management: crop water demands, scheduling, water allocation, economic aspects, institutional aspects, Water use efficiency and water productivity, Field efficiency versus basin efficiency, Physical efficiency vs. water productivity, Implications for agricultural water management
- Simulation models of water use efficiency, irrigation methods, water balance, crop water requirement, irrigation water requirement, rainwater harvesting techniques, flood-water harvesting techniques, Irrigation water demand/forecasting

6. Flood management:

Introduction, hydrological extremes, variability of hydrology and climate, statistical description, definition and types of floods, causes of floods: hydrological risks and climate change, vulnerability and flood damage analysis (socio-cultural, economic, environmental aspects), approaches and techniques to manage these natural occurrences: floodplain zoning and management, set-back levees and flood easements, environmental enhancement and restoration as part of floodplain management, opportunities for conjunctive use and recharge as part of floodplain management, structural flood management measures; levees, walls, floodways, bank stabilization, flood forecasting and monitoring, flood emergency services, flood damage reduction, mitigation and adaptation strategies (evaluation and comparison of different measures), flood risk management, floods forecasting and warning systems, flood management programmes and project management, modeling and GIS applications

7. Drought management:

Introduction, definitions and types of droughts, meteorological droughts, hydrological droughts, agricultural droughts, impacts of droughts on rainfed and irrigated agriculture, forestry, grassland, ecosystems, drought impacts, defining droughts, causes of droughts, drought indices, drought triggers, virtual drought exercises, adaptation strategies and drought risk management, land use systems and drought management, drought and desertification, role of climate change.

- Cases (*to be read by students*): Managing Floods in the Netherlands, Flood Frequency and Protection, The Rhine River Basin (case: Problems and Solutions, Managing Risk, Storage, Discharge-Increasing Measures, Green Rivers, Use of Existing Water Courses, The Overall Picture, Dealing With Uncertainties), Flood Management on the Mississippi, Flood Risk Reduction, Decision Support and Prediction, Floodplain Modeling

8. Principles of integrated water resources management (IWRM):

- Water as a social, economic and environmental good
- Water legislation: conflicts, water laws and institutions related to water resources allocation and protection (e.g case waterschappen Nickerie), hydro-politics of water (international river systems, trans-boundary water transfers), water security, water ethics, human rights to water (MDG), access and equity.

The Faculty of Technology (FTeW) of the Anton de Kom University of Suriname was established in 1976. The FTeW offers since 1976 bachelor of science education programmes, and since 2009 master education programmes and provides also research and services in different fields of applied technology, such as geology and mining, mechanical engineering, environmental sciences, infrastructure, agricultural production and electrical engineering.

The mission of the FTeW is:

The Faculty of Technology contributes in a pro-active way to technological innovations, and the promotion of science and development in the community. It allows its staff, students and stakeholders the freedom to develop activities in the field of education, research and services, while at the same time observing the moral standards set by the academic and international community. Hereby the Faculty equally takes into consideration the current social needs and developments in Suriname.

The vision of the FTeW is:

- The Faculty of Technology is a leading scientific and technological institute in Suriname at the core of sustainable development aimed at the progress and welfare of Surinamese society
- It educates high quality academics who are of immediate professional relevance in various domains of Surinamese society
- It provides the basis for advance education after the MSc level
- It provides for an academically stimulating environment, whereby sound and pro-active research and services are developed, and
- It takes into consideration the current needs of society as well as the national and international trends and developments in the field of science and technology.

More information

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| Anton de Kom University of Suriname - FTeW | http://adekus.uvs.edu/ |
| MSc in Sustainable management of natural resources | http://vlir-iuc.uvs.edu/smnr/ |
|  vlirus SHARING MINDS, CHANGING LIVES | http://vlir-iuc.uvs.edu |
| Government of Suriname | http://gov.sr/ |
| Academic journal of Suriname | http://www.adekusjournal.sr/ |

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