

Alternative Course Guide

Master Earth Sciences: Term 2

Last updated: 23-05-2017



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Introduction

This is the course guide made by students of the Education Committee of the U.A.V. It serves as an alternative for the [official course guide](#). Here you can read the students' positive and negative experiences, whether their courses fitted their track or not, and important points from the evaluations, like the work load. The alternative course guide is updated every period by the U.A.V.'s Education Committee. It is not complete yet, but we hope you can nevertheless use it to make better choices for your master's program.

In this guide, all the possible subjects of the first period of the Master programme can be found. Underneath each subject is a personal account of a particular student's experience and reason for choosing the course.

From 2016-onwards it is possible to have a subject package that does not comply with a particular track (also known as a *recommended study path*), but rather a combination of various elements of each track. You are invited to literally think 'outside the track box'; take a look at subjects outside your study path, or even program. Within the first month of starting your master, a rough outline of how you are going to fill in the next coming two years needs to be sent to the coordinator.

Timeslot A

Theoretical Seismology (GEO4-1408)

Overview

Timeslot	A	Mean rating last year	8.8
Teacher	Arwen Deuss	Mean work load last year	16-20 hours
Contact	a.f.deuss@uu.nl	Success rate last year	10 out of 12

Acquired knowledge and skills

Knowledge: A follow-up on the bachelor course Seismology with a strong theoretical aim. The physics and mathematics behind the working of seismological waves is discussed, giving insight in how they travel through the earth. The course description on Osiris is adequate.

Skills: High-level mathematical and physical understanding of how seismic waves travel and deform the earth.

Assessment, structure and work load

The assignments given during the practical sessions had to be handed in for grading during the course (30%). The assignments require a dedication to bite down and figure out every last step of difficult mathematics. The course ended with a final test (70%) based on the assignments. If you don't work structurally at home to finish the assignments, you will have a peak load at the end.

Experiences

The lecture skills of the teacher are very good. She routinely checks whether the group understands, otherwise she explains the concept in another way. Feedback on the assignments is given if you discipline yourself and hand them in a minimum of 2 weeks before the course. The assistant was very helpful and was easy to approach outside practical sessions for questions.

Astronomical Climate Forcing & Time (GEO4-1412)

Overview

Timeslot	A	Mean rating last year	8
Teacher	Dr. Frits Hilgen	Mean work load last year	16-20 hours
Contact	f.j.hilgen@uu.nl	Success rate last year	

Acquired knowledge and skills

Knowledge: This course gives you more understanding of climate variability and in particular how astronomical cycles influence climate. You gain advanced knowledge about the Milankovitch cycles and how they influence climate.

Skills: Improved Excel skills during the computer practicals. You also make your own geological timescale during one of the practicals. Another skill you gain in this course is to recognize astronomical cycles in a sedimentary record.

Assessment, structure and work load

The course is structured by lectures and computer practicals. Furthermore, the course has a midterm test (20% of the final grade) and a final test (45% of the final grade). The remaining 35% of the grade is equally divided over an essay and oral presentation. The work load is evenly spread throughout the period.

Experiences

The course was good organized and very useful for future sedimentologists. I learned a lot during this course and acquired new skills. I really understand the mechanism of astronomical cycles influencing climate a lot better. Frits Hilgen is also a very dedicated teacher with interactive lectures and supplying summaries of the lectures for the exam.

Morphodynamics of Tidal System (GEO4-4435)

Overview

Timeslot	A	Mean rating last year	7.9
Teacher	Dr. M van der Vegt	Mean work load last year	21-25 hours
Contact	m.vandervegt@uu.nl	Success rate last year	24 out of 30

Acquired knowledge and skills

Knowledge: physical processes behind tidal systems, morphological and hydrodynamic processes associated with tidal processes

Skills: hydro- and morphological modelling with for instance MATLAB, scientific writing, oral presentation and basic laboratory experience.

Assessment, structure and work load

This course is rather challenging with a large amount of information in the slides containing some very theoretical and physical subjects. The practical's and reports are the main reason for the large work load. The reports are combined with the result of the final written exam to form the grade for this course.

Experiences

This is one of the core courses for the track Coastal Dynamics and Fluvial systems. The course is found to be very useful and interesting with an average grade of 7.8, despite having a high work load. The main complaints are about the lectures on the more theoretical and mathematical subjects, these subjects are harder to understand, especially without the practicals that are usually present in other subjects. The track is recently reformed and this is one of the new courses, so future years could result in an altered course as is mentioned by the teacher in the evaluation.

Quantitative Water Management (GEO4-6001) (not updated)

Overview

Timeslot	A	Mean rating last year	7.1
Teacher	Jelle Buma, MSc	Mean work load last year	16-20 hours
Contact	j.buma@uu.nl	Success rate last year	

Acquired knowledge and skills

The course focusses on the local and regional water management issues in the Netherlands (drainage) and internationally (management of reservoirs). Calculations regarding these fields are done during the course, as an application of the theory. Not only the theory is discussed, but also practical differences, such as conflicts between the theory and in-field application of techniques. Ofcourse, all of these will partly be discussed in the light of global change, both in a natural way (climate change) and with human interference (increased water needs).

Assessment, structure and work load

Experiences

Timeslot B

Tectonophysics (GEO4-1409)

Overview

Timeslot	B	Mean rating last year	6.3
Teacher	Dr. Rob Govers	Mean work load last year	21-25 hours
Contact	r.govers@uu.nl	Success rate last year	

***The course outline in OSIRIS is out-of-date. This course has been restructured and taught by Rob Govers.**

Acquired knowledge and skills

Knowledge: The course focusses on the physical aspects of general processes in the Earth's crust/lithosphere system (heat flow, driving forces and deformation of the lithosphere, stress, isostasy, flexure, dynamic topography etc.), as well as plate boundary processes and plate boundary evolution (dynamics of subduction, triple junctions, thermal-dynamic aspects of continental collision etc.). It emphasises on analytical and numerical models, and on geophysical, geodetic and geological observations that constrain these models. It also involves the study of several selected research papers.

Skills: You learn to analyse academic literature with a critical attitude, develop a working knowledge of the physical processes in the crust/lithosphere, as well as an ability to analyse models of physical processes in circumstances that don't require numerical methods.

Assessment, structure and work load

The course was structured with 2 hours of lecture and 2 hours of practical session per scheduled day, in which you have time to work on the given questions. The first part of the course was a theoretical introduction to the physical principles, needed to complete the questions, which was succeeded by an intermediate test (25%). The second part of the course focussed on discussing approximately 8 research publications and related theory ("surprise" test 5%). The final exam is worth 70%, and is supposed to cover all material covered in the course, but pay special attention to the research articles!

Experiences

Rob has a strong physical background and appears to expect the same from his students. He is a good lecturer, but passes through the theory fairly quickly.

Kinetic Processes (GEO4-1426) (not updated)

Overview

Timeslot	B	Mean rating last year	7.5
Teacher	dr. Thilo Behrends Prof. dr. Chris Spiers	Mean work load last year	16-20
Contact	t.behrends@uu.nl	Success rate last year	20 out of 22

Acquired knowledge and skills

Knowledge: You learn how to derive and apply quantitative expressions for describing the rates of biogeochemical processes, like Michaelis-Menten kinetics and the Arrhenius equation. Also the transition state theory will be explained (two weeks) and used. A few weeks before the exam dr. Spiers will teach one week, about kinetic processes in rock-fluid systems under non-hydrostatic conditions.

Skills: You will work with Excel.

Assessment, structure and work load

In the weeks before the Christmas break you will have graded assignments as homework. In the last two weeks before the Christmas break (so four lectures) there are guest lectures from Lubos Polerecky about statistical thermodynamics (which relates to the transition state theory). Directly after the Christmas break you will do a presentation of 45 minutes in groups of two. The presentation will cover a whole week of lectures. This presentation needs to be made in the Christmas break. After the week with presentation, you will get the contribution of Chris Spiers. The last week there is a guest lecture of Niels den Hartog (geochemical hydrogeologist).

Experiences

The variety of the course and the different aspects is nice. You see that kinetic processes are very important in many fields. The lectures given by Thilo are written on the blackboard. This means that the slides only have pictures and graphs on them without any text. So it is clever to be present at the lectures and to make notes! The homework assignments from Zhangs textbook (which will be online on blackboard) are not strongly related to the lectures. This makes them difficult. Tip 1.) You may use two A4 sheets with notes during the exam. Use them good, write so many things on it as you can. It really helps remembering the subject matter and you do not need to learn anything by hard. Tip 2.) For the homework exercises, some of the answers are presented at the back of the book. So that you can check if it is correct.

Timeslot C

Structural Analysis of Deformed Rocks (GEO4-1411)

Overview

Timeslot	C	Mean rating last year	7.8
Teacher	dr. Hans de Bresser prof.dr. Martin Drury prof.dr. Chris Spiers	Mean work load last year	21-25 hours
Contact	j.h.p.debresser@uu.nl	Success rate last year	34 out of 38

Acquired knowledge and skills

Knowledge: Structure and dynamics (micro-to-large scale) of brittle and ductile deformed rocks (de Bresser, Spiers); meaning of micro-structures in metamorphic terrains (Drury).

Skills: Metamorphic microscopy, making structured observations of deformed structures

The course description on Osiris is excellent. The course fits well into the Basins and Orogens and Earth Materials tracks.

Assessment, structure and work load

The course is very well-structured with two lectures, a practical session (computer or classroom; 35 %), and a home assignment (15%) every week, and one final exam (50 %). This resulted in a balanced work load. Because of the good structure, you do a lot and learn a lot, without experiencing a high pressure. The final exam was representative for the course content.

Experiences

All teachers were excellent; motivating students, providing structured assignments and are of course experts in their field. The course is research-oriented and can be useful for the MSc-fieldwork in period 4. You will get plenty of feedback, however in the last evaluation some people noted that the feedback on the last assignments arrived too late.

Vertebrate Evolution (Tetrapods) (GEO4-1514B)

Overview

Timeslot	C	Mean rating last year	8.3
Teacher	dr. W. Wessels prof. dr. J. Reumer	Mean work load last year	16-20 hours
Contact	w.wessels@uu.nl	Success rate last year	21 out of 22

Acquired knowledge and skills

Knowledge: Nearly the entire evolutionary history of vertebrate species is covered in this course. Through this a broad but yet detailed knowledge of vertebrate knowledge is obtained. Specifically the changes that can be observed in the skull are brought into focus and their relation to changes in the habitat.

Skills: Identifying fossil remains and determining their habitats.

Assessment, structure and work load

A two-hour lecture and four hour practical are spread over two days. At the end of course you are required to write a summarizing report of the practicals, which is graded. Furthermore a presentation and essay are required on a (freely) chosen topic. Students prepare two 'pop-up' lectures, or presentations, about a freely chosen subjects. These are must be 5 and 20 minutes long. The final exam consists of two parts. An exam on skeletal and dentary features followed by an open book exam on the whole course. The workload isn't staggering and well-spread over the course.

Experiences

The lectures are interesting, not only due to the content but also due to the qualities of the lecturers. The practicals greatly enhance the knowledge of species determination and are well supervised. Overall this is a fun and interesting class. It is not difficult to end this course with a good grade as long as you spend enough time on reading the material and writing the reports. Also included is a visit to a museum of Natural History.

Geology and Petroleum Geology of the North Sea (GEO4-1517A)

Overview

Timeslot	C	Mean rating last year	7.2
Teacher	dr. J. Trabucho Alexandre	Mean work load last year	16-20 hours
Contact	J.Trabucho@uu.nl	Success rate last year	27 out of 27

Acquired knowledge and skills

The course will provide an overview of the stratigraphic development of the North Sea area from pre-Carboniferous to Neogene: paleogeography, basin development, depositional environments, and stratigraphic framework based on exploration data such as well logs and seismic surveys.

Furthermore, the factors contributing to the North Sea being a successful hydrocarbon reservoir are discussed, such as the source rocks, reservoirs, seals, and trap configurations.

Assessment and work-load

Although the subject is not particularly difficult itself there are a lot of long lectures to be followed. Half of the course will be at the VU Amsterdam, and the other half in Utrecht. These will provide the bulk of the lectures but numerous other lecturers, from for example TNO and NAM, will be lecturing. Overall this is not a very difficult course but there is a lot of material to prepare for the final exam. The course also includes a small field trip to the Wessex basin of Southern England in which the evolution of a petroleum system can be seen in the field.

Experiences

A lot is learned about petroleum geology and the Dutch geology in general, which is very interesting. One of the downsides of the course is that it significantly overlaps with other petroleum courses. Another downside is that the subjects are relatively easy and offers not many academic skills. The field trip to England is a lot of fun and certainly one of the upsides of the course, especially if the weather is nice.

Unsaturated Zone Hydrology (GEO4-4417)

Overview

Timeslot	C	Mean rating last year	7.0
Teacher	prof. dr. M.F.P. Bierkens prof. dr. ir. S.M. Hassanizadeh dr. M.R. Hendriks W.W. Immerzeel	Mean work load last year	16-20 hours
Contact	M.F.P.Bierkens@uu.nl	Success rate last year	46 out of 50

Acquired knowledge and skills

Knowledge: The unsaturated zone is important because of for example groundwater recharge, infiltration and overland flow, for vegetation and agriculture. The course starts with the part of Martin Hendriks which covers the basics of unsaturated zone: soil physics, matric and preferential flow and infiltration. Mark Bierkens continues and discusses the determination of soil physical parameters and unsaturated flow equations. The last lectures by Majid Hassanizadeh are more physical and cover interfacial tension, capillary flow and a critical evaluation of unsaturated flow theories.

Skills: Students learn how to work with soil moisture and infiltration curves, how to work out simple unsaturated flow equations and how to set up force diagrams concerning capillary flow. Also the hydrological models 'Hydrus' and 'SWAT' are used.

Assessment, structure and work load

The course consists of lectures and practicals. Practicals have to be handed in and will be graded. Also students have to do duo presentations. There is a practical with the flow model Hydrus, about which students have to write a report. The course starts with basics, with is relatively easy for those who followed the BSc course Physical Hydrology. The level increases during the course and at the end of the course the (mathematical) level is high.

Experiences

Students who had the BSc course Physical Hydrology might think the level is too low at the beginning of the course. However, the second part covers new and more difficult subjects. The paper is graded, but the feedback is not much. Overall, the grades are high, probably because the presentations and papers are graded high or the final exam looks like earlier assignments/old exams.

Timeslot D

Dynamics of Basins and Orogens (GEO4-1418)

Overview

Timeslot	D	Mean rating last year	7.8
Teacher	dr. L.C. Matenco dr. P.Th. Meijer	Mean work load last year	16 – 20 hours
Contact	p.meijer@uu.nl	Success rate last year	30 out of 32

Acquired knowledge and skills

Knowledge: Mechanics (eg. isostasy) (Meijer) & interplay of lithosphere, crustal structures and sedimentation in basins and orogens (Matenco).

Skills: Presenting a scientific article in a structured way, first order recognition of syn- & post-rift sedimentation in seismic sections, basic physical modeling of isostatic processes. The course is not part of the Earth Materials track, but I found it very useful for my general geology knowledge. If you really like physics, it is advised to take the Tectonophysics course instead of this one.

Assessment, structure and work load

The course consists of weekly lectures and practicals (computer and classroom), and presentation sessions. The practicals, presentation, class participation and final exam graded. The part that scored worst over the last years was the uneven balance of workload over the course, but changes were made in the course to overcome this difficulty. Now, the course is well organized and has hardly any weak points.

Experiences

The two lecturers are very different in background and approach, which resulted in a course with a pleasant variety in between physics and case studies. I (following the track Earth Materials) learned many completely new things. The presentations were well-guided and led to scientific discussions. Sometimes I was overloaded with information, but the lecturers are always available for questions. Also the modelling assignments were found very useful for understanding the subjects.

Hydrogeological Transport Phenomena (GEO4-1433)

Overview

Timeslot	D	Mean rating last year	8.1
Teacher	prof. dr. ir. S.M. Hassanizadeh dr. A. Raoof	Mean work load last year	16-20 hours
Contact	s.m.hassanizadeh@uu.nl	Success rate last year	22 out of 30

Acquired knowledge and skills

Knowledge: The course starts with laws about dissolution and volatilization and continues with flow and transport equations: advection, degradation/decay, diffusion, dispersion and adsorption. At the end of the course there is a lecture about transport in the unsaturated zone. The course fits in a sequence of courses of increasing level: Principles of Groundwater Flow (Period 1), Hydrogeological Transport Phenomena and Environmental Hydrogeology (Period 4). *Skills:* In this course students learn how to come up and work out flow and transport equations for different situations and different initial and boundary conditions. The mathematical level is high. Students learn to think themselves, for example if you think a value is missing in the exercise, you have to search on the internet for an appropriate value yourself. Also transport modeling in Modflow is a topic. During the lectures there is referred to real problems and applications.

Assessment, structure and work load

Two times a week a four-hour lecture. Some exercises are included in the lectures. Every week students have to hand in assignments, which are graded. The work load was balanced, with a take-home exam before the Christmas break, and a final exam at the end of the course. These assignments are of equal or higher level than the exercises in the lecture. There also is an excursion to a contamination site, with a guest lecture, on which you have to hand in a report. However, as students find the field trip not a valuable addition to the course, it is likely to be left out in the future. Another guest lecture at the end of the course covers virus transport.

Experiences

Students think the didactical quality of Majid Hassanizadeh is very high. Students think the course is very instructive and of a high level. The lecture notes of Majid, which he sends to every student, are good. You are allowed to use them during the final exam. Overall, students get relatively low grades for their final exam, but the grades of the assignments compensate for this.

Estuarine Ecology (GEO4-1450) (not updated)

Overview

Timeslot	A	Mean rating last year	8.1
Teacher	dr. ir. C.J.M. Philippart	Mean work load last year	16-20 hours
Contact	k.philippart@uu.nl	Success rate last year	24 out of 24

Acquired knowledge and skills

Assessment, structure and work load

Experiences

Remote Sensing (GEO4-4408)

Overview

Timeslot	D	Mean rating last year	7.4
Teacher	prof. dr. S.M. de Jong dr. E.A. Addink	Mean work load last year	16-20 hours
Contact	s.m.dejong@uu.nl	Success rate last year	12 out of 29

Acquired knowledge and skills

Knowledge: remote sensing techniques and theory behind remote sensing

Skills: using hyper spectral images, scientific reports, oral presentation, spatial analysis with remote sensing products and quality analysis of remote sensing products

Assessment, structure and work load

The course starts with some lectures covering the basic subjects about remote sensing and hyper spectral analysis. After that the course consists almost solely of practical's in which a lot of different techniques are used. The presentation, excursion and the exam are all located towards the end of the course, but are spread-out enough to spread out the workload too. The practicals are responsible for the workload of 16-20 hours a week. The reports (10%), an oral presentation (10%) and the final exam (80%) are combined into the final grade of the course.

Experiences

The practical approach of this course is widely praised by the students with the excursion to ITC (as the highlight of the course). The quality of the lectures is one of the weaker points of the course. The computer exercises were found useful, but less feedback is received on the actual meaning of the processing methods you are using. Now, many of the exercises are explained step by step, which makes the exercises easy to do but also causes the students to think less about what is actually happening. The teacher mentioned this as one of the improvements for next year. The skills obtained in this course are extremely useful as mentioned earlier in.