

Master Course on Hydrology & Water Footprint Assessment

September 5 – November 11, 2016

The course is a 10-week course at Master of Science level and open to students and professionals from different disciplines. A Bachelor degree in some related field is required. External participants will join students following University of Twente's Master Programme in Civil Engineering and Management (Specialisation in Water Engineering and Management). The course language is English. The study load is 15 ECTS-credits (420 hours spread over 10 weeks).



The course consists of two parallel running parts: part I Hydrology and part II Water Footprint Assessment. Participants can register for the whole course or for one of the two parts.

Lecturers for Hydrology
Dr.ir. M.J. Booij – University of Twente
Drs. H.W. Grobbe - HW Grobbe Advies en Management
Dr. ir. F.H.M. van de Ven – Deltares/ TU Delft
Dr. Z. Vekerdy – ITC, University of Twente

Lecturers for Water Footprint Assessment
Prof.dr.ir. A.Y. Hoekstra – University of Twente
Dr. A.K. Chapagain – Water Footprint Network
Dr. A.E. Erkin – Water Footprint Network
Dr. W. Gerbens-Leenes – University of Twente
Dr. E. de Ruyter van Steveninck – UNESCO-IHE
J. Schyns, MSc – University of Twente
Dr. G. Zhang – Water Footprint Network

Blackboard site
Participants have online access to a Blackboard site that contains the latest course schedules, course materials, web links, etc. The site is also used for announcements.

Part I: Hydrology

Coordinator: Dr.ir. M.J. Booij – e-mail m.j.booij@utwente.nl

The aim of Part I of the course is to be able to describe and quantify various components in the hydrological cycle and apply this knowledge to determine availability and frequencies of amounts of water. More specific goals are:

- to recognise and quantify components of the hydrological cycle
- to evaluate amounts of water and corresponding frequencies
- to be able to interpret hydrological data
- to be able to estimate how much water runs off and how fast (surface and underground)
- to evaluate extreme conditions

Content of the course

The hydrological cycle from precipitation to river discharge is considered, in particular those links which are important for the civil engineer:

- components of the hydrological cycle (precipitation, evapotranspiration, infiltration, ground water flow, surface water flow)
- how often do extreme conditions occur?
- what can you measure, how can you measure it and how well are these measurements?
- how can you understand phenomena by means of simple models?
- how can you influence water flows?

Materials

1. Shaw, E.M., Beven, K.J., Chappell, N.A. and Lamb, R. (2010) Hydrology in practice, 4th edition, Spon Press, ISBN 978-0-415-37042-4, www.routledge.com/books/details/9780415370424.
2. Supplementary lecture notes Hydrology (195400100, lecture notes no. 846)
3. Individual assignments (made available through Blackboard)
4. Group assignments (made available through Blackboard)

Didactics

Lecturing and preparation (50 hrs), individual assignments + self-study (90 hrs), group assignments (60 hrs), field work (6 hrs), presentations (4 hrs).

Part II: Water Footprint Assessment

Coordinator: Prof.dr.ir. A.Y. Hoekstra – e-mail a.y.hoekstra@utwente.nl

Aim of the course

The aim of this part of the course is that participants develop understanding of the intricate relation between freshwater and the functioning of societies and economies at large, and the role governments, companies, farmers, investors and consumers have in achieving a sustainable, efficient and equitable use of freshwater systems. The course is characterised by an interdisciplinary approach, in which knowledge and techniques from different disciplines are brought together in order to arrive at an integral understanding of the impact of humans on freshwater systems and, vice versa, the societal and economic impact of freshwater scarcity and pollution. Substantial attention will be paid to the global and cross-sector dimension of water management.

At the end of the course the participant is supposed to:

- have a vision on what is sustainable, efficient and equitable allocation and use of freshwater;
- understand the global dimension of water use and allocation;
- understand the common pool character of water use;
- be able to formulate and evaluate water management strategies at river basin or national level;
- understand the links between water management and other policy domains (e.g. spatial planning, agricultural, energy, trade and tax policies) and understand the consequences of these links for policy making;
- be able to carry out a systematic analysis of the complex interactions between social and natural processes in a river basin;
- be able to assess the physical, social and economic effects of specific policy interventions;
- be able to develop management strategies in view of specific development objectives;
- understand the institutional framework in which planning and management take place;
- be able to carry out a Water Footprint Assessment for a country, river basin or product.

Content of the course

The course includes the following elements:

- Overview of the field of Water Footprint Assessment (WFA)
- WFA – blue, green & grey WF accounting
- WFA – sustainability assessment
- WFA – response formulation

- Integrated river basin management
- River basin game – water as a common pool resource

- Aquatic ecology & environmental flow requirements
- Globalisation of water roleplay
- The water footprint of nations
- The water footprint of food, feed, fibres, flowers and fuel
- Water footprint caps, benchmarks & fair shares

Materials

1. Hoekstra, A.Y. et al. (2011) The water footprint assessment manual: Setting the global standard, Earthscan, London. The book can be **freely downloaded** in different languages from www.waterfootprint.org. You can purchase a hardbound copy at a discount price of **30 euro** at the secretariat of the Water Department, room W114 in Building De Horst.
2. Hoekstra, A.Y. (2013) The water footprint of modern consumer society, Routledge, London. The book can be bought at a discount price of **25 euro** at the secretariat of the Water Department, room W114 in Building De Horst.
3. Presentations of all lectures in ppt or pdf, made available through Blackboard.

Assignment

The course includes an assignment for groups of 3-4 persons. The assignment is to carry out a quick-scan of the problems and possible solutions for a self-chosen case on water scarcity and/or pollution.

Didactics

Lecturing, exercises & discussion (46 hrs), assignment (60 hrs), student presentations & discussion (4 hrs), e-learning (4 hrs), self-study (96 hrs).

Certificate / Assessment

Based on participation in lectures, games, exercises and assignments, participants will receive a certificate of participation. In addition, if desired, participants can get a grade through an assessment. The assessment of Part I is carried out as follows: individual assignments (60%) and group assignments (2 students, 40%). The group assignments have to be concluded with a mark 5.5 or higher in order to successfully complete the course. The assessment of Part II is done as follows: group assignment (25%) and written exam (75%). The written exam has to be concluded with a mark 5.5 or higher in order to successfully complete the course.

More info

Contact Joke Meijer, e-mail J.B.G.Meijer-Lentelink@utwente.nl

UNIVERSITY OF TWENTE.

Registration form

Master Course on Hydrology & Water Footprint Assessment

University of Twente, Enschede, the Netherlands, Sep. 5 – Nov. 11, 2016

Details of participant

First name(s)		Male / female
Surname		
Degree(s)		
Affiliation*		
Postal address		
Country		
E-mail		

* Mention here your employer or university where you are studying.

Course fee (please tick)

- Category I: 0 € Students enrolled at a Dutch University already paying tuition fee
- Category II: 475 € Students from EU countries*
- Category III: 3300 € Students from outside the EU

* EER countries: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxemburg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, UK. And also: Switzerland and Suriname.

Full / partial participation (please tick)

- I wish to participate in both (parallel running) parts of the course.
- I wish to participate in the Hydrology part of the course (50% discount on above course fee).
- I wish to participate in the Water Footprint Assessment part of the course (50% discount on above course fee).

Certificate / assessment (please tick)

- I wish to receive a certificate of participation. I will take part in all lectures, games, exercises and assignments, but not take part in the final exam.
- I wish to receive a certificate of participation and a grade as well. I will take part in all lectures, games, exercises and assignments, and also in the final exam.

Upon receipt of your registration form, you will receive a request for payment by bank transfer. Payment needs to be done within two weeks of receipt of the request.

Signature

Date

E-mail the completed and signed registration form to: Joke Meijer, j.b.g.meijer@utwente.nl.