

2D - Free Surface Flow Modeling

(New HEC-RAS version 5.0)

Course description

The course will focus on the theory and analyses of practical free surface flow problems. The basic theory of free surface flow, mass; energy and momentum conservation, will be reviewed and the application to determine flood lines, culvert sizing, bridge flow hydraulics and dam break analysis will be covered. The widely used HEC-RAS software package will be reviewed and demonstrated by performing one-dimensional (1D) and two-dimensional (2D) hydraulic calculations for steady and unsteady flow conditions as well as dam break analysis. Delegates will learn how to approach and construct a numerical (1D & 2D) model for various flow conditions, and to effectively view and analyse results.

A number of practical problems will be discussed and solved. This will acquaint participants with background and confidence to conduct various flow simulations.

Course objective

The objectives of the course are to provide a theoretical sound background in hydraulic analyses and a greater understanding of numerical modeling. This will be achieved by conveying the theory in easy to understand presentations and reinforcing the understanding and application by problem solving. The participants will master the numerical modeling software HEC-RAS by working through practical exercises for 1D and 2D problems with guidance from the presenters.

What will you learn?

Course attendees will gain a detailed understanding of:

- Basic hydraulics (flow regimes, controls and losses);
- Surface drainage (backwater calculations, flood lines);
- Understand in situ flow measurement techniques and flow gauging structures in South Africa;
- Learn to use the popular software package by the U.S. Army Corps of Engineers' HEC-RAS for performing 1D hydraulic calculations such as steady and unsteady flow simulations and analysing drainage structures;
- Learn how to use HEC-RAS ver 5.0 to model 2D unsteady flow hydraulics.
- Get an overview of two-dimensional flow theory and the differences between one-dimensional modeling.
- Gain hands-on HEC-RAS experience by participating in practical computer workshops.
- Obtain valuable insights in methods for minimizing computation errors and instabilities for two-dimensional unsteady hydraulic models.
- Learn from "real world" projects and applications.

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Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA



CONTINUING EDUCATION
UNIVERSITY OF PRETORIA

Venue	Dates
Pretoria (To be announced)	2 - 6 February 2015

Continuous Professional Development

The course is accredited with ECSA

Target group

Persons in the planning, design and management of flood and storm water related structures would benefit from this course. For novice users the full course is recommended (option 3), participants wanting to attend the last two days interested in 2D modeling and who has experience in HEC-RAS steady and unsteady flow 1D may consider Option 2.

Cost per course

Fee structure options for the course (VAT inclusive).

Fee structure	Cost/person
Option 1: Normal fee (day 1 to 3)	R 6 500,00
Option 2: Normal fee (day 4 & 5)	R 5 000,00
Option 3: Normal fee (day 1 to 5)	R 10 400,00

Organisations sending 4 or more delegates can deduct 10% of the total course fee

Registration Enquiries

Send your enrolment form to:

tessa.breiting@ce.up.ac.za

Or Register online:





Web: www.ceatup.co.za

Course number: P003460-001-2014

Important notes

- You will need a laptop/notebook (relevant software will be provided) and calculator.
- You will learn something very useful and new.
- You will enjoy the lunches and refreshments provided.
- You will have great networking opportunities.

Main presenters

<p>Mr Marco van Dijk Tel: + 27 012 420 3176 E-mail: marco.vandijk@up.ac.za</p>		<p>Marco van Dijk graduated from the University of Pretoria with a degree in Civil Engineering in 1996 and worked for a consulting engineering firm during which time he also completed his BEng (Hons) degree. He then joined the Department of Civil Engineering of the University of Pretoria and obtained a MEng degree in Water Resource Engineering in 2003. He is presently enrolled for a PhD (Civil Engineering). He lectures in hydrology and hydraulics and has 16 years of experience in this field. He has developed and presented numerous courses on flood determination, flood lines, drainage structures and stormwater modelling using EPASWMM and HEC-RAS.</p>
<p>Mr Chris Goodell Tel: +1-503-946-8536 E-mail: cgoodell@westconsultants.com</p>		<p>Chris Goodell (P.E., D.WRE) is a senior hydraulic engineer with WEST Consultants and manages the Portland, Oregon office. He has over 19 years of experience in computational hydraulics, river hydraulics and hydraulic design. He worked at the Hydrologic Engineering Center (HEC) actively working on the development of HEC-RAS as well as being a contributing author to the HEC-RAS manuals and has applied HEC-RAS to a wide range of complex problems. He earned his B.S. degree in civil engineering at Oregon State University and his M.Eng. in Hydraulic Engineering from the International Institute for Hydraulic Engineering (IHE) in Delft, The Netherlands. He has taught HEC-RAS courses and provided technical support for HEC-RAS since 2000. His work experience includes watershed hydrology, hydraulic design studies on multipurpose hydropower projects, river and stream restoration, bridge hydraulics studies, flood control projects, sediment/erosion projects, hydraulic computational model development, dam breach studies, and fish passage design.</p>
<p>Prof Fanie van Vuuren Tel: +27 012 420 2438 E-mail: fvuuren@eng.up.ac.za</p>		<p>Fanie van Vuuren is a registered Professional Engineer with 38 years of experience; He holds the following degrees BSc (Civil), BSc (Hons), MEng, MBA and PhD all obtained from the University of Pretoria. He is currently a Professor in the Department of Civil Engineering at the University of Pretoria and heads the Water Division. His professional experience included working for the Government and Municipal Sectors, Contractors and serving as a director of consulting engineering firms before he opted for an academic career. Fanie has lectured locally and abroad, published several papers, compiled various guidelines, books and research reports and has presented numerous courses on pipelines, pump stations, dynamic analyses and drainage systems.</p>
<p>Ms Ione Loots Tel: + 27 012 420 5484 E-mail: ione.loots@up.ac.za</p>		<p>Ms Ione Loots graduated in 2007 with a BEng (Civil) degree from the University of Pretoria (UP). In January 2008 she started at Aurecon (then Africon) as a Design Engineer, specialising in water and stormwater projects. She obtained her BEng Honours degree in Water Resources Engineering at UP in 2011. Her Master's Degree in Water Engineering with specialisation in Hydropower generation in distribution systems was completed in 2013 (cum laude). She has experience in hydrology and free surface flow design problems.</p>

2D - Free Surface Flow Modeling (New HEC-RAS version 5) 2 - 6 February 2015



Monday - 2 February 2015		
Time	Session	Lecturer
7:30	Registration and Morning Coffee	CE@UP
8:00	Opening and welcome	Mr M van Dijk
8:15	P1 - Visual overview of the extend of Free Surface Flow	Mr M van Dijk
8:45	P2 - Introduction to free surface flow theory	Prof SJ van Vuuren
9:40	Tea	
10:00	P3 - Flow measurement techniques	Mr F le Roux
11:00	P4 - Flow gauging in South Africa	Dr P Wessels
12:00	P5 - Roughness parameters for free surface flow calculations	Prof SJ van Vuuren
12:45	Lunch	
13:45	P6 - Flood line calculations and water surface profiles	Mr M van Dijk
14:30	H1 - Practical: Free surface flow and flow profile exercises	MvD, SJvV & IL
15:00	Tea	
15:20	H1 - Practical (continued)	MvD, SJvV & IL
16:30	Closure day 1	
Tuesday - 3 February 2015		
7:45	Opening and feedback on previous day	Mr M van Dijk
8:00	P7 - Working with HEC-RAS - An overview	Mr M van Dijk
9:00	P8 - Entering a project and analyzing (HEC-RAS)	Mr M van Dijk
10:00	Tea	
10:20	P9 - Culvert and bridge analysis + HEC-RAS (demo)	Mr M van Dijk
11:10	E1 - Practical: Basic HEC-RAS and flood line determination	MvD, SJvV & IL
13:00	Lunch	
14:00	E2 - Practical: Basic analysis, sensitivity analysis, calibration and flow distribution	MvD, SJvV & IL
15:00	Tea	
15:20	E2 - Practical (continued)	MvD, SJvV & IL
16:30	Closure day 2	
Wednesday - 4 February 2015		
8:00	Opening and feedback on previous day	Mr M van Dijk
8:10	E3 - Practical: Error finding and extracting results	MvD, SJvV & IL
9:30	E4 - Practical: Setting-up of HEC-RAS model (river section, bridge and weir) and performing unsteady flow analysis	MvD, SJvV & IL
10:00	Tea	
10:20	E4 - Practical (continued)	MvD, SJvV & IL
12:30	P10 - Dam Break Analysis in SA	Mr D van der Spuy
13:15	Lunch	
14:15	P11 - Dam break analysis + HEC-RAS (demo)	Prof SJ van Vuuren
14:50	Tea	
15:10	E5 - Practical: Dam break analysis using HEC-RAS	MvD, SJvV & IL
16:30	Closure day 3	

Draft course program

Thursday - 5 February 2015

Time	Session	Lecturer
8:00	Opening and feedback on previous day	Mr M van Dijk
8:10	P12 - Introduction to 2D Modeling in HEC-RAS	Mr C Goodell
9:10	Tea	
9:30	E6 - Practical: Lateral Structures and Storage Areas	CG, MvD, LC
11:30	P13 - 2-D Theory	Mr C Goodell
12:30	Lunch	
13:30	P14 - RAS Mapper (geospatial capabilities)	Mr C Goodell
14:40	Tea	
15:00	E7 - Practical: Creating a 2D computational mesh	CG, MvD, LC
16:50	Closure day 4	

Friday - 6 February 2015

8:00	Opening and feedback on previous day	Mr M van Dijk
8:10	P15 - Preprocessing 2D Areas	Mr C Goodell
9:10	P16 - Viewing 2D Results	Mr C Goodell
10:10	Tea	
10:30	E8 - Practical: Offline 2D project (storage areas)	CG, MvD, LC
12:30	Lunch	
13:30	E9 - Practical: Inline 2D project (hydraulic structures)	CG, MvD, LC
15:00	Tea	
15:20	E9 - Practical (continued)	CG, MvD, LC
15:50	P17 - 1-D versus 2-D modeling	Mr C Goodell
16:50	Closure day 5	



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Enrolment Form

COURSE NAME:
COURSE START DATE: / / COURSE NUMBER: P - -
D D / M M / Y Y Y Y

YOUR DETAILS

Identity Number/Passport Number: Date of Birth: / /
Surname:
Full Names:
Preferred Firstname:
Initials: Gender: Male Female Title: Ms Mr Other:

YOUR CONTACT DETAILS

Physical Address:
City:
Country: Code:
Postal Address:
(If not the same as physical address)
City:
Country: Code:
Email Address:
Work Phone: () Please tick if you **WANT** to receive any promotional material of upcoming courses in the future
Home Phone: () Preferred method of correspondence SMS E-MAIL
Cell Phone: () Where did you hear about us? Advertisement Web Brochure Word of mouth

YOUR QUALIFICATIONS

Highest Academic qualification: Grade 12 Diploma Degree Post-graduate Degree Year Completed:
Membership of Professional Association/Body:
Registration Number:
(if applicable)

YOUR EMPLOYER/OCCUPATIONAL DETAILS

Company/Institution Name:
Occupation/Job Title:
Work Phone: () Company VAT nr:
Physical Address:
City:
Country: Code:
Postal Address:
(If not the same as physical address)
City:
Country: Code:
Primary Industry of Employment (tick only one)

<input type="checkbox"/> Agriculture, Forestry, Fishing, Hunting	<input type="checkbox"/> Services - Entertainment	<input type="checkbox"/> Engineering Manufacturing	<input type="checkbox"/> Medical
<input type="checkbox"/> Mining	<input type="checkbox"/> Services - Hospitality	<input type="checkbox"/> Health & Welfare	<input type="checkbox"/> Transportation
<input type="checkbox"/> Construction	<input type="checkbox"/> Services - Repair/Maintenance	<input type="checkbox"/> Government/Public Administration	<input type="checkbox"/> Engineering Service
<input type="checkbox"/> Manufacturing	<input type="checkbox"/> Services - Social	<input type="checkbox"/> Law	<input type="checkbox"/> Real Estate
<input type="checkbox"/> Wholesale & Retail Trade	<input type="checkbox"/> Communication	<input type="checkbox"/> Sport	<input type="checkbox"/> Other
<input type="checkbox"/> Finance, Insurance	<input type="checkbox"/> Education	<input type="checkbox"/> IT	

RESPONSIBLE FOR PAYMENT: Self Employer

(Please complete the contact details below if you ticked Employer)
Contact details of the person we can contact for payment: Work Phone: ()
Name and surname:
Email Address:

I hereby confirm that the information supplied on this form is correct and that I have read and agree to the conditions stipulated on the reverse side of this enrolment form. I accept personal responsibility to ensure payment of the relevant fees before commencement of the course.

Signature:

Date: / /





Payment conditions:

- Course fees must be **paid in full 14 days prior** to the course start date to **reserve** your seat. Bookings will be **cancelled** if payment was not received **14 days prior** to the course start date.
- Proof of payment must be submitted to enrolments@ce.up.ac.za **upon enrolment**. All payments must reflect the **invoice number or ID number** of the applicant.
- Should the course fee be funded by an institution (including the employer) on behalf of the applicant, the applicant must supply CE at UP with supporting documentation in the form of an official purchase order **upon enrolment**.
- Attendance will **not** be permitted without payment.
- CE at UP reserves the right to withhold **access** to a course and a delegate's **results** and **certificate** if full payment for the course has not been received.

General:

- Enrolment in any of the courses presented by CE at UP would result in this terms and conditions finding application.
- If the applicant does not agree to be bound by these terms and conditions of enrolment, such enrolment should not be proceeded with.
- These terms and conditions of enrolment ("terms and conditions of enrolment") apply to all applicants who may enrol for any course offered by CE at UP.
- The applicant is entitled to print a copy of these terms and conditions as well as the other documents accessible through the Internet and as may be referred to in this terms and conditions of enrolment.
- In the event that the applicant experiences any difficulties in printing these terms and conditions of enrolment or any of the other documents referred to or acquire assistance in obtaining a hard copy or electronic copy of said documents, please contact CE and UP at info@ce.up.ac.za.
- Similarly, where an applicant does not understand or is unsure about the meaning of any of the terms and conditions of enrolment referred to herein the applicant is invited to approach CE at UP to obtain the necessary required information or detail.

General conditions:

- The applicant agrees to accept responsibility to inform CE at UP of any changes in the information supplied on the enrolment form within the prescribed time period of which the applicant is aware.
- CE at UP reserves the right to refuse admission to a course to any applicant if the criteria for enrolment as stipulated in the course information have not been met in full.
- The applicant further confirms that he/she complies with the particular admission requirements to attend the course as applicable and as prescribed in the marketing material. The applicant further confirms that he/she fully understands the specific admission requirements. (In the event where there is any doubt the applicant should approach CE at UP to obtain the necessary detail requirements).
- The applicant confirms that by submitting the enrolment form he/she indicates his/her willingness to register for the course and to accept all responsibilities for payment of course fees as set out in the registration information.
- The applicant agrees to abide by the assessment criteria for the course as set out in the course material. (Where there is any doubt, the applicant is invited to approach CE at UP to obtain the required information before submitting his/her enrolment form).
- The applicant confirms that he/she understands that it is against the rules of the University of Pretoria (of which CE at UP forms a part) to commit any form of plagiarism (the publishing or stealing of work or ideas belonging to another person).
- The applicant understands that further detail on the policy on plagiarism of the University of Pretoria can be found at <http://upetd.up.ac.za/authors/create/plagiarism/students.htm> (If the applicant experiences any problem to access this address or require any further detail or copies, the policy will be made available on request.)
- The applicant agrees to abide by the general code of conduct for students of the University of Pretoria. The code of conduct can be found at <http://web.up.ac.za/sitefiles/file/2011%20yearbooks/General%20Regulations%20en%20information%202011.pdf> (If the applicant experiences any problem to access this address or require any further detail or copies, the policy will be made available.)
- The applicant understands that the library facilities of the University of Pretoria will not be available to the applicant and the University of Pretoria has no responsibility to provide the applicant with access to any library facilities.
- The applicant understands that the language of presentation of the courses is in English, unless stated otherwise.
- The applicant understands that in the event of any dispute of any nature whatsoever arising between the applicant and CE at UP, the South African law will apply and the appropriate courts of South Africa will have the jurisdiction.
- The applicant understands that all intellectual property rights, (i.e. by example rights in text, recordings, pictures or other licensed materials) vests with the University of Pretoria and the applicant may not reproduce or distribute any such material.

Cancellation policy:

- CE at UP reserves the right to refuse admission to a course, in which case the applicant will be informed and applicable fees will be refunded.
- Cancellations are accepted in writing and without penalty up to **14 days prior** to the course start date. Notification of cancellation must be submitted in writing either via email to enrolments@ce.up.ac.za or faxed to 012 434 2505.
- Applicants who cancel outside the approved cancellation period would not be entitled to any refunds unless the applicant is unable to attend as a result of reasons such as hospitalisation which in the sole discretion of CE at UP renders it impossible for the applicant to attend.

Security and Privacy:

- CE at UP is committed to the protection of the privacy of the applicant. Personal information of the applicant will only be made available where CE at UP is statutory obliged to do so or for purposes of communication between CE at UP and the applicant and to give effect to the processing and presentation of the required course to the applicant.
- The applicant accepts full responsibility for the protection and usage of any passwords that will provide him/her access to CE at UP management information systems.
- The applicant further consents that personal information may be used for communication about his/her enrolment and related activities as well as for statistical and marketing purposes and that he/she has the right to terminate this use at any time by notice to CE at UP.

Disclaimer:

- Neither CE at UP nor any of its agents or representatives shall be liable for any personal damages, loss or liability of whatsoever nature arising from the attendance of a course presented by CE at UP or as a result of entering upon the premises of the University of Pretoria.

Amendments:

- Unforeseen circumstances may necessitate the appointment of speakers other than those advertised as part of the course. Where the applicant is not satisfied with any such changes, CE at UP will consider refunding the applicant in total or partly for the fees for part of the course already attended to.
- Course dates, programme sequence, time and venue are subject to change without notice. Where the applicant is not satisfied with any such changes, CE at UP will consider refunding the applicant in total or partly for the fees for part of the course already attended to.

Payment methods:

The following payment methods are accepted:

- Electronic bank transfers to the following bank account:
Bank: ABSA Hatfield
Account number: 407 026 8244
Branch Code: 335545
- Credit cards
- Cash payments will not be accepted