Gas, vapour and dust

**Explosion Hazards**, protection, mitigation and prediction

Monday 20 – Friday 24 March 2017

15% Discount for IFE members
Gas, vapour and dust
Explosion Hazards, protection, mitigation and prediction
Monday 20 – Friday 24 March 2017

Course directors:
Professor Gordon Andrews and Dr Roth Phylaktou
Energy Research Institute
School of Chemical and Process Engineering

Background to the course
In chemical process plants and oil and gas installations (either onshore or offshore) equipment, pipework arrays, support structures, etc. result in highly congested volumes of complex geometrical configuration. Congestion and system geometry can increase the severity of an explosion through a feedback mechanism of accelerating turbulent combustion. The disasters at Flixborough and Piper Alpha draw attention to the damage likely to arise from an explosion in a typical industrial layout and the inadequacies of previous practices to predict and minimise the consequences. These disasters have spurred the major industrial and academic research centres to address this problem and as a result the field of explosion prediction and mitigation is continuously developing with new recommendations and findings being published and further areas of uncertainty being identified. However, major industrial accidents such as the Texas City Oil Refinery and Hemel Hempstead still do happen, highlighting the importance of continuing learning in this particular area.

Course objective
To review recent experimental and theoretical research, with particular emphasis on information relating to the explosion development in obstacle-congested volumes and process vessels on confined and partially confined configurations.

Who should attend
This course is suitable for engineers and scientists involved in both the offshore sector and the onshore chemical process and nuclear industries. More specifically, the course will be of benefit to:
- explosion safety consultants and engineers
- research and development scientists/engineers
- loss prevention and facilities managers
- risk and insurance assessors
- civil engineers/designers of process plant
- designers and manufacturers of explosion protection systems
- those newly appointed to any of the above areas

Course delivery
The course will be delivered by a team of practitioners and academics, all experts in their particular fields of contribution. Presentations will concentrate, where appropriate, on the implications and practical application with example calculations of the research findings (so please bring a calculator). Detailed course materials will provide comprehensive coverage of research methodologies and results.

What our previous delegates say:

Excellent array of materials, excellent delivery. It pretty much covers all the fundamentals of explosions – Shell

Excellent course, useful and informative and great material for further reading – Total

Comprehensive course giving useful information on current understanding of explosions – Magnox Ltd

Course Accreditation
The gas, vapour and dust Explosion Hazards, protection, mitigation and prediction CPD course, Leeds, has been approved for 32.5 hours in total by the Institution of Fire Engineers (IFE). The Energy Institute has approved Leeds University – Faculty of Engineering as an Approved Training Provider

MSc Option
This course also forms part of an MSc Masters Programme (full time or part time) in Fire and Explosion Engineering. Modules of this MSc may also be taken individually or as part of a coherent course to meet personal needs for Continuing Professional Development (CPD). For more information on the MSc please visit the website at http://courses.leeds.ac.uk/24952/MSc_Fire_and_Explosion_Engineering

Book your place online at www.engineering.leeds.ac.uk/short-courses/

Monday 20 March 2017
Flammability and Explosions
08.30 Registration
09.00 Explosion stoichiometry and applications for gases, vapours, solvents, aerosols and dusts with applications to tank explosions, BLEVES, aerosols and dust explosions
10.00 Coffee
10.15 Explosion flammability limits for gases, vapours, aerosols and dusts. Ventilation below the lean limit as the first explosion protection measure
11.15 Flash point and fuel tank explosions, the TWAB0 disaster and auto-ignition temperatures
12.15 Lunch
13.00 Flame arrestors and explosion isolation barriers
13.15 Jef Snoeys, Fike Corporation
14.15 Explosion protection using inerting
14.30 The role of large scale experiments in explaining vapour cloud explosions
15.15 Tea
15.30 Flam Reactivity: burning velocity, flame speed and KG
16.30 Self-acceleration of laminar propagating flames
17.00 End of day one
19.00 Course dinner

Tuesday 21 March 2017
Characterisation of Gas and Dust Explosions Vent and Suppression Protection Design
08.45 Registration
09.00 Dust explosion characteristics and the influence of dust size distribution
10.30 Coffee
10.45 Industrial explosion suppression systems. Jef Snoeys, Fike Corporation
12.15 Lunch
13.00 Explosion venting theory and design standards
14.30 Flameless explosion venting – product, performance, vent system design examples and case studies. Jef Snoeys, Fike Corporation
15.15 Tea
15.30 Vent Ducts, Large L/D venting and Interconnected Vessel Explosions
17.00 End of day two

Wednesday 22 March 2017
Vapour Cloud Explosions
08.45 Registration
09.00 Managing explosion risks
09.45 Explosion Characteristics: Managing the Source Term
10.30 Coffee
10.45 Important parameters in turbulent explosions
12.45 Lunch
13.45 Flame acceleration and transition to detonation
Dr Roth Phylaktou, Energy Research Institute, University of Leeds
14.45 The role of large scale experiments in explaining vapour cloud explosions
Mike Johnson, DNW GL
15.35 Tea
15.50 Explosion mitigation by general area water deluge
Mike Johnson, DNW GL
17.00 End of day two

Thursday 23 March 2017
Blast Prediction and Blast Response
10.30 An overall review and concluding remarks
Professor Derek Bradley, University of Leeds
12.00 Example problems – demonstration of CFD modelling exercises
Chris Coffey, GeCon
13.30 End of day five and course

Friday 24 March 2017
Explosion Assessment: Capability, Validation, Limitations and Application of CFD
08.45 Registration
09.00 Barrier methods for explosion control
09.45 Explosion model evaluation
Professor Vincent Tam, Warwick University
10.15 Coffee
11.00 Simplified flammable gas volume methods for gas explosion modelling from pressurized gas release
11.30 Mushunnel Incidence 2005 - Explosion mechanism
Professor Vincent Tam, Warwick University
11.45 FLACS
Chris Coffey, GeCon
12.30 An overall review and concluding remarks
Professor Derek Bradley, University of Leeds
13.15 Lunch
14.00 Example problems – demonstration of CFD modelling exercises
Chris Coffey, GeCon
15.30 End of day five and course

100% of 2016 respondents said they would recommend the course to colleagues
100% of 2016 respondents said they would recommend the course to colleagues
Further information

Venue
The venue for the course will be Weetwood Hall Conference Centre and Hotel which offers first-class hotel facilities, a business centre and ample parking facilities. Weetwood Hall is an award winning, flexible conference centre and hotel in the north of England.

Weetwood Hall Hotel is ideally situated 15 minutes north of the centre of Leeds in wooded grounds at the junction of the Otley Road and the outer ring road. It is just 15 minutes from Leeds Bradford International Airport and a short distance from the A1, M1, M606, M621 and M62 motorways.

Further details can be found at www.weetwood.co.uk

Course fees
The following course fees include the cost of tuition, course materials, lunches and light refreshments for the days of attendance:

Full five days £1595
Any one day £410

IFE members - discount fee
Delegates who are a member of the Institution of Fire Engineers (IFE) will receive a 15% discount on the course fee. Please indicate when booking if you are a member, stating your IFE membership number.

IFE member full five days £1355.75
IFE member any one day £348.50

Accommodation
Bed and breakfast accommodation is available at the course venue, Weetwood Hall Conference Centre and Hotel.

We have negotiated the following special rates per night:
- Friday – Sunday evening, bed and breakfast £82
- Monday – Thursday evening, bed and breakfast £86

To take advantage of the special rates we have negotiated with the hotel for our course delegates, please book using the instructions below:
1. Log onto: http://www.engineering.leeds.ac.uk/short-courses/
2. Select ‘Course title’
3. Select the ‘Accommodation’ tab in the drop down menu and click ‘Book hotel accommodation’
4. Complete the following fields: Arrival date, departure date, rooms, adults, children.
5. Click the ‘Check Availability’ button (N.B. you will not need to click on ‘Click Here for Special Rates’ or enter a promotional code as this is already completed for you).
6. Proceed with your booking as instructed by the booking system.

A list of alternative hotels is available on request.

Delegates are responsible for their own evening meals except on Monday 20 March when the course dinner is included.

If you are unable to complete your accommodation using the online booking system please contact Weetwood Hall Hotel directly at the contact details given on their web page at www.weetwood.co.uk

Please note that bookings via the ‘Accommodation Booking’ link must be made two weeks before the course commences at the latest to qualify for the special rates and to guarantee room availability. Any accommodation requests after this date should be made direct with the hotel and will be subject to availability and rates.

How to book
Booking for this course should be completed through our secure Online Store using debit or credit card. To complete your booking please follow the instructions below:
1. Log on to our Online Store at: https://store.leeds.ac.uk/
2. Select Conferences and Events in the left-hand navigation bar.
3. Select CPD Faculty of Engineering.
4. Select the course or event for which you wish to register and click on ‘Book’.
5. If you are a new user, please follow the instructions to register. If you already have an account log in as instructed.
6. Complete the application process as directed by the booking system.

You will receive an automatic confirmation email within 24 hours of your booking.

Course dinner
The course dinner will be held at a Leeds city centre restaurant and is included in the course fee. This will take place on Monday evening and transport from and to Weetwood Hall Hotel is provided. The dress code is smart casual. If you would like to attend please indicate when booking.

Accessibility
Please let us know if you have any specific requirements including any access or dietary requirements in relation to this course.

For online booking queries and for all other enquiries please contact:
Course Coordinator
CPD, Conference & Events Unit, Faculty of Engineering
School of Civil Engineering, G.04
University of Leeds
LEEDS, LS2 9JT, UK.
T: + 44 (0) 113 343 2494/8104
F: + 44 (0) 113 343 2511
E: cpd@engineering.leeds.ac.uk
W: www.engineering.leeds.ac.uk/short-courses/
@LeedsUniCPD

Terms and conditions for booking
Payment in full should accompany your booking. The course fee is exempt from VAT. Fees must be paid in full no later than 15 working days before the course commences. Failure to pay may result in attendance being refused.

Registrations are accepted on the understanding that the printed programme is given in good faith but may have to be re-scheduled or the speakers changed for reasons outside our control. The University of Leeds reserves the right to cancel or postpone the course, in which case fees will be refunded in full. In the event of cancellation, the University will not be held liable for delegates travel or accommodation expenses.

Delegates will receive a full refund for cancellations made within 7 days of online booking, except where the booking has been made for an event commencing within the next 7 days. Where a delegate wishes to cancel a registration after this 7 day period, written cancellations received up to 15 working days before the course will be subject to an administrative charge of 20% of the total remittance. After this date the full fee is chargeable and no refunds will be made, this also applies for non-attendance but copies of the course documents will be sent. Substitutions may be made at any time.

If you are unable to complete your registration using the online booking system please contact the CPD, Conference & Events Unit to discuss alternative arrangements.