

**Registration form**

Please register as soon as possible for this course as spaces are limited to a maximum of 15.

	<b>Early Bird Registration on or before 5.11.16</b>	<b>After 5.11.16</b>
Registration Fee (CPACT members)	<b>£700 + VAT</b> <input type="checkbox"/>	<b>£990 + VAT</b> <input type="checkbox"/>
Registration Fee (non-members)	<b>£1000 + VAT</b> <input type="checkbox"/>	<b>£1350 + VAT</b> <input type="checkbox"/>

The above fees include tea/coffee breaks, lunches and dinner on the evening of Wed 13th January. Extensive course notes are also included. Fees are refundable only up to eight weeks before the event. Substitution may be made at any time.

**Accommodation** has been reserved at The Park Inn Northampton, Silver Street, Northampton, NN1 2TA (15 minutes by taxi to Clairat Scientific)

PLEASE TICK BOXES BELOW FOR ROOM RESERVATIONS.

**IMPORTANT:** ROOM RATE TO BE PAID TO CPACT WITH REGISTRATION FEE

16th Jan B&B rate £83.00  17th Jan B&B rate £83.00  18th Jan B&B rate £83.00

**METHOD OF PAYMENT:**

- Cheque (Please make cheques payable to Clairat Scientific)
- Invoice will be sent by Clairat Scientific (Please provide a Purchase Order number .....

Title .....Name .....

Job Title .....

Department.....

Organisation .....

Address .....

..... Postcode .....

Telephone .....Fax .....

e-mail .....

Special Dietary Requirements .....

Please return completed form to: Carol Badger, CPACT, c/o Pure and Applied Chemistry Department, University of Strathclyde, Thomas Graham Building, 295 Cathedral Street, Glasgow G1 1XL  
Email: admin@cpact.com Tel: +44 141 548 4836 Fax: +44 141 548 4713

**Course Certificate**

Course certificates will be available on request.

**Location**

Centrally located, Northampton has direct rail links to London Euston, Birmingham and Birmingham International Airport and the course hotel is ten minutes walk from the station. By road, access is via the M1 from the South or North and the A14 from the East.



**CENTRE FOR PROCESS ANALYTICS  
AND CONTROL TECHNOLOGY**

**PROCESS SPECTROSCOPY  
COURSE**

**Tuesday 17th January -  
Thursday 19th January 2017**

**Clairat Scientific,  
Northampton**



## Introduction

Process Analysis is an integral part of process optimisation, process control and performance monitoring. Rapid analytical measurements are increasingly required in industry to monitor progress of a reaction, know when the end-point of a process has been reached, check reaction kinetics, detect impurities or control blending, granulation, etc. All these activities and many more require timely qualitative and quantitative information. This can often be provided through at-line, on-line, in-line or non-invasive application of molecular spectroscopy techniques.

The course provides an introduction to molecular spectroscopy through a series of presentations and practical exercises/demonstrations on process spectroscopy techniques, including NIR, MIR, UV-visible, Raman spectrometries. Developments in complementary process analysis procedures based on light induced fluorescence spectrometry, mass spectrometry, NMR spectroscopy and acoustic measurements will also be described. Emphasis will be given to the practical application of spectroscopy to process analysis.

## Who should attend?

This course will be for those required to develop and/or use spectroscopic techniques for process analysis. Exposure to up-to-date developments in instrumentation and procedures will provide practical appreciation of the attributes of different techniques.

## Demonstrations

The following topics will be covered during the course:

- NIR at-line and in-line analysis
- MIR in-line analysis
- Raman in-line and non-invasive analysis
- UV-visible in-line analysis
- Non-invasive reflectance NIR spectrometry
- Multivariate calibration model building

Additional one-to-one or company specific training, project discussions or sample measurements are available immediately after the course by arrangement with Clairet Scientific.

## Course Leaders

Dr John Andrews, Clairet Scientific  
Dr Paul Dallin, Clairet Scientific  
Prof David Littlejohn, University of Strathclyde  
Dr Alison Nordon, University of Strathclyde

## Provisional Programme

### DAY 1 - Tuesday 17 January 2017

**Morning session** (10.15 start) Welcome  
Introduction to process analysis and sampling issues  
Introduction to spectroscopy and measurement modes (absorption, fluorescence, emission)

#### Lunch

**Afternoon session** (14:00 start) Introduction to UV-visible spectrometry  
Applications of UV-visible spectrometry in process analysis  
Introduction to process tomography  
**Break**  
Demonstration sessions with instruments: UV-visible, tomography and intrinsically safe operation of instruments

### DAY 2 - Wednesday 18 January 2017

**Morning session** Introduction to MIR and NIR spectrometry  
Applications of MIR and NIR spectrometry in process analysis  
**Break**  
Introduction to Raman spectrometry  
Applications of Raman spectrometry in process analysis

#### Lunch and group discussion session

**Afternoon session** Demonstration sessions with instruments: MIR spectrometry, NIR spectrometry, Raman spectrometry

**19.30 Course dinner**

### DAY 3 - Thursday 19 January 2017

**Morning session** **Overview of complementary and developing techniques**  
Acoustic spectroscopy and NMR spectroscopy  
Light induced fluorescence (LIF) and mass spectrometry  
**Break**  
Strategies for selection of process analysis techniques  
Data pre-processing procedures  
Regression analysis procedures for multivariate calibration  
Design of experiments

#### Lunch

**Afternoon session** (end 16:00) Demonstration sessions: Design of experiments, Multivariate calibration model building for NIR spectrometry, Advanced Raman spectrometry