

Singapore National Institute of  
Chemistry  
*And* Chemistry Department,  
National University of Singapore



**NUS**  
National University  
of Singapore



*Jointly presents*

2-Day Workshop on  
"BASIC STATISTICS FOR TESTING  
LABORATORIES"

5-6 February 2004  
York Hotel, Singapore

#### INTRODUCTION

Many chemists and laboratory analysts have learnt statistical principles during their university and college days but might not have appreciated the power of statistics used in the design of experiments and chemical analysis. With the increasing consciousness and demand of quality in laboratory data produced, they now need to apply various statistical tools to demonstrate to the laboratory users the precision, accuracy and confidence intervals of these measurements and the validity of the experiments designed.

Although today's modern analytical instruments may come with sophisticated data handling software, the laboratory personnel is still required to understand the underlying statistical principles in order to digest the analytical data more intelligently. He is, for example, expected to establish the method detection levels when he is dealing with low level parameters and ultra trace analyses. He must also understand the idea of degrees of freedom, as it is fundamental to experimental designs. In fact, the analysis of variance (ANOVA) is one basic approach to study the significant difference, if any, between the experimental responses obtained and the various experimental factors, which are affecting the final results.

#### OBJECTIVES

This Workshop aims at addressing the relevant statistical principles commonly used in a chemical laboratory, and providing the practical statistical tools for laboratory practitioners. Examples in applied chemistry and class exercises will help the participants to grasp the underlying principles discussed. A lap top notebook computer with Excel spreadsheet is to be brought along during the workshop and a certificate of attendance will be issued to the course participants at the end of the workshop.

#### THE LEAD FACILITATOR

Mr. Yeoh Guan Huah, B.Sc. (Hons) and M.Sc. in chemistry is the Managing Director / Senior Analytical Chemist of ALS Technichem Singapore since 1978. He is a trainer, facilitator and technical assessor of SAC-SINGLAS (Singapore Accreditation Council-Singapore Laboratory Accreditation Scheme). For the past 4 years, Mr. Yeoh has conducted several short courses and workshops on practical topics related to laboratory quality management in Malaysia and Singapore. In March this year, he conducted a 2-day workshop on QA/QC procedures for testing laboratories for SNIC.

## WHO SHOULD ATTEND

Laboratory managers, chemists, laboratory analysts, technical officers, and laboratory quality personnel who are involved in bench works and quality assurance in testing laboratory would benefit from this workshop.

## WORKSHOP CONTENTS

- Introduction
- Errors
  - Types of errors – gross, random and systematic
  - Precision and accuracy
  - Propagation of errors – linear combinations and multiplicative expressions
  - Basic measurement uncertainty principles
- Population and sample
  - Differences between population mean and sample mean
  - Population variance and sample variance
  - What is degree of freedom?
- Probability distribution functions
  - Normal (Gaussian), rectangular and triangular distributions
- The sampling distribution of the means
- Determination of outliers by Dixon's  $Q$  outlier test and by the use of  $z$ -scores
- Confidence intervals for population mean and the Student's  $t$ -distribution
- Significance testing -  $F$ -test and Student's  $t$ -tests
- Introducing the one-way ANOVA principles
- Linear regression curve and its confidence intervals
  - The linear (product-moment) correlation coefficient
  - The line of regression of  $y$  on  $x$  by the least square method
  - Determination of *lack-of-fit* for the linear regression
- Statistics in quality control
  - Use of Shewhart control charts
  - Construction of CuSum chart for trend analysis
- Determination of detection limits – IDL, MDL, PQL

## REGISTRATION - FEES & CLOSING DATE

Registration fee covers the costs of tea/coffee breaks, lunches and all course materials:

- S\$ 350 for SNIC members
- S\$ 450 for non-SNIC members
- Registration confirmation is upon receipt of payment.
- Registration form and payment must arrive SNIC Secretariat by Friday, 23 January 2004.
- See Page 3 for a copy of the registration form.

## LAP TOP / NOTE BOOK COMPUTER

This is required throughout the workshop. Participants are encouraged to bring their own lap top/note book computers with Microsoft Excel.

## FURTHER INFORMATION – Please contact

Ms Lily Teo – Secretariat,  
Singapore National Institute of Chemistry (SNIC)  
Tel: +65 6466 5775, Fax: +65 6467 7667  
Email: lteo@meetmatt.net  
C/o Meeting Matters International  
Add: 5 Toh Tuck Link, Singapore 596224

Organisers:  
Singapore National Institute of Chemistry  
And Chemistry Department,  
National University of Singapore



## REGISTRATION FORM

### 2-Day Workshop on "BASIC STATISTICS FOR TESTING LABORATORIES"

5-6 February 2004  
York Hotel, Singapore

Ms Lily Teo -SNIC Secretariat  
C/o Meeting Matters International  
5 Toh Tuck Link, Singapore 596224  
Tel: + 65 6466 5775, Fax: + 65 6467 7667  
Email: lteo@meetmatt.net

Prof /A Prof / Dr / Mr. / \_\_\_\_\_

Ms: \_\_\_\_\_

Organisation: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

Tel: \_\_\_\_\_ Fax: \_\_\_\_\_ Email: \_\_\_\_\_

I wish to register for the Workshop on "Basic Statistics for Testing Laboratories" to be held on 5 & 6 February 2004 at York Hotel, Singapore.

Registration Fees (SNIC member / Non-SNIC member\*) S\$ \_\_\_\_\_

Enclosed please find a cheque for the amount S\$ \_\_\_\_\_ made payable to "Singapore National Institute of Chemistry " for the registration.

Signed: \_\_\_\_\_

Date: \_\_\_\_\_

\*Notes:

- Please delete if not applicable
- Photostat copy of the registration form may be used to register more than one participant.
- Payment must accompany registration. Please write participant name on back of cheque.
- You may send a substitute but there will be no refund for registration withdrawal.