



STATEMENT OF WORK

Provision of Analytical Skills Development Course

1. Scope

This Statement of Work (SOW) describes the requirements for an Analytical Skills Development Course to be provided in English.

The aim of the **Analytical Skills Development Course** (hereinafter referred to as the Course) is to assist qualified personnel (analytical chemists coming from developing and transition economy countries) in acquiring the necessary experience and practical knowledge so as to:

- a) facilitate the chemical analyses related to national implementation of the Chemical Weapons Convention (CWC);
- b) enhance national capacities in Member States by offering training in analytical chemistry to personnel from industry, academic institutions, and government laboratories;
- c) facilitate adoption of good laboratory practices in analytical chemistry laboratories;
- d) broaden the basis of future recruitment for posts related to CWC-related analyses/inspections in National Authorities and the Technical Secretariat.

All 20 participants in the programme will have at least a bachelor's degree in chemistry/analytical chemistry or in other related fields from a recognised university/institution, with a minimum of 5 years practical work experience in chemical laboratories, including gas chromatography and mass spectrometry (GC/MS).

The Course is organized by the OPCW and is fully supported by the OPCW regular funding.

2. Definitions, Acronyms, and Abbreviations

The following definitions, acronyms, and abbreviations shall apply throughout this SOW unless defined otherwise hereinafter:

- AMDIS: Automated Mass Spectral Deconvolution and Identification System;
- CI: Chemical ionization;
- CWC: Chemical Weapons Convention;
- EI: Electron impact;
- FID: Flame Ionization Detector;
- FPD: Flame Photometric Detector;
- GC: Gas chromatography;
- GC/MS: Gas chromatography and mass spectrometry;
- NIST: National Institute of Standard and Testing, USA;
- NPD: Nitrogen Phosphor Detector;



3. Requirements

- 3.1. The Contractor shall provide the Analytical Skills Development Course to 20 participants. The Course shall be delivered in class and be laboratory-based.
- 3.2. The Contractor shall deliver the Course entirely in the English language.
- 3.3. The duration of the Course shall be 2 weeks. The first edition of the Course shall take place in the second half of 2018. The date for additional editions of the Course shall be mutually agreed between the OPCW and the Contractor.
- 3.4. The program of the Course shall consist of two parts:
 - 3.4.1. The first part of the Course shall focus on basic training and “hands-on” experience in gas chromatography (GC) where the participants will attend a one-week theoretical and practical training in GC covering GC theory, hardware, optimization, system validation and troubleshooting, as well as introduction of GC-MS; and
 - 3.4.2. The second part of the Course shall focus on sample preparation of environmental samples and GC and GC/MS analyses of such samples for chemicals related to the CWC. This second part shall provide intensive ‘hands-on’ training in the preparation of different sample matrices (introducing a range of extraction, clean up and derivatization procedures) for later analysis by GC with element selective detectors and by GC/MS in electron impact (EI) and chemical ionization (CI) modes.
- 3.5. The Contractor shall cover the following topics in the Course:
 - 3.5.1. GC: Retention/separation, selectivity and efficiency, Golay theory and practical aspects of capillary columns, GC hardware, qualitative and quantitative analysis, selection of columns, optimization of separation, methods of injections, various detection systems, fast GC analysis, PLOT columns for analysis of volatile compounds with a good balance of theoretical and practical training supported by trouble shooting;
 - 3.5.2. Sample preparation: Extraction of CWC related chemicals from different matrices (such as soil, aqueous and organic solutions), sample clean-up, and methods for derivatization in order to analyze the chemicals of interest by GC and GC/MS; and
 - 3.5.3. GC/MS: Theory of GC/MS and operating principles (EI and CI mode), hardware considerations, tuning, mass calibration and instrument validation, trouble shooting, data processing software (introduction to NIST search, AMDIS from NIST and the OPCW central analytical database), introduction to spectra interpretation.
- 3.6. The Contractor shall deliver the Course by ensuring the following instrumentation shall be available to the participants:
 - 3.6.1. 4 or 5 state of the art capillary GC instruments equipped with FID and preferably one element selective detector (i.e. NPD, FPD); and
 - 3.6.2. 2 or 3 bench top GC/MS instruments to be operated in EI and CI mode.



- 3.7. The structure of the Course shall be based upon theory as well as practical laboratory training, giving the participants optimal opportunity to gain hands-on experience during the training. With a view to providing best guidance to the participants of the Course in the second part of the Course, the instructor student ratio should be 1:4.
- 3.8. The structure of the course shall be as follows:

Week One

Week one of the Course shall focus on establishing and developing the skill set propaedeutic for every participant to fulfil the objectives of the Analytical Skills Development Course outlined in Section 1 to this document. During this week, the schedule should cover introduction, GC theory and practical experiments.

Day 1: Introduction; GC theory, practical experiments.

Day 2: GC theory and practical experiments.

Day 3: GC theory, practical experiments.

Day 4: GC theory, practical experiments.

Day 5: GC theory, practical experiments and introduction to GC-MS.

Week Two

The second week of the Course shall draw directly upon and develop further the skills introduced in the first week of the Course. The key training concepts required for the conduct of CWC-related analyses shall be introduced. Their full understanding shall be achieved through carefully selected experiments, technically-based exercises and problems all centred around the analyses of CWC-related chemicals.

Day 6: Theory of MS, introduction to experimental work with GC/MS, and analytical applications.

Day 7: Theory, experimental work and analytical applications.

Day 8: Theory, experimental work and analytical applications.

Day 9: Theory, experimental work and analytical applications.

Day 10: Theory, experimental work and analytical applications.

- 3.9. The Contractor shall conduct short objective-type tests at the end of each week to evaluate the assimilation of knowledge by the participants and to provide feed-back to them. The program coordinator shall have considerable experience in managing training programs related to analytical skills development.
- 3.10. The Contractor shall provide proof of sufficient experience of each of the faculty staff/lecturers responsible for the development and the delivery of the Course in the proposal. The Contractor shall ensure that staff and



lecturers responsible for the course have a good command of the English language.

- 3.11. The Contractor shall utilize the last work day of the week before the commencement of the training for completion of registration and other procedural formalities with the participants. On this day, OPCW will also provide an induction orientation to the participants. The participants will therefore be required to reach the location of the training at least a day before the registration day.
- 3.12. The Contractor shall deliver the Course only on work days and not during weekend days.
- 3.13. The OPCW will be responsible for making travel arrangements from the place of origin of the participants to the venue of the Course and from.
- 3.14. The Contractor shall provide the participants of the Course with accommodation in single rooms with attached bathroom .
- 3.15. The Contractor shall make a cafeteria on the location of the Course available to the participants to the Course.
- 3.16. The Contractor shall provide accommodation with a view to minimizing commuting time from the place of accommodation to the location of the Course.

4. Participants' background and Course evaluation

- 4.1. The Contractor shall carry out before the start of the Course a background survey with a view to enquiring about the participants' experience on chromatography and mass spectrometry, knowledge of statistical methods, and expectations.
- 4.2. The performance of the participants shall be evaluated based on class participation, demonstration of knowledge during practical assignments and role plays and written tests. Attendance, attitude and professionalism shall also be considered.
- 4.3. The Contractor shall prepare and circulate among participants a questionnaire to evaluate contents and structure, administrative and logistic arrangements of the Course. The feed-back shall be made available to the OPCW for a post-course evaluation.
- 4.4. The Contractor shall circulate among participants' feedback forms provided by The OPCW, collect said forms after being duly filled in, and return these forms to the OPCW at latest one week after completion of the Course.



5. Deliverable data items

The Contractor shall provide The OPCW within 30 days after completion of the Course with a Course evaluation report including following details:

- 5.1. Course Program;
 - 5.2. Evaluation summary based on the reports of articles 4.3 and 4.4 to this document; and
 - 5.3. Financial Statement.
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