**PROVISIONAL CURRICULUM FOR TRAINING OF STUDENTS AT THE DEPARTMENT OF ANALYTICAL CHEMISTRY 2021**

**APPLIED ANALYTICAL CHEMISTRY**

**training 2021**

**for undergraduate, graduate and post graduate students**

**The detailed syllabus will be elaborated according to level of study and the particular interest of the trainees.**

**Module 1: Pre-laboratory considerations and calculations**

- calibration of measuring vessels, instrument and analytical function

- choice of calibration approach

- treatment of data from calibration (computer based approaches)

- interpretation of calibration data

- calculations based on equilibrium constants

- calculation of sample size in a chosen method

- calculation of results of analysis in a chosen method. Presentation and interpretation of results from chemical analysis.

**Module 2: Sample pretreatment**

- obtaining sample solution

- separation by precipitation, extraction, ion exchange and electrolysis

- masking by complex formation, redox reaction, protolyte reaction, precipitation reaction

- pre-concentration techniques

**Module 3: Applied analytical column chromatography.**

**-** Principles, choice of separation columns, composition of mobile phase and elution mode.

- Analysis of bioproducts and fuels by gas chromatography and HPLC.

- Computer based approaches for treatment of the chromatographic data.

**Module 4: Applied spectrophotometry.**

- analysis of mixtures

- dealing with overlapping spectra

- determination of composition and stability constant of a complex

- quantitative analysis. Calibration by external standard and multiple standard addition

- determination of metal ions by chelating extraction and spectrophotometry

- analysis of water and soil. Spectrophotometric determination of contaminants and nutrients – approaches and choice of method, sample preparation techniques, sources of errors, data treatment and uncertainty estimation

**Module 5: Applied voltammetry**

- quantitative analysis – comparative study of voltammetry methods, choice of method, examples

- calibration approaches in voltammetry

- choice of experimental conditions (working electrode, scan mode, background electrolyte, etc)

- application of DPV for study of complex forming reactions

**Module 6: Applied potentiometry**

- analysis of mixtures by potentiometric titration

- titration of polyprotolytes and mixture of string and weak acids

- titration of mixtures of halogens

- Gran plot

- theoretical considerations, calculations based n equilibrium constants

- computer based approaches for data treatment

**Module 7: Applied conductometry**

- measurement of conductivity

- interpretation of data

- conductometric titration of weak protolytes

- computer based approaches for data treatment

**Module 8: Applied atomic emission spectrometry**

- ICP-OES – principle of the method

- method development

- calibration approaches

- quantitative analysis

- determination of analytical characteristics

**Module 9 Applied statistics for analytical chemistry**

- main statistical approaches for treatment of data from chemical analysis
- computer based approaches

**Module 10 Validation of analytical methods**

- main concepts
- main regulatory guides
- estimation of analytical characteristics of a method
- examples
- fit-to-purpose