

COURSE SYLLABUS STEM Ed Abroad Program

Course Title: Analytical Chemistry (including laboratory component)

Course Semester: Fall

University and Country: Adam Mickiewicz University; Poznan, Poland

Number of ECTS: 6 (lecture) and 2 (laboratory)

Course Designations for Transfer Credit: CH315/316 (NCSU), CHEM316/316L (ISU)

Content: Analytical Chemistry is a sophomore- or junior-level course in method of analysis and separate of chemical analytes.

Pre-requisites: Organic Chemistry II with a grade of C- or better.

Aims: Introduce the fundamental principles and modern techniques of chemical analyses. This includes an examination of electrolytic solutions, including acid-base, oxidation-reduction, and solubility equilibria, and introduction to spectrochemical, electrochemical, volumetric and chromatographic methods of analysis, modern chemical instrumentation. Application of modern analytical chemistry instrumentation in analysis of real samples with sample preparation step and interpretation of obtained real samples data. Lectures are fully integrated with laboratory experiments.

Recommended Books: Textbook: Skoog et al, Fundamentals of Analytical Chemistry, 9th Ed.. A copy of the book has been placed in 3.33 office (Dr. Marcin Frankowski)

Instructors: Dr. Marcin Frankowski (marcin.frankowski@amu.edu.pl), Dr. Anetta Frankowska (anettazf@amu.edu.pl), Dr. Iwona Kurzyca (ikurzyca@amu.edu.pl) with consultation by Dr. Ghada Rabah (NC State University).

Grading System and Percentage Contribution

A. Lecture assessment

Lecture participation	5%
Continuous assessment (preparation for class)	5%
Homework	15%
Exam (3 @15% each)	45%
Final Exam, Cumulative	30%
Total	100%

B. Laboratory assessment

Preparation for laboratories	40%
Laboratory reports	60%
Total	100%

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AMU Grading system and scale

The grading system used at Adam Mickiewicz University, whose name is abbreviated as AMU or UAM, is as follows:

Tests, exams, homework assignments grading scale

- 5 100%-91%
- 4+ 90%-86%
- 4 85%-76%
- 3+ 75%-71%
- 3 70%-60%
- 2 59% and less

This translates into the following ECTS (European internationally recognized system) grading scale:

ECTS Grade	AMU grade	Definition
A	5.0	EXCELLENT – outstanding performance with only minor errors
B+	4+ / 4.5	VERY GOOD – above the average standard but with some errors
B	4.0	GOOD – generally sound work with a number of notable errors
C+	3+ / 3.5	SATISFACTORY – fair but with significant shortcomings
C	3.0	SUFFICIENT – performance meets the minimum criteria
F	2.0	FAIL – considerable further work is required

Hours: 3 Lecture hours per week. The laboratory component consists of 14 topics listed below. Each laboratory has a duration of 4 hours.

Course Lecture and Laboratory Topics:

Lecture topics:

	Lecture TOPICS
1	Introduction
2	Calculations used in analytical chemistry (Chapter 4)
3	Chemicals, apparatus and unit operation of analytical chemistry (chapter2)
4	Errors in chemical analysis (Chapters 5&6)
5	Statistical data treatment and evaluation (Chapter 7)
6	Calibration (Chapter 8)
7	Sampling and sample preparation (additional materials)
8	Sampling and sample preparation (additional materials)

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9	Exam 1
10	Chemical equilibrium (Chapter 9)
11	Titration in Analytical Chemistry (13&14)
12	Complex acid- base systems (Chapter 15)
13	Electrochemistry (Chapter 18)
14	Potentiometry (Chapter 21)
15	Exam2
16	Intro to spectrochemical methods (Chapter 24, 26) UV-Vis
17	Atomic Spectroscopy (Chapter 28)
18	Atomic Spectroscopy (Chapter 28)
19	Instruments for optical spectrometry (Chapter 25)
20	Optical Emission Spectrometry (ICP-OES)
21	Exam3
22	Analytical Separation (Chapter 31)
23	Analytical Separation (Chapter 31)
24	High Performance Liquid Chromatography (Chapter 33)
25	High Performance Liquid Chromatography (Chapter 33)
26	Ion chromatography (Chapter 33D and additional materials)
27	Gas Chromatography (Chapter 32)
28	Exam4
29	Analysis of real samples and review
30	Final Exam

Laboratory topics:

LAB	Experiment - Moja propozycja
1	Check in/Lab safety briefing and lab logistics.
2	Sampling and sample preparation (Extraction, mineralization, etc.)
3	Quantitative Techniques/Titration 1 (KPH; Ca i Mg; potentiometric)

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4	Quantitative Techniques/Titration 2 (KPH; Ca i Mg; potentiometric)
5	Basic electrophysical measurements (weak, strong electrolytes, buffers)
6	Fluoride ISE
7	Molecular Absorption Spectrophotometry (UV-VIS)
8	Atomic Absorption Spectrometry
9	Atomic Emission Spectrometry
10	Optical Emission Spectrometry
11	HPLC 1
12	HPLC 2/IC
13	Gas Chromatography
14	Other analytical techniques in analytical chemistry lab: description and basic info e.g. ICP-OES, ICP-MS, LC-MS, EDX presentation of methods
15	FINAL EXAM