University of Gdańsk

Subject card

Subject name and code	From raw data to verdict: critical thinking and evidence interpretation - simulation workshop, PG_00211860		
Field of study	Forensic Analytics		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2028/2029
Education level	Bachelor's studies	Subject group	Obligatory subject group in the field of study Optional subject group
Mode of study	full-time studies	Mode of delivery	at the university
Year of study	3	Language of instruction	English
Semester of study	6	ECTS credits	2.0
Learning profile	academic	Assessment form	credit
Conducting unit	Laboratory of Chemistry and Analytics of Cosmetics -> Department of Analytical Chemistry -> Faculty of Chemistry -> Rector		
Name and surname of lecturer (lecturers)	Subject supervisor	dr Iwona Dąbkowska	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	0.0	15.0	0.0	0.0	0.0	15

E-learning hours included: 0.0

Additional information:

Teaching language: English

Class format: project work / simulation workshop

Learning activity and number of study hours

Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
Number of study hours	15	2.0	33.0	50

Subject objectives

- To develop students' skills in critical interpretation of analytical data and evidential material in realistic simulation scenarios.
- To build decision-making competences related to selecting analytical methods, prioritizing analyses, and assessing the limitations of evidential material.
- To improve the ability to formulate an expert opinion and defend it in a simulated court setting.To develop the ability to distinguish relevant information from noise, including the identification of misleading data and alternative hypotheses.
- To strengthen precise scientific communication in English in the context of result interpretation and expert reporting.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[AKRL3_W12] The graduate knows and understands, at an advanced level, the latest trends and achievements in analytical chemistry, toxicology, molecular biology and instrumental methods used in forensic science.	1. 1. Selects appropriate research techniques for the type of trace and the evidential question. 2. Justifies analytical choices in terms of time, cost, sample amount, and expected informational value of the result. 3. Can identify which contemporary analytical and toxicological techniques are useful in a given forensic scenario and explain what information they can provide and what interpretative limitations they have.	[SW2] presentation/project/paper/ report [SW5] implementation of a problem task
[AKRL3_K04] The graduate is ready to cooperate with representatives of other fields—law, medicine, biology—within forensic expertise.	The student can cooperate in a team during case analysis by taking on a selected procedural or expert role and can take into account the views of specialists from other fields during discussion of evidential material.	[SK2] presentation/project/paper/ report [SK5] implementation of a problem task [SK8] observation of student's independent or team work
[AKRL3_U08] The graduate is able to prepare oral and written presentations and reports in Polish and in chosen foreign language, as well as present and evaluate different viewpoints and engage in discussion in those languages.	The student can prepare a concise oral and written interpretation of an analytical result, using a correct opinion structure, appropriate terminology, and data-based argumentation.	[SU2] presentation/project/paper/ report [SU5] implementation of a problem task [SU6] demonstration of practical skills
[AKRL3_K02] The graduate is prepared to make reliable, objective, and socially responsible decisions and to assume responsibility for the interpretation of research results, being aware of their impact on evidentiary procedures and the functioning of the justice system.	1. Critically assesses one's own reasoning process and interpretative limitations. 2. Understands the need for continuous development in data interpretation, analytical methods, and expert communication. 3. The student can identify the limitations of the applied analytical method, assess the risk of misinterpretation, and formulate a conclusion in a cautious, objective, and data-appropriate manner.	[SK1] oral statement/conversation/ discussion [SK2] presentation/project/paper/ report [SK6] demonstration of practical skills [SK8] observation of student's independent or team work
[AKRL3_U12] The graduate is able to use a foreign language at the B2 level in the field of chemical and forensic terminology.	The student can use English-language teaching materials and prepare a short, linguistically correct expert statement in English concerning results and their interpretation.	[SU1] oral statement/conversation/ discussion [SU8] observation of student's independent or team work

Subject contents

This course is a **simulation workshop** based on deduction, methodological decision-making under limited resources, and the formulation of expert opinions. Introduction: principles of deduction in forensic science; structure of an expert report; how to read analytical data. Phase I – data analysis: interpretation of ready-made evidential datasets, selection of information, distinguishing signal from noise, and comparison of group conclusions during briefings. Phase II – decision-making on analytical requests: method-selection decision trees, prioritization of evidential material, sample management, and cost-benefit analysis. Phase III – preparation of an expert opinion, court simulation with elements of cross-examination and differentiated procedural roles, including prosecution and defense perspectives. Phase IV – peer review of expert opinions according to a structured assessment sheet and discussion of differences in interpretation. Summary: the most common errors and interpretative pitfalls, and the importance of critical thinking in the work of a forensic analyst. Tasks in the successive phases will be based on evidential material from different types of cases: heavy metal or radioactive poisoning, fire and explosives, drug traces, forged documents or products, and complex environmental cases.

Prerequisites and co-requisites

- Completion of basic courses in analytical chemistry and an introduction to forensic science or forensic chemistry.
- Ability to interpret basic instrumental data, including chromatograms and mass spectra.
- Readiness for teamwork, problem-based discussion, and scientific communication in English.
- English proficiency sufficient for preparing a short expert opinion and taking part in a defense of the position.

<table>
<tr><td>Assessment methods and criteria</td><td colspan="2"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>interpretation of the data from Phase I, justification of the analytical requests from Phase II, and the expert opinion from Phase III. Assessment will be based on: deductive logic – 40%, factual accuracy – 40%, and the quality of scientific communication in English – 20%.</td><td>51.0%</td><td>40.0%</td></tr>
<tr><td>Team participation in case analysis and defense of opinion in Phase III</td><td>51.0%</td><td>20.0%</td></tr>
<tr><td>Peer review</td><td>51.0%</td><td>20.0%</td></tr>
<tr><td>Activity during the simulation game, participation in briefings, and discussion</td><td>51.0%</td><td>20.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>1. Houck M.M., Siegel J.A., Fundamentals of Forensic Science
2. Saferstein R., Criminalistics: An Introduction to Forensic Science
3. Bell S., Forensic Chemistry
4. Cooper G., Negrusz A., Clarke's Analytical Forensic Toxicology
5. Saferstein R. Criminalistics: An Introduction to Forensic Science</td></tr>
<tr><td>Supplementary literature</td><td>1. Brent E. Turvey Criminal Profiling: An Introduction to Behavioral Evidence Analysis
2. Bland M., Neuman A. The Crime Analyst's Companion: International Case Studies and Practice
3. Wolstenholme R. et al. Analytical Techniques in Forensic Science</td></tr>
<tr><td>eResources addresses</td><td>Basic
https://cba.gov.pl/ftp/dokumenty_pdf/Analiza_UNODC_dla_analitykow.pdf -</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">The course is designed to develop practical skills in the analysis of evidential material obtained from physicochemical investigations.

Phase I: Students are provided with ready-made evidential material and are required to interpret it. The instructor supplies complete analytical datasets, including chromatograms, mass spectra, and sample collection protocols. Students work in small groups as an analytical team. Their task is to identify the relevant findings, exclude irrelevant noise, and formulate conclusions. Each session concludes with a briefing in which group conclusions are compared and differences in interpretation are discussed.

Phase II: Students independently decide which analyses are necessary. The instructor presents a crime scene description and the available evidential material in its raw, uninterpreted form. The teams request analyses from a range of available methods, taking into account that each analysis carries a cost in terms of time, money, and sample quantity. The key competencies developed at this stage include evidential triage, prioritization, and justification of methodological choices. Once the requests have been submitted, the instructor provides the corresponding results.

Phase III: Students present and defend their conclusions. Each team prepares a concise expert opinion and presents it before a simulated court consisting of the other students and the instructor, who act as defense counsel or judge. The cross-examination includes questions such as: Why was this method chosen? How was measurement uncertainty addressed? Were alternative hypotheses excluded? Teams are required to prepare an opinion for either the prosecution or the defense based on the same data, leading to a discussion of probabilistic interpretation.

In addition, each student submits a case portfolio containing an interpretation of the evidential material from a selected case, a justification of the requested analyses, and the final expert opinion.</td></tr>
<tr><td>Work placement</td><td colspan="2">Not applicable</td></tr>
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