

JOHN JAY COLLEGE OF CRIMINAL JUSTICE  
THE CITY UNIVERSITY OF NEW YORK  
524 W 59th street, New York, New York 10019

## *Analytical Toxicology*

### **TOX 416**

Monday 5:40-8:20 pm, Rm 8.61NB

**Instructor: Shu-Yuan Cheng, Ph.D.**

Room: 5.61.09 NB (Office)      Tel: (646) 557-4637

Email: shcheng@jjay.cuny.edu

Office hours: TBA and by appointment

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**Course description:** TOX 416 will present the important fundamental concepts of analytical toxicology including sampling, sample handling, the chain of custody, sample storage, sample preparation (homogenization, digestion, extraction, derivatization, etc), various analytical techniques (Biosensors, Capillary electrophoresis, Chromatography, Immunoassay, enzyme-based assay, spectrophotometry, etc.).

#### **Learning Objectives:**

Students that complete this course will be able to:

##### Reasoning

- Critique technical data and opinions from published articles and legal proceeding
- Describe the process of specimen selections as related to both clinical and forensic toxicology
- Assess the potential usefulness of information obtainable
- Differentiate various specimen types with regard to the information that can be obtained and limitations of different biological specimens analyzed
- Formulate and document accurate opinions and data developed from analytical measurement of biological samples that are generated by the student or other sources
- Interpret toxicological data in relation to the type and condition of specimens

##### Knowledge

- utilize information gained both in classroom and from toxicological/pharmacological literatures to evaluate and interpret different types of toxicological and pharmacological data

##### Practical skills

- Apply various advance analytical techniques utilized for qualitative and quantitative detection for drug and poisons in biological (post modern and clinical) specimens.
- Interpret scientific data in unbiased and objective manners and recognize the what is incomplete, inaccurate or biased presentations of results and data

- Critique opinions obtained from other sources for accuracy and objectivities
- Demonstrate the conduct and behavior both in and out of laboratory consisted with relevant published professionals codes of behaviors and ethics
- Understand the key elements involved in chain of custody and specimens and maintaining documentations of all laboratory procedures

#### Communication

- Participate in discussions as well as written expression of thoughts and opinions, such as case studies, written exams and assignments
- properly articulate and support scientific positions for both public presentation as well as for legal settings
- Demonstrate written competence by means of assignments and examinations

**Course pre-requisites:** ENG 102 or ENG 201, CHE 315 and CHE 320-321

#### **Suggested Texts/equipments:**

1. *Principles of forensic toxicology (third edition) by Barry Levine*
2. *Fundamentals of analytical toxicology by Robert J Flanagan et al.*
3. *Clark's analytical forensic toxicology by Sue Jickells et al.*

#### **Statement of the College Policy on Plagiarism:**

- Plagiarism is the presentation of someone else's ideas, words, or artistic, scientific, or technical work as one's own creation. Using the ideas or work of another is permissible only when the original author is identified. Paraphrasing and summarizing, as well as direct quotations, require citations to the original source. Plagiarism may be intentional or unintentional. Lack of dishonest intent does not necessarily absolve a student of responsibility for plagiarism.
- It is the student's responsibility to recognize the difference between statements that are common knowledge (which do not require documentations) and restatements of the ideas of others. Paraphrase, summary, and direct quotation are acceptable forms of restatement, as long as the source is cited.
- Students who are unsure how and when to provide documentation are advised to consult with their instructors. The library has free guides designed to help students with problems of documentation.
- This course will use turnitin.com for the paper. Plagiarism will result in an automatic "zero" for the assignment, and the instructor reserves the right to report the academic dishonesty to the college disciplinary mechanisms.

#### **Americans with Disabilities Act (ADA) Policies**

Qualified students with disabilities will be provided reasonable academic accommodations if determined eligible by the Office of Accessibility Services (OAS). Prior to granting disability accommodations in this course, the instructor must receive written verification of a student's eligibility from the OAS which is located at L66 in the new building (212-237-8031). It is the

student's responsibility to initiate contact with the office and to follow the established procedures for having the accommodation notice sent to the instructor."

**Blackboard:** Important course announcements, reading assignments, lecture notes, review questions, a discussion forum for Q and A, and other resources will be posted to the course on Blackboard. Please check regularly. Furthermore, **students are responsible** for checking their **John Jay e-mail account** regularly for important announcements. Contact DoIT, **not** your instructor, for help with e-mail or Blackboard.

**Grades:** The grade for TOX416 is a composite of two (2) exams, an oral presentation and lab grade.

(25% midterm + 25 % final + 20% oral presentation + 30% lab grade = 100%)

**Grading Scale:** The grading scale is the official grading scale for this course. There will be no exceptions to this scale and grades will not be rounded, except as explained here: following all computations, the grade will be rounded to the nearest tenth of a point in Microsoft Excel (one decimal place, e.g., 97.2%). This is the final grade and no further manipulations will be made. The scale will then be strictly used. This means that a 72.949% is a "C-" and a 72.950% is a "C." These calculations are done by the computer so there are no judgment calls or "leniency."

93.0 and above	A
90.0 - 92.9	A-
87.0 - 89.9	B+
83.0 - 86.9	B
80.0 - 82.9	B-
77.0 - 79.9	C+
73.0 - 76.9	C
70.0 - 72.9	C-
67.0 - 69.9	D+
63.0 - 66.9	D
60.0 - 62.9	D-
below 60.0	F

**You must check Blackboard and your John Jay E-mail account regularly.**

You are responsible for any and all course information, assignments, announcements, and communication that occurs through blackboard and/or your email account.

## Important Policies

**Course Attendance:** You are required to attend the class sessions. An attendance sheet will be circulated during class. It is your responsibility to sign the sheet *during* class. You will not be permitted to sign the attendance sheet after the class has been dismissed. You will be allowed two (2) absences with no required documentation. However, beginning with the third undocumented absence, your final course grade will be penalized by 20 percentage points (20%) for each undocumented absence. Arrivals later than fifteen (15) minutes after the start of class will count as a one-half absence.

**Exams:** There will be two (2) exams: one (1) midterm and one (1) final. The midterm and the final will be form 25 points each.

### Oral presentation:

1. Topic is due on Feb 11
2. Submit the reference paper 2 weeks before the presentation day
3. Use Power point slides
4. 15-20 minutes presentation

The detail will be given in class.

## Course Reading List

### Suggested Texts (student purchase, unless library has e-book):

*Casarett & Doull's Essentials of Toxicology, Second Edition (Casarett and Doull's Essentials of Toxicology) Curtis Klaassen (Author), John B. Watkins III (Author)*

Suggested references:

- [www.ncbi.nlm.nih.gov](http://www.ncbi.nlm.nih.gov) (Pubmed)
- <http://toxnet.nlm.nih.gov/>
- *Principles of forensic toxicology (third edition) by Barry Levine*
- *Fundamentals of analytical toxicology by Robert J Flanagan et al.*
- *Clark's analytical forensic toxicology by Sue Jickells et al.*

<b>Section</b>	<b>Date</b>	<b>Content</b>
1	Jan 28	Introduction
2	Feb 4	Postmortem Forensic Toxicology
3	Feb 11	Human Performance Toxicology/Forensic Drug Testing <b>Oral presentation topic due (0%)</b>
4	Feb 20 (Wed)	Liquid-liquid extraction
5	Feb 25	Solid phase extraction (SPE) and Solid phase microextraction (SPME)
6	March 4	Spectrophotometry
7	<b>March 11</b>	<b>Midterm I (30%) Lecture 1-6</b>
8	March 18	Immunoassay
9	April 8	Liquid chromatography (LC)
10	April 15	Gas chromatography
11	April 22	LC/MS
12	April 29	GC/MS
13	May 6	Biochemical and molecular biological techniques in Toxicology I
14	May 13	Biochemical and molecular biological techniques in Toxicology II
Final	<b>TBA</b>	<b>Final (25%)Lecture 8-14</b>