COURSE DESCRIPTION:

Clinical Implications of Human Poisoning will cover the clinical, historical, and public health aspects of toxicology resulting from human poisoning. The concepts covered in this course are essential to all medical and pharmaceutical disciplines. The students will learn and discuss the science as well as the science policy behind a large spectrum of toxins that have affected individual humans as well as large masses. The course will provide a (1) basic science introduction to toxicology, (2) a review of the clinical, historical, and controversial aspects of toxicology and (3) a discussion of the impact of toxicology on not only the human body but on the health of the population. Our focus will not be on the cellular level but will be on the organ, body, and population level. Students will learn through didactic lectures, patient narratives and cases, journal articles, simulation scenarios, and historical and public health reports, as well as video or audio media. Through these mediums, students will study real life scenarios of acute and long-term poisoning. Through the topics described in the course syllabus, this course will bring to focus the medical challenges in toxicology at the level of an individual patient as well as the related public health concerns. With the help of the lecturers, typically Emergency Medicine physicians and Medical Toxicologists, students will learn the scientific thought process behind solving these medical challenges.

COURSE OBJECTIVES:

Students who take this course will be able to:

- Understand and discuss the toxicology of human poisoning at the interface of the cell, organ, and whole-body physiology
- Understand and discuss the historical and public health aspect of human poisoning at the local as well as global level
- Read clinical case studies, international case studies, and public health reports involving human poisoning and toxicology

COURSE FORMAT:

This course is a lecture-based course. **Lectures** will be held **in person only** in the Medical School Building. For more discussion on the expectations for in person attendance/participation, access to recorded lectures, and role of virtual learning see the next section. **Attendance at lectures is VOLUNTARY, however students do receive a participation grade** (20% of their cumulative grade) that includes attendance and completion of lecture participation assignments. The remainder 80% of the grade will come from performance on the midterm and final exam.

The amount of time (in weeks) devoted to each topic: 14 x 3-hour sessions, 2 x 1-hour exams

Course Content: 2 Science (35%)

Clinical (50%)Human Interest (15%)

SCHEDULE

Lecture Number	Date	Торіс	Lecturer	Supplemental Reading
1	6/2/2025	Principles of Toxicologic Pharmacology: Toxicokinetics, Toxicodynamics, and Antidote	Bruce Ruck	Chapters 3 & 4 in Burcham 2014 Chapter 9 in Goldfrank's 11e
2	6/5/2025	Clinical Approach to the Poisoned Patient: Vital Signs and Toxic Syndromes, Decontamination, & Laboratory Analytics	Cynthia Santos	Chapter 6 in George 2018 Chapters 3&4 and Case Studies 1 & 2 in Goldfrank's 11e Historical Epidemic Poisonings
3	6/9/2025	Things that Swim, Crawl, Slither, and Grow in the Ground (Marine and Land Envenomations; Plants and Mushrooms)	Chris Counts, Anthony Spadaro	Chapter 116 & Case Study 4 in Goldfrank's 11e Chapter 118 in Goldfrank's 11e Chapter 23 in George 2018
4	6/12/2025	Avoidable Toxicological Disasters in History: Prohibition, Bhopal, Goiani, Zamfara	Mehruba Anwar	Chapter 22,33 in George 2018 Chapter 2 & 39 in Goldfrank's 11e
5	6/16/2025	The Periodic Table of Poisons: Metals, Metalloids, and Non- Metals	Jessica Krueger	Chapters in Goldfrank's 11e Chapters in George 2018
6	6/19/2025	Disaster Preparedness and Terrorism: Large-Scale Chemical, Biological, and Radiation Poisonings	Chris Meaden	Chapters 126 – 128 in Goldfrank's 11e
7	6/23/2025	Environmental Poisoning/ 2nd half: midterm	Cynthia Santos	Stockholm Convention: Protecting Human Health and the Environment from Persistent Organic Pollutants Optional: PEHSU Courses (e.g. Air Quality, Environmental Health) Lancet Commission on Pollution (Sections 1 &2) Chapter 136 in Goldfrank's 11e

8	6/26/2025	Rodenticides, Herbicides, Pesticides, and the Politics of Poison Prevention	Diane Calello	Chapters 107 – 114 Case Study 11 in Goldfrank's 11e
9	6/30/2025	Substances of Abuse, Part 1: Opioids, Alcohol, and Their Withdrawal Syndromes	Jessica Krueger	Chapters A26, 76-80 in Goldfrank's 11e
No class	7/3/2025	Independent Self-Study: Toxicological Outbreak Investigations, Risk Assessment and Risk Communication	Self-Study	CDC TOI Course Modules
10	7/7/2025	Notable Poisonings: Assassinations, Homicides, Celebrity Drug Deaths	Bruce Ruck	Chapter 37 & 38 in George 2018 Chapter 2 in Goldfrank's 11e Chapter 126 in Goldfrank's 11e Optional: ATSDR Cholinesterase Inhibitors Case
11	7/10/2025	How Poisons Poison: Simple and Chemical Asphyxiants, Neurotoxins, Cardiotoxins	Howard Greller	Chapters 120 - 124 in Goldfrank's 11e Case Study 12 in Goldfrank's 11e
12	7/14/2025	Classic & Common Culprits in Intentional Self-Poisoning: Salicylates, Acetaminophen, and Antidepressants	Cynthia Santos	Chapters 14, 15, and 18 in George 2018
13	7/17/2025	Substances of Abuse, Part 2: Stimulants, Hallucinogens, and Novel Psychoactives	Mehruba Anwar	Chapters 73-75, 79, 82 & 83 in Goldfrank's 11e
14	7/21/2025	Extremes of Age, Reproductive and Perinatal Populations/2nd half simulation scenarios	Chris Meaden/ 2nd half: Med Tox Fellows, Cynthia Santos	Chapter 31 and 32 and Case Study 6 in Goldfrank's 11e Chapter 30 in Goldfrank's 11e Chapter 7 in Burcham 2014 Optional: PEHSU Course (Reproductive Health)
15	7/24/2025	Final Exam & Closing Statements	Cynthia Santos	

Other Topics Covered Indirectly Throughout:

- Developing Sciences (e.g. Nanotechnology, Pharmacogenomics)
- Organ System toxicology (Pulmonary, Cardiac, Hepatic)
- Antidotes

- Prevention
- Legal and political implications

FACULTY AND STAFF

The course is presented by the Division of Medical Toxicology, Department of Emergency Medicine. The course director is Dr. Cynthia Santos [cs1315@njms.rutgers.edu]. The contact information for the course faculty is listed below. A student seeking individual assistance in any matter relating to the course content is encouraged to make an appointment with the appropriate faculty member. **All administrative and grading concerns should be directed to the course director.**

COURSE TEXTBOOKS

There is **NO REQUIRED** textbook for the course. Many of the lectures are based on chapters from different books.

Selected Reading:

 Burcham P. An Introduction to Toxicology (2014) https://link.springer.com/book/10.1007/978-1-4471-5553-9
 George D. Poisons: An Introduction for Forensic Investigators (2018) https://www.amazon.com/Poisons-Introduction-Investigators-David-George-dp-1498703828/dp/1498703828/ref=mt_hardcover
 Torres J, Bobst S. Toxicological Risk Assessment for Beginners (2015) https://link.springer.com/book/10.1007/978-3-319-12751-4
 Goldfrank's Toxicologic Emergencies 11e https://accesspharmacy-mhmedical-com.proxy.libraries.rutgers.edu/book.aspx?bookid=2569

Other Potentially Useful Resources:

1) ATSDR Case Studies – Various topics in environmental, metals, pesticides and radiation. They are long and wordy but some of the figures are good

2) ACEP/ACMT Simulation Scenarios – Could use simulations on various pharmaceuticals and envenomation cases

3) ACMT Courses: GETKIT, GETUP, Total Toxicology Course

4) Podcasts: Dantastic Mr. Tox & Howard, Tox and Hound, toxtalk, thepoisonreview, ACMT (tox in 10)

EVALUATION METHODS & COURSE GRADING

Grading: This course will include two exams, a mid-term (60 minutes) and a final exam (75 minutes). The exam will include questions with multiple-choice answers or true or false. The midterm will account for 35.55% of the grade and the final exam will account for 44.45% of the

grade. Each exam will be based on material presented in the previous lectures and textbook readings. The final exam is not cumulative and covers material in Weeks 7-15. 20% of the cumulative grade will stem from students' contribution to in-class exercises and discussions. The students will receive notification of the reading materials prior to the class. In class, the students is expected to participate in small group and classroom-level discussions. Participation will be assessed on the basis of their contribution to the discussion of the material, active participation in group and/or individual activities, and engagement in critical thinking through raising thoughtful, relevant discussion points. Each lecture will have a participation assignment that students in groups of up to 2-3 can complete in the last 10-15 minutes of the course. The participation assignment will include 2-3 broad questions specific to that topic lecture. The Lecturer will discuss the responses to these questions at the end of the lecture as a way to provide a recap and summary of the lecture material. The students are expected to submit their participation assignment on the Canvas website within 24 hours after the lecture. The participation assignments will be graded as Pass or Fail (students who do not hand in the participation assignment will not get participation credit for that lecture). Midterm and final exam grades will be graded in a numerical score and receive a corresponding letter grade. Letter grades will be determined according to the following rubric: A (>90); B+ (>80); B (>70); C+ (>62.5); C (>55); F (>55). A curve may be implemented as required by the exam results. The exams will be administered through ExamSoft Software. Additional information regarding ExamSoft requirements and software downloads will be available on the Canvas website for the course.

EXPECTATIONS FOR INPERSON ATTENDANCE/PARTICIPATION VS. VIRTUAL LEARNING

We really feel the educational experience, discussion, and connection to the material is so much stronger in person. There is such a difference between interactive classroom learning and passive learning from watching videos. We understand the convenience of virtual learning (and virtual everything!) however we feel the benefits of in person interactive experience has much more opportunity to create a truly long lasting and meaningful educational experience. For these reasons the expectation is that students attend the lectures **in person only**, participation via Zoom is not a substitute for in-person participation.

That being said, the recorded lectures will be made available shortly after each lecture as per the graduate school requirements. **The recorded lectures are not meant to be a substitution for in-class participation. The expectation is that students try to attend most of the lectures in person as there is also a class participation component for your grade.** The grading rubric is available in the course description. The recorded lectures are meant to be a supplement and not a replacement to in-person attendance. A requirement by the school is that the lecture recordings be made available within 24 hours of the lecture which we will provide. The exams will be available virtually with remote proctoring.

EDUCATION PORTAL AND CANVAS COURSE ACCESS:

The CANVAS course website is an essential part of the Clinical Implications of Human Poisoning Course. CANVAS can be accessed using the Educational Portal website at <u>https://ep.njms.rutgers.edu</u>. The Education Portal provides single sign-on and "one stop shopping" site for various academic systems such as CANVAS, Education Management System, Digital Media Portal, Virtual Microscopy, SOCRATES, etc.

If the Education Portal is unavailable, direct links for CANVAS, NJMS Video, Virtual Microscopy etc., are provided below:

CANVAS: To access all course information log onto CANVAS at: https://canvas.rutgers.edu/

PODCAST ACCESS:

WIRELESS ACCESS FOR ELECTRONIC EXAMS (ON CAMPUS EXAMS)

RU Health Sciences is the primary wireless network for SGS however you can use either RU Health Sciences or RU Wireless Secure for electronic exams. Please make sure you can connect to both prior to an exam. See https://ruwireless.rutgers.edu/ruwireless-secure for more information. **DO** NOT USE RU Wireless.rutgers.edu/ruwireless-secure for more information. **DO**

EXAMSOFT SYSTEM REQUIREMENTS:

Note: These requirements will be updated by the SGS Office of Student Affairs and Admissions. The requirements below are from the 2019-2020 Academic year:

EXAMSOFT SYSTEM REQUIREMENTS:

The following laptop requirements are necessary for the School of Graduate Studies

REQUIREMENTS				
Windows	Mac OS			

 Operating System: 32-bit and 64-bit Versions of Windows 10. Alternate versions of Windows 10 RT and 10 S are NOT supported at this time. CPU Processor: 2.0 ghz Intel i3 processor or equivalent RAM = 4 GB or higher HD (needs at least 1 GB of free space) 13' screen or larger (Laptops) Minimum screen resolution of 1024x768 is required with a 32 bit color setting Virtual machines & applications are not allowed Surface Pro is allowed (non-pro Surface devices are not allowed) Tablets are not allowed; nor Chromebooks, netbooks, etc. For on-site support, a working USB port is required (newer devices may require an adaptor) 	 MacOS Catalina (version 10.15) is only compatible with Examplify version 2.0.6 or higher (Released on 10/14/19 or later) Any server version of Mac OS is NOT supported 1GHz Intel processor or higher RAM = 4 GB or higher HD (needs at least 1 GB of free space) 13' screen or larger (Laptops) Minimum screen resolution of 1024x768 is required with a 32 bit color setting Virtual machines & applications are not allowed iPads/tablets are not allowed For on-site support, a working USB port is required (newer devices may require an adaptor) 					
 Microsoft Edge, Internet Explorer Chrome 	SafariChrome					
 Firefox 	 Firefox 					
 Do not use beta versions. Other browsers are not 	 Do not use beta versions. Other browsers are not 					
supported.	supported.					
Browser Settings	Browser Settings					
- JavaScript Enabled	- JavaScript Enabled					
- Cookies Enabled	- Cookies Enabled					
- CSS Enabled	- CSS Enabled					
- Disable pop-up blockers	- Disable pop-up blockers					
Must have Administrator level account permissions.						
Disable Toolbars, Adware or Spyware programs. They ma cause delays in loading testing questions. If you are using McAfee, you need to turn off Real-Time S	Scanning.					
Turn off Windows updates or virus scanner updates to av						
**** <u>The following requirements apply for exams with E</u>	xamiu or Examivionitor enabled					
	Examplify version 2.3.2 or greater					
	Hard Drive: 2GB or higher available space					
RAM: 8GB or higher recommended; 4GB required						
Webcam						
Microphone (no headphones!)						
Internet: 2Mpbs upload speed						

EXAMSOFT EXAMPLIFY LINKS:

Mac : <u>https://examsoft.force.com/emcommunity/s/article/Examplify-Minimum-System-</u> <u>Requirements-for-Mac-OS-X</u>

Windows: <u>https://examsoft.force.com/emcommunity/s/article/Examplify-Minimum-System-</u> <u>Requirements-for-Windows</u>

ABSENCE FROM COURSE QUIZZES AND EXAMS:

SGS has issued a **MISSED EXAM POLICY** for students enrolled in their programs. Below are the valid excuses for missing a quiz or exam in this course (verbatim from the SGS Exam Policy):

- Significant illness, with official note by doctor, which must include a valid reason for missing the exam. The doctor's note cannot result from a remote (online) diagnosis.
 NOTE: Illness prior to the exam ("didn't have time to study") does not constitute a valid excuse, although exceptions can be given by the SGS Associate Dean of Student Affairs if the prior illness has been severe or lengthy.
- Death in the immediate family (parents, siblings, children, grandparents, aunts/uncles, niece or nephew, sister-in-law or brother-in-law, parents-in-law, first-cousins).
 Verification, with dates, is required, but this can be a newspaper announcement, event (e.g. wake) announcement, etc.
- 3) Medical/dental school interview, in which the interview or unavoidable travel overlaps with the exam. Copy of the invitation letter.
- 4) Presentation at a meeting. Proof of attendance required.
- 5) More than two final exams on the same day. (NOTE: An exam should not be rescheduled for an individual with two exams on the same day). If a student has more than two exams on the same day, they will need to contact the SGS Associate Dean of Student Affairs, who will contact the course directors about allowing the student to take one of the exams on a different day. The vast majority of schools across the country, including Rutgers New Brunswick, allow up to two final exam in the same day.
- 6) Permission of SGS Associate Dean of Students Affairs, with consultation of coursedirector. This will be rare, but is meant to account for valid, but unforeseen circumstances.

Each of these reasons will require some form of documentation to be submitted to verify the absence. For the full policy, please follow this link: http://njms.rutgers.edu/sgs/current_students/docs/new/ExamPolicy.pdf

If you are going to miss any quiz or exam, contact Dr. Santos at cs1315@njms.rutgers.edu, not the other lecturers in the course. It is the sole responsibility of the course director to administer the exams or handle any student related issues

CODE OF PROFESSIONAL CONDUCT (COURSE EXAMINATIONS):

All students have a fundamental responsibility for maintaining academic integrity and intellectual honesty in their academic and professional endeavors. They are expected to observe generally accepted principles of scholarly work, to submit their own rather than another's work, to refrain from falsifying data, to acknowledge the published work of others in an appropriate manner, and to refrain from receiving or giving aid during examinations or other work requiring independent effort. When submitting written material, students take full responsibility for the originality of all work not otherwise identified by appropriate acknowledgments and imply that both the ideas and words used are their own. All students are expected to respect the property of faculty and other students, and not use research equipment or laboratory supplies of others without permission.

Specific examples of appropriate behavior in examinations exams are given below:

Examinations: The purpose of an examination is to assess a student's knowledge of a topic defined within a course or courses. <u>Unless given explicit written instructions to the contrary, a student must work without assistance on an examination.</u>

- **Classroom examination:** Each student will provide answers to questions as directed. Unless otherwise stated, no material (books, calculators, computers, communication devices) of any kind can be used during an examination.
- **Take-home examination:** Each student will provide answers as directed. Unless otherwise stated, research and writing must be done individually without assistance or exchange of information with others. The ability to use source material in the research of answers will be defined for each examination. But, unless stated otherwise, all source material should be cited appropriately as outlined below.

NOTE: THESE POLICIES ALSO HOLD TRUE FOR ALL EXAMS ADMINISTERED REMOTELY.

To view the full policy for the Code of Professional Conduct in the School of Graduate studies regarding examinations, research and oral presentations follow this link: <u>http://njms.rutgers.edu/sgs/current_students/ac_integ.php</u>

ACADEMIC WARNING POLICY:

http://njms.rutgers.edu/sgs/documents/policys/SGS_Academic_Warning_Policy.pdf

Each program shall clearly inform students of the criteria for satisfactory academic performance. Academic standing will be reviewed each semester by the Program's Academic Standing Committee. Students who receive less than an average grade of "B" in the designated Core course(s) or have a GPA less than 3.0 will receive an academic warning notice. Students

performing below satisfactory levels of proficiency as outlined by the program may also receive a written warning notice. The written warning states the problem(s), outlines those measures needed for improvement and sets a deadline for compliance. Letters informing students of an academic warning will be sent within 30 calendar days of the end of the semester. A request will be made to students receiving academic warning letters to meet with the Program Director and/or the Academic Standing Committee.

COURSE ADD/DROP POLICY:

Policy for the Addition of a Course:

Students may add courses with the approval of the instructor (when required) and the program director. A student wishing to add a course after the general registration period has closed, must complete the "Add/Drop/Withdraw" form and have appropriate approval of the course instructor (when required) and program director prior to the start of the course. Registration will not be permitted beyond the first week of a course. Credit will not be given for courses in which the student was not registered.

Add Course Form Link:

https://na2.docusign.net/Member/PowerFormSigning.aspx?PowerFormId=96fcae95-bc67-45fb-8da3-11300ded2e99

Policy for Dropping a Course:

Students may drop courses with approval of the instructor (when required) and the program director. <u>Students submitting a completed "Add/Drop/withdraw" form to the SGS Registrar's office within 10 academic days of the start of the course will receive a full tuition refund and the course will not appear on their official transcript. The drop period of 1-10 *academic days, is distinguishable from the withdrawal period in that the drop period is without penalty. A completed and approved Add/Drop/Withdraw" form(s) must be received by the Registrar's office within the time periods set forth above in order for a course(s) to be "dropped".</u>

Drop Course Form Link:

https://na2.docusign.net/Member/PowerFormSigning.aspx?PowerFormId=c45635ca-6a1e-4936-b436-337b211b8433

*An academic day is defined as a day that the SGS campus at which the student is enrolled is open for business.

REASONABLE ACCOMMODATIONS AT RUTGERS SCHOOL OF GRADUATE STUDIES:

Rutgers School of Graduate Studies is committed to providing equitable access to learning opportunities to students with documented disabilities (e.g. mental health, attentional, learning, chronic health, sensory, or physical). To ensure access to this please contact Student Affairs, to engage in a confidential conversation about the process for requesting reasonable accommodations in the classroom setting. Students are encouraged to register with the Office of Student Affairs as soon as they begin their program. Accommodations are not provided retroactively. Rutgers School of Graduate Studies encourages students to access all resources available through the School for consistent support and access to their program.

More information can be found online at

http://njms.rutgers.edu/education/student_affairs/student_support/disability_services.cfm .

Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must complete the ODS registration form: <u>https://webapps.rutgers.edu/student-ods/forms/registration_and contact the RBHS Office of Disability Services at 973-972-5396 or cindy.poorepariseau@rutgers.edu_to make an appointment for an intake interview. You will also be asked to provide documentation of your disability:</u>

https://ods.rutgers.edu/students/documentation-guidelines .

If_the documentation supports your request for reasonable accommodations, the Office of Disability Services will provide you with a Letter of Accommodations. This Letter will be used to notify appropriate school personnel about the accommodations you are qualified to receive. To begin this process, please complete the Registration form on the ODS web site at: https://webapps.rutgers.edu/student-ods/forms/registration.

TEACHER-LEARNER POLICY RUTGERS SCHOOL OF GRADUATE STUDIES:

The Rutgers SGS Newark Health Science Campus strongly believes that teaching and learning should take place in a climate of mutual respect where students and faculty are equally responsible for maintaining a professional and collegial environment. An environment where students are evaluated based upon accomplishment, professionalism and academic performance. We are committed to maintaining a positive learning environment and the highest standards of behavior in the teacher-student relationship.

To view the full Teacher-Learner policy for the School of Graduate studies, please follow this link: <u>https://njms.rutgers.edu/sgs/current_students/docs/Teacher%20Learner%20Policy.pdf</u>