

University of Florida

Graduate Distance Education programs in
Forensic Science, Pharmaceutical
Chemistry, and Clinical Toxicology

Course syllabi 2021/2022

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1. General course policies

Following are the general course policies that apply to all of the UF graduate distance education courses in Forensic Science, Pharmaceutical Chemistry, and Clinical Toxicology as listed in the content of this document. Please be aware that some courses have both written essay assignments and quizzes that are used for student evaluation while other courses have written essay assignments only. Additional means for student evaluation may be utilized by the individual instructor which will be announced on the course website within Canvas at the beginning of the semester.

For further information about your specific program of study, please see the respective website:

Forensic Science, <http://www.forensicscience.ufl.edu/>
Pharmaceutical Chemistry, <http://pharmchem.cop.ufl.edu/>
Clinical Toxicology, <http://clintox.cop.ufl.edu/>

1.1 Getting started

To get started, briefly introduce yourself via the discussion board then go to the first module. Read through the course content and any required reading listed in the module introduction. Once you are familiar with the material, complete the assignment and quiz (where applicable). Do not hesitate to contact your teaching assistant (TA) or instructor at any time if you need guidance; if you are unsure about the focus of the assignment; if you have assignment questions or questions relating to the course content or quiz (where applicable). If you do not tell us you need help, we cannot help you.

1.2 Revision and Notes

As you go through the semester, keep copies of important emails, bulletins and assignments you may use for revision as these will be purged from the course at the end of the semester. We recommend you make a copy of the course modules since this will be the only access you will get to these materials. We will not be able to provide you with copies of course content once the course is removed from your account.

1.3 Course assignments

The assignments are listed under the assignment tab. You should consider the assignment questions as you read through the module content.

Required Materials: Students must comply with the UF Computer and Software Requirement. Please see the website for your respective program for further information.

1.4 Assignment deadlines and important course dates

The courses do not have a midterm or final exam. Students are evaluated continuously throughout the semester and graded according to their performance in the course module assignments and quizzes (where applicable). All modules have a written assignment and some have additionally timed quizzes that must be completed by the assignment deadline for the corresponding module.

All written assignments must be completed in your own words. Cutting and pasting from the internet is not acceptable and may be considered to be plagiarism. Failure to complete an assignment in your own words may result in you receiving a score of zero for the written assignment.

When it comes to grading, both written assignments and quizzes (where applicable) are weighted equally.

For courses that have timed quizzes: if you lose your internet connection during your quiz and scores are not recorded simply email your course instructor and they can help you.

When sending course assignments, include your name and please make sure your assignments are labeled clearly. Assignments should be submitted using the assignment drop box. If you have difficulty with the drop box email your instructor and teaching assistant - they will work with you to troubleshoot the problem. Assignment feedback will also be provided via the assignment drop box, so students should

check back to the drop box feature in the appropriate module to receive feedback and the assignment grade.

Always keep a copy of your course assignments in case you need to resend it. Also, you may want it for revision purposes later.

For Assignment deadlines - see the course calendar in Canvas.

For other important dates, consult the [UF Calendar of Critical Dates](#) and <http://www.registrar.ufl.edu>

1.5 Communication

Communication is a central part of all of our courses. Please take advantage of email and the discussion board whenever you have a question about the course content, assignments, quizzes (where applicable), or anything else related to the course. We want to provide all of our students with the best opportunity to learn and are always available to answer your questions. Please never hesitate to contact your course instructor and TA if you have questions.

1.5.1 Email

Course Email, not the discussion board, should always be used to contact the faculty or staff if you have a problem of a personal nature.

For technical assistance do not contact the UF HELP Desk. Please contact our IT support via email at dess@ahc.ufl.edu in addition to your course instructor.

If you are having technical problems with the course content (downloads, etc.) or you are unable to access your course interface, please contact your course instructor directly, and please do not spend hours trying to get something to work as this will only lead to frustration. We do not want any of you to be offline for any length of time. Contact us as soon as you can so we can check it out and help you. If you are experiencing difficulty with your access to course email then please email your course instructor directly via regular email. In that email, make sure you give your name and the name of your course. External instructor email addresses are listed for each course separately.

Please respond to all emails from your instructor or TA. When they email you they are usually contacting you because they want to help you.

If you have a question about your grade, a quiz (where applicable), or assignment question, please email your course instructor and they will be happy to help you.

1.5.2 Discussion board

The course discussion board can be used to post content related questions and assignment materials when necessary. Please ask your course instructor or TA questions any time; they are here to help you. Please do not use the discussion forum to ask specific questions about your current course content, assignments etc.

It is VERY important that you read all the discussion bulletins that have been posted. The course instructor or TA will use this site to post important information relating to content or quiz (where applicable) changes, deadlines etc. Since postings can accumulate quickly, please login each day to stay on top of these postings or you may miss important information.

Please make sure you do not post assignments that are supposed to be submitted to the assignment drop box. If you accidentally do, email your course instructor right away and they will delete it for you.

1.6 Grading

Students will be graded on written assignments and module quizzes (where applicable). The final grade will be based on the student's cumulative score divided by the total number of available points. The resulting percentage will be converted to a letter grade based on the scale below.

Students will receive individual feedback on points lost on the assignments. The comments of the TA or professor can be viewed on the assignment submission page for the corresponding module.

Students can check their progress in the course by viewing their grade records via the course interface.

Western Sydney, HAN, and Edinburgh grades will be assigned as per the policies and procedures within your university.

Grades will be assigned as follows:

A	90% or Above
A-	88 - 89%
B+	85 - 87%
B	80 - 84%
B-	78 - 79%
C+	75 - 77%
C	70 - 74%
C-	68 - 69 %
D+	65 - 67%
D	60 - 64%
D-	58 - 59%
E	< 58

1.6.1 Makeup policy

Make up assignments are not usually given, but may be at the discretion of the course instructor after evaluation of the circumstances leading to the request.

1.6.2 Grade changes

Grades will be changed only when a grading error has been made. If you think an error has been made, you should email the instructor or TA as soon as possible. Your entire assignment will then be re-graded.

1.7 Instructional policies

All of our courses are part of the distance education programs at the University of Florida. Instead of traditional lecture format, the primary medium for communication between course instructors, teaching assistants and students will be via Canvas, a user-friendly web-based classroom management tool, and the World Wide Web.

1.7.1 Attendance

Students must participate in the bulletin board discussions, and are required to visit the course website daily for important updates and bulletins.

1.7.2 Class participation

Students are expected to constructively join in bulletin board discussions, with appropriate preparation; to post interesting and relevant information on the class bulletin board, and to interact professionally with their classmates.

1.7.3 Performance expectations

Students are expected to produce quality work of a standard comparable to any graduate level didactic course. Discussion board postings and discussions must be legible, constructive and appropriate. Students are required to think for themselves and will be expected to complete assignments that require the application of logic and reasoning skills when the answer may not be found in a book or the course notes.

1.7.4 Academic honesty

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." [The Honor Code \(https://sccr.dso.ufl.edu/process/student-conduct-code/\)](https://sccr.dso.ufl.edu/process/student-conduct-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor in this class.

Students are also not allowed to use any apps or websites such as Quizlet, Course Hero or anything similar to share their assignments and the course notes or to obtain assignment responses. Use of such sites without the specific permission of instructors or program directors are a violation of UF Copyright rules and UF student honor policies. Such violations could result in the student's expulsion from the University of Florida. Anyone found to be using these sites or soliciting chat groups on the internet to answer assignment questions will be assigned an automatic zero grade with no option to redo the assignment.

1.7.5 Plagiarism

Plagiarism includes any attempt to take credit for another person's work. This includes quoting directly from a book or web site, without crediting the source. Sources should always be referenced or a link to the website added and, where direct quotes have been used, quotation marks must be placed around the quoted material. **However, we expect more than simply cutting and pasting in a graduate level course.** Students are expected to review, evaluate and comment on material they research **in their own words**, rather than simply copying relevant material. Your work will be graded accordingly.

1.7.6 Assignments

Each module includes an assignment that has a due date posted on the Course Calendar. While we understand that our students have other work and personal commitments, we expect every effort to be made to meet these deadlines. If for some reason, because of circumstances beyond your control, you are unable to meet an assignment deadline, students should e-mail the instructor and explain the situation in advance of the submission deadline. If no prior communication occurred, the instructor may deduct points for late submission at their discretion or as stated in the course overview and/or communicated via the discussion board. Being consistently late in submitting assignments disrupts the discussion of topics on the bulletin board and will therefore result in loss of marks for that assignment up to a full letter grade. If you email your course instructor they will work with you around the deadline.

If you have outstanding assignments at the end of the semester we will send you a follow up email as a reminder and as a means to determine your plans for completion. If you do not respond to us before the final day of classes you will be assigned a grade based on the completed assignments.

1.7.7 Student Complaint process

All complaints should initially be addressed with the course instructor to find an amenable resolution. If no resolution is possible, the program director for the respective course of study should be contacted by either the student or the course instructor. The program director for all Forensic Science programs (including Forensic DNA & Serology, Forensic Drug Chemistry, and Forensic Toxicology) is Prof. Nancy Toffolo, ntoffolo@ufl.edu. The program director for the Pharmaceutical Chemistry and Clinical Toxicology programs is Dr. Oliver Grundmann, grundman@ufl.edu. If resolution of the complaint with the program director is not possible, official university policy dictates involvement of the associate dean of student affairs which will be initiated by the program director. All involved parties will then attempt a resolution.

If no resolution is possible at this stage, the University of Florida Ombudsman may be involved. More information on this process can be found here: <http://www.distance.ufl.edu/student-complaint-process>.

1.7.8 Incomplete grades

Under special circumstances, if a student is unable to finish a course before the end of the semester we may be able to assign an incomplete grade. An incomplete grade is a non-punitive grade assigned at the discretion of the course instructor. In our courses an incomplete grade may be assigned if 1/3rd or more of the course assignments have been completed and if the student has remained in communication with TA's and instructors throughout the course, or has made an effort to request an incomplete grade. If an incomplete grade is assigned, outstanding assignments and quizzes must be completed by the end of the next semester during which the course is offered. If the assignments are not completed in this time you will be assigned a grade based on the completed assignments.

1.7.9 Drop dates

Consult the UF Calendar of Critical Dates at [UF Calendar of Critical Dates](#). Students must inform us that they are withdrawing from a course to ensure appropriate tuition reimbursement. Deleting yourself from the course roster does not officially withdraw you from a course.

1.8 Student privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see the [Notification to Students of FERPA Rights](#).

1.9 Accommodations for students with disabilities

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the [Disability Resource Center](#) (<https://disability.ufl.edu/students/get-started/>). It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

1.10 Course Evaluation

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

1.11 Counseling and Student Health

Students may occasionally have personal issues that arise in the course of pursuing higher education or that may interfere with their academic performance. If you find yourself facing problems affecting your coursework, you are encouraged to talk with an instructor and to seek confidential assistance at the University of Florida Counseling Center, 352-392-1575, or Student Mental Health Services, 352-392-

1171. Visit their web sites for more information: <http://www.counseling.ufl.edu/cwc/>. The Student Health Care Center at Shands is a satellite clinic of the main Student Health Care Center located on Fletcher Drive on campus. Student Health at Shands offers a variety of clinical services, including primary care, women's health care, immunizations, mental health care, and pharmacy services. The clinic is located on the second floor of the Dental Tower in the Health Science Center. For more information, contact the clinic at 352-294-5700 or check out the web site at: <https://ufhealth.org/uf-student-health-care-center-shands-hospital>

Crisis intervention is always available 24/7 from: Alachua County Crisis Center: (352) 264-6789

Do not wait until you reach a crisis to come in and talk with us. We have helped many students through stressful situations impacting their academic performance. You are not alone so do not be afraid to ask for assistance.

2. Forensic Science course objectives and topics

2.1 PHA6851 Forensic Analysis of DNA

Credits: 3

Objectives

This course will introduce students to the evaluation of biological evidence in criminal matters using DNA technologies, including the methods routinely used for the isolation of DNA from cells and techniques applied to DNA quantitation, electrophoretic separation, as well as data analysis, interpretation and reporting.

At the completion of this course students are expected:

- To understand the major differences between historical DNA profiling methods
- To understand how biological samples are collected, preserved and stored
- To understand the role of quality assurance, accreditation and validation in forensic laboratories
- To understand the methods routinely used in DNA isolation
- To understand the information obtained from DNA quantitation and how to apply this in forensic casework
- To understand the principles of PCR and the amplification process
- To understand the principles of capillary electrophoresis as a DNA separation technique
- To understand STR DNA data analysis steps to include recognition of DNA artifacts
- To understand basic interpretation steps and reporting for single source forensic DNA samples
- To understand the current statistical applications for forensic DNA interpretation
- To understand the legal and forensic implications of DNA analysis for purposes of court room testimony

Topics

Module 1	DNA Introduction
Module 2	Quality Assurance and Performance Optimization
Module 3	DNA Isolation
Module 4	DNA Quantitation
Module 5	DNA Amplification
Module 6	DNA Separation
Module 7	DNA Data Analysis
Module 8	Interpretation and Reporting

Course instructor

Christine Schlenker, Email: ntoffolo@ufl.edu, Phone: 001-352-273-8691

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website.

Forensic Science website: <http://forensicscience.ufl.edu/programs/courses/forensic-analysis-of-dna/>

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2.2 PHA6852 Mammalian Molecular Biology

Credits: 3

Objectives

This course will focus on the principles of modern molecular biology and biochemistry and expand on the concepts you may have already encountered in other classes in this program. The content will also include the applications of experimental techniques and procedures routinely used in this field.

At the end of this course students should:

- Be familiar with the basic components and structure of DNA and RNA and the processes involved in prokaryotic and eukaryotic replication, recombination repair, transcription and translation
- Understand the control mechanisms of protein synthesis
- Be familiar with common analytical and experimental methods used routinely in molecular biology and biochemistry
- Understand the control mechanisms used to regulate cellular processes at a molecular level
- Understand the processes and mechanisms of mobile elements and their role in genetic disease and evolution
- Understand the principles of tumorigenesis and the molecular factors involved in tumor growth and suppression

Topics

MODULE 1.	DNA Structure and DNA-Protein Interactions
MODULE 2.	Prokaryotic and Eukaryotic DNA Replication and Enzymes
MODULE 3.	DNA Repair Mechanisms
MODULE 4.	Special Recombination-Transposition, Site Directed Mutagenesis
MODULE 5.	Eukaryotic and Prokaryotic Transcription
MODULE 6.	RNA Processing
MODULE 7.	Protein Synthesis and Translation
MODULE 8.	Gene Control: Regulation, Epigenetics, Methylation, Histone and Other Modifications
MODULE 9.	Enzymes of DNA Metabolism in the Laboratory
MODULE 10.	Clones and Cloning
MODULE 11.	Molecular Biology Techniques
MODULE 12.	Cancer: Growth Factors; RNA Tumor Viruses; Oncogenes; Tumor Suppressors; Chromosomal Abnormalities

Course instructor

Joe Pasternak, Email: ntoffolo@ufl.edu, Phone: 001-352-273-8691

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website.

Forensic Science website: <http://forensicscience.ufl.edu/programs/courses/mammalian-molecular-biology/>

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2.3 PHA6853 Biological Evidence and Serology

Credits: 3

Objectives

This course will address the fundamental concepts and principles involved in the examination of biological evidence and the practices of serology as they relate to crime scene and forensic investigation.

At the completion of this course students are expected:

- To understand the basic processes involved in crime scene investigation and processing
- To know the techniques used in locating biological evidence and appropriate storage for biological samples
- To know the tests conducted in the field and in the laboratory for the preliminary and confirmatory identification of biological fluids
- To understand the principles behind the techniques of species identification
- To understand the relevance and forensic application of species identification
- To understand the basic principles of inheritance and blood group distribution within a population
- To be familiar with the identifying blood groups used routinely in forensic investigations
- To understand the mechanisms of and advantages and limitations of electrophoretic techniques used routinely in forensic identification
- To know the characteristics of commonly encountered biochemical markers of individuality used in forensic identification
- To understand the function of blood spatter interpretation in crime scene reconstruction
- To understand the legal and forensic implications of biological evidence and the limitations of data interpretation for courtroom testimony

Topics

MODULE 1	Crime Scene Investigation - Biological Evidence
MODULE 2	Processing Biological Evidence
MODULE 3	Laboratory Analysis of Biological Evidence (Blood)
MODULE 4	Laboratory Analysis of Biological Evidence (Semen and Other Biological Evidence)
MODULE 5	Species of Origin and Serology Separation Techniques
MODULE 6	Introduction to Blood Spatter
MODULE 7	Introduction to DNA Analysis
MODULE 8	Court Room Testimony

Course instructor

Nancy Toffolo, Email: ntoffolo@ufl.edu, Phone: 001-352-273-8691

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website. Forensic Science website: <http://forensicscience.ufl.edu/programs/courses/biological-evidence-and-serology/>

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2.4 PHA6854 Forensic Immunology

Credits: 3

Objectives

This course will introduce students to the principles of immunology, immunological techniques, and their application to forensic analyses.

At the completion of this course, students are expected:

- To understand the cellular basis of immunity, including innate and adaptive immunity
- To understand the principles of antibody-antigen interactions
- To know the functional and structural properties of antibodies
- To know to the details of the immune system for capturing and displaying antigens to lymphocytes
- To know the details of cell-mediated immune responses and the effector mechanisms of cell mediated immunity
- To know the details of the humoral immune response
- To understand the process resulting in antibody diversity
- To understand the processes of complement mediated reactions
- To understand the processes of hypersensitivity
- To know examples of diseases caused by defective immune responses, congenital and acquired immunodeficiencies
- To know the principles and processes of Immunology and serology laboratory methods

Topics

Module 1	The Basics of Immunology
Module 2	Antibodies
Module 3	Antigen Capture, Presentation and Recognition
Module 4	Cell Mediated and Humoral Immune Responses
Module 5	Diversity, Assembly, Switching and Maturation
Module 6	Complement System, Activation and Regulation
Module 7	Immune Response Disorders
Module 8	Immunology and Serology Laboratory Methods

Course instructor

Nancy Toffolo, Email: ntoffolo@ufl.edu, Phone: 001-352-273-8691

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website. Forensic Science website: <http://forensicscience.ufl.edu/programs/courses/forensic-immunology/>

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2.5 PHA6855 Forensic Genetics

Credits: 3

Objectives

The course is designed to introduce genetics so that even if you haven't studied it before you will develop an understanding that will inform your practice in work. The context is of course is forensic science but rather than jump straight into forensic DNA analysis this is a foundation course, designed to give a framework of human molecular genetics. We will also look at some of the important issues in genetics including genome mapping and the role of gene dysfunction in disease. The first module is an overview and it is very important that you use the assignment time to check out some websites that will be very useful later on.

At the completion of this course, students are expected to:

- Understand the basic structure of genes and chromosomes
- Understand the basic principles of inheritance
- Understand genotype and phenotype
- Understand the rationale behind the human genome sequencing project
- Understand how genes work and what happens when they don't
- Understand polymorphism and its value in defining uniqueness
- Understand the underlying principles behind DNA profiling
- Explore the role of genes in diseases, including cancer

Topics

Module 1	Introduction to Forensic Genetics
Module 2	The Basic Principles of Inheritance
Module 3	The Molecular Structure of Chromosomes and DNA Replication
Module 4	Making Genes Work
Module 5	Population Genetics and The Human Genome Project
Module 6	DNA Profiling and Forensic Investigation
Module 7	Interpretation and Applications of Forensic DNA Analysis
Module 8	Mutation and DNA Repair

Course instructor

Joe Pasternak, Email: ntoffolo@ufl.edu, Phone: 001-352-273-8691

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website. Forensic Science website: <http://forensicscience.ufl.edu/programs/courses/forensic-genetics/>

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2.6 PHA6856 Blood Distribution and Spatter

Credits: 3

Objectives

This course will provide an in-depth review of the principles of blood spatter creation, and blood stain interpretation as it pertains to biological evidence.

At the completion of this course students are expected:

- To understand the function of blood spatter interpretation in crime scene reconstruction
- To be familiar with the terminology used routinely in blood spatter interpretation
- To understand the function and structural differences of specified components of the circulatory system
- To understand the physiological mechanisms initiated when the circulatory system is breached or damaged
- To know the physical and chemical nature of blood
- To understand the physical forces that are involved in the flight and droplet dynamics of blood
- To understand the geometric parameters used to determine the angle of impact of blood
- To understand the parameters involved in determining directionality of blood spatters
- To understand the means of determining the point of convergence and the point of origin of blood staining
- To know the identifying characteristics of different types of bloodstains
- To understand the importance and methods of crime scene documentation and reconstruction
- To understand the legal and forensic implications of blood spatter interpretation and the limitations of data interpretation for courtroom testimony

Topics

Module 1	Blood stain pattern analysis
Module 2	Hemodynamics
Module 3	Motion and directionality
Module 4	Impact Spatter and Altered Blood Stains
Module 5	Angle of Impact, Point of Convergence and Point of Origin
Module 6	Documentation and Evaluation of Bloodstain Patterns
Module 7	Detection of Blood
Module 8	Note Taking and Courtroom Testimony

Course instructor

Cortney MacDonald, Email: ntoffolo@ufl.edu, Phone: 001-352-273-8691

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website.

Forensic Science website: <http://forensicscience.ufl.edu/programs/courses/blood-distribution-and-spatter/>

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2.7 PHA6935 Advanced Criminalistics

Credits: 3

Objectives

This course is designed to provide an in-depth knowledge of the following eight evidence categories: glass, textile fibers, paint, fire debris, explosives, firearm discharge residues, illicit drugs, and paper, inks and toners. Each stand-alone module introduces the evidence type and its forensic significance, details the relevant distinguishing and discriminating characteristics for the trace material in question, presents the analytical techniques commonly applied in the criminalistics laboratory, and discusses data interpretation and evidential value. The course is unique in terms of its coverage of these trace evidence categories from an operational forensic science perspective.

At the end of this course, students should be able to:

- Describe each evidence category in terms of general characteristics and how the material may be encountered in a criminal investigation
- Appreciate the variations in physical and chemical properties that can be used to characterize samples from each evidence category
- Recognize the importance of transfer and persistence phenomena for each trace evidence type
- Understand the range of analytical techniques that can be applied within the criminalistics laboratory and the information generated by each technique
- Describe recommended evidence collection methods and analytical sequences appropriate for each evidence category
- Understand the difficulties associated with the interpretation of analytical results for each evidence type and recognize the factors that can impact on relative evidential value

This course is taught by Western Sydney University as part of a collaborative venture between the University of Florida and Western Sydney University, Australia.

Prerequisites: Principles of Forensic Science.

Topics

Module 1	Glass
Module 2	Textile Fibers
Module 3	Paint
Module 4	Fire Debris Analysis
Module 5	Explosives
Module 6	Firearm Discharge Residues
Module 7	Illicit Drugs
Module 8	Paper, Inks and Toners

Course instructor

Annette Johnson, Email: annette.johnson@ufl.edu

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website.

Forensic Science website: <https://forensicscience.ufl.edu/programs/courses/advanced-criminalistics/>

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2.8 PHA6935 Crime Scene Investigation

Credits: 3

Objectives

A substantial amount of forensic evidence used in the prosecution of criminal cases is initially established at the crime scene. Recognising, detecting, recovering, preserving and recording this evidence forms a critical function within forensic science and criminal investigation. This course explores the main aspects of crime scene investigation, including: crime scene processes, recognition of evidence, documentation of crime scenes, evidence detection and enhancement, maintaining evidence integrity, and bloodstain pattern analysis. It also covers professional practices associated with evidence handling and case file management.

This course is taught by Western Sydney University as part of a collaborative venture between the University of Florida and Western Sydney University, Australia.

At the end of this course, students should be able to:

- Describe the general approach to crime scene examination.
- Appreciate the range of evidence types that may be present at a crime scene and describe appropriate search, recovery and preservation methods for each evidence type.
- Articulate the requirements of good crime scene photography and case file management practices.
- Understand the importance of professional practices associated with maintaining evidence integrity and continuity.
- Report evidence and conclusions from crime scene investigations accurately and in an appropriate format.

Topics

Module 1	Crime Scene Principles
Module 2	Role of the Crime Scene Examiner Recording the Crime Scene
Module 3	Fingerprints and DNA Evidence
Module 4	General Physical Evidence
Module 5	Bloodstain Pattern Analysis
Module 6	Specialised Scene Examinations
Module 7	Optional extra credit module: Indigenous Australia – Cultural Awareness & Contributions to Forensic Science
Module 8	Case File Management and Report Writing
Module 9	

Course instructor

Annette Johnson, Email: annette.johnson@ufl.edu

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website.

Forensic Science website: <https://forensicscience.ufl.edu/programs/courses/crime-scene-investigation/>

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2.9 PHA6935 Environmental Forensics 1

Credits: 3

Objectives

This course will introduce students to principles of environmental forensic science. In particular, you will learn about the transport and fate of chemicals in the environment. The environmental “crime scene”, where pollution first occurs, is often hundreds of kilometres from where the impact of the pollution is felt. Along the way, pollutants undergo changes as they interact with the environment. Linking a pollutant to its source involves understanding and quantifying these changes.

NOTE: This course requires some basic knowledge of mathematics and chemistry to a first year university level. Some of the concepts in this course will be illustrated through the use of spreadsheets. **You will need to have a copy of the spreadsheet program Microsoft Excel on your computer to open these spreadsheets.** You will be directed how to download these files. Some of the spreadsheets run sub-programs called "Macros". When you open these files, you may see a message warning you that the program contains Macros. You will be asked to either Disable Macros or Enable Macros. **Make sure you Enable Macros.**

This course is taught by Western Sydney University as part of a collaborative venture between the University of Florida and Western Sydney University, Australia.

At the end of this course, students should be able to:

- Describe what an environmental forensic scientist does
- Describe legal processes involving environmental forensic science
- Understand the relationship between dose and toxicity
- Formulate measures of toxicity
- Perform calculations related to toxicity
- Understand the concepts of bioconcentration, bio-accumulation and biomagnification
- Describe various classes of toxic compounds
- Understand how the genesis of crude oil relates to its composition
- Interpret oil “fingerprints” from gas chromatography (GC) and mass spectrometry (MS)
- Apply biomarker metrics to identify hydrocarbons
- Describe the principles of chemical partitioning in the environment
- Describe the types of biological transformations that impact on organic compounds in the environment
- Understand the basic principles of analytical and numerical environmental transport models
- Understand the process of groundwater contamination
- Describe analytical and numerical models used for groundwater contamination
- Understand the principles of atmospheric dispersion of pollutants
- Describe models of atmospheric pollution

Topics

Section 1	Introduction
Module 1	What is Environmental Forensic Science?
Section 2	Environmental pollutants
Module 2	Toxicity of environmental contaminants
Module 3	Oil contamination: Hydrocarbon fingerprinting
Section 3	Fate of chemicals in the environment
Module 4	Environmental partitioning
Module 5	Biological transformations
Section 4	Contaminant transport by groundwater
Module 6	Environmental Transport Models
Module 7	Groundwater Transport
Section 5	Transport of Atmospheric pollutants
Module 8	Atmospheric Dispersion

Course instructor

Brendan Pearson, Email: brendanpearson@ufl.edu

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website. Forensic Science website: <http://forensicscience.ufl.edu/programs/courses/environmental-forensics-1/>

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2.10 PHA6935 Chemistry of Explosive Materials

Credits: 3

Objectives

The course provides information on the range of explosive compounds and mixtures that may be encountered in incidents involving national security. It also covers improvised explosive devices, security screening applications, bomb scene management, and the forensic recovery and analysis of explosive residues. The course concludes with case studies designed to illustrate the concepts covered in the preceding modules.

This course is taught by Western Sydney University as part of a collaborative venture between the University of Florida and Western Sydney University, Australia.

Upon completion of this course, students should be able to:

- Understand the chemistry of organic and inorganic explosive compounds and explosive mixtures;
- Recognise the significant range of materials that are available for criminal use and how these materials are classified;
- Explain the general synthetic routes employed for the manufacture of organic explosive compounds;
- Describe the main components of an IED and the types of evidence that may be present in primary fragmentation;
- List the range of technologies currently employed for the screening of individuals and objects (such as cargo and baggage) for explosive residues and explosive devices;
- Understand general post-blast examination techniques, including the application of on-site testing regimes, the collection of debris, and the swabbing of items for explosive residues; and
- Describe the recommended guidelines for the forensic identification of bulk (intact) explosives and post-blast explosive residues.

Topics

Module 1	General Nature of Energetic Materials
Module 2	Chemistry of Organic Explosives
Module 3	Chemistry of Peroxide-based Explosives
Module 4	Improvised Devices
Module 5	Screening Technologies
Module 6	Forensic Analysis of Explosives
Module 7	Bomb Scene Management
Module 8	Case Studies

Course instructor

Chris Lennard, Email: clennard@ufl.edu

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website. Forensic Science website: <https://forensicscience.ufl.edu/programs/courses/chemistry-of-explosive-materials/>

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2.11 PHA6935 Forensic Analysis of DNA 2

Credits: 3

Objectives

Forensic Analysis of DNA 2 is a continuation of PHA6851 Forensic Analysis of DNA where students learned about the methods routinely used for the isolation of DNA from cells and techniques applied to DNA quantitation, electrophoretic separation, as well as data analysis, interpretation and reporting. In DNA 2, students learn how to interpret DNA data to include mixture deconvolution and the statistics that apply to DNA matches/inclusions. Modules also guide the student through the basis of Y-STR and Kinship testing statistical applications. Students will also learn the report writing, review and testimony skills required of a DNA analyst.

Prerequisites: PHA6851 Forensic Analysis of DNA.

At the completion of this course students are expected:

- To understand the basic steps of data analysis
- To be able to differentiate artifacts from alleles
- To understand what DNA data looks like in and out of the optimal range
- To understand how to differentiate single source samples from mixtures
- To understand the steps taken to deconvolute mixtures
- To understand the use of assumptions in mixture interpretation
- To understand the significance of a match
- To be able to calculate random match probability and likelihood ratios
- To understand when Y-STR analysis is to be utilized
- To be able to calculate Y-STR statistics for matches
- To understand kinship testing scenarios
- To be able to calculate a Paternity Index
- To understand common requirements and content of laboratory reports
- To understand the purpose of the review process in DNA casework
- To understand the basis and limitations of expert testimony

Topics

Module 1	DNA Data Analysis
Module 2	Autosomal STR Interpretation
Module 3	Mixture Deconvolution 1
Module 4	Mixture Deconvolution 2
Module 5	Significance of a match and calculating statistics
Module 6	Y-STR testing
Module 7	Kinship Testing
Module 8	Report Writing, Review and Testimony

Course instructor

Christine Schlenker, Email: ntoffolo@ufl.edu, Phone: 001-352-273-8691

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website.

Forensic Science website: <https://forensicscience.ufl.edu/programs/courses/forensic-analysis-of-dna-2/>

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2.12 PHA6935 Forensic Anthropology I

Credits: 4

Objectives

This course will provide an introduction to the basic knowledge needed to perform some of the forensic anthropologist's tasks, especially anatomy and human osteology. Due to the impossibility of teaching a laboratory class, we will substitute the hands-on experience by a carefully selected set of pictures and material in order to familiarize you with the practice of the discipline.

Upon completion of this course you should:

- Have acquired basic knowledge and theoretical principles on osteology and anatomy
- Be able to distinguish the difference between human and non-human material
- Have gained basic knowledge on each bone of the human skeleton
- Have learned the basic methods of human remains recovery and laboratory processes
- Understand when and how a forensic anthropologist becomes involved in the legal system, mass disaster- related work and human right violation cases

Topics

Module 1	Introduction
Module 2	Basic Bone Biology
Module 3	Human vs. Non human
Module 4	Human Osteology: The Skull and Teeth
Module 5	Human Osteology: The Thorax, Vertebral Column and Pelvis
Module 6	Human Osteology: The Arm and Hand
Module 7	Human Osteology: The Leg and Foot
Module 8	Field and Laboratory Work
Module 9	Forensic Anthropology and Mass Fatality
Module 10	Forensic Anthropology and Human Rights

Course instructor

Alicia Lusiardo, Email: nibya@ufl.edu, Phone: 00598-2336-6591

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website. Forensic Science website: <http://forensicscience.ufl.edu/programs/courses/forensic-anthropology-i/>

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2.13 PHA6935 Introduction to Forensic Medicine II

Credits: 4

Objectives

This course gives knowledge and understanding of relevant medical concepts, techniques and methods in order that the candidate has sufficient competence to interpret human diseases, conditions and behavior in a forensic setting. An understanding of the organizational structures involved in the practice of forensic medicine both locally and internationally, increase in the candidate's awareness of how forensic medicine relates to the wider context of society and how it contributes towards improving that society.

This is a University of Edinburgh course, taught by University of Edinburgh faculty and instructors as part of a collaborative venture between the University of Florida and the University of Edinburgh, Scotland.

At the end of the course the student should be able to:

- Understand the basic scientific, medical, ethical and legal principles that are relevant to the practice of forensic medicine.
- Understand the essential techniques and methods used by forensic doctors and be able to discuss their validity, effectiveness and applicability within a professional setting.
- Understand some of the causes and effects of human behavior and be able to relate these to issues affecting society as a whole.
- Demonstrate an awareness of the value of a multi-disciplinary and integrated team approach in the forensic disciplines and utilize this awareness in the development of personal and interpersonal skills.

Practitioners who successfully complete the module will be expected to:

- Develop and maintain the highest standards of professional integrity in all matters relating to the practice of forensic medicine and in the pursuit of justice.
- Work towards improving the quality of forensic provision within the local medico-legal and criminal justice system.
- Seek to initiate collaborative relationships with academics and other practitioners in order to contribute to research in the discipline.
- Communicate sensitive information to other professional colleagues and, where necessary, be able to present evidence within a legal setting effectively and with accuracy and precision.

Topics

Module 1	Introduction to Pathology
Module 2	Pathology II
Module 3	Mass Disasters
Module 4	Physical Abuse of Children
Module 5	Child Sexual Abuse
Module 6	Sexual Offences in Adults
Module 7	Sudden Infant Death
Module 8	Forensic Archaeology and Anthropology
Module 9	Forensic Odontology
Module 10	Forensic Psychology
Module 11	Forensic Psychiatry
Module 12	Alcohol
Module 13	Drugs and Drug-Related Deaths
Module 14	Forensic Service

Course instructor

Nancy Toffolo, Email: ntoffolo@ufl.edu, Phone: 001-352-273-8691

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website. Forensic Science website: <http://forensicscience.ufl.edu/programs/courses/forensic-medicine-ii/>

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2.14 PHA6850 Principles of Forensic Science

Credits: 3

Objectives

This course has been developed to introduce students to the different disciplines of forensic science and show how they are applied to the examination of various types of evidence.

At the completion of this course, students are expected to:

- Be familiar with the multidisciplinary nature of forensic science
- Understand the approach to crime scene investigation
- Be familiar with the collection and examination of latent prints
- Understand microscopic techniques as they apply to trace evidence
- Understand the abuse potential, recognition and analysis of drugs of abuse in both dosage forms and biological fluids
- Be familiar with the examination of biological evidence including DNA
- Understand the approach to firearm examination and comparison
- Appreciate the procedures involved in death investigation

Topics

Module 1	History and Nature of Forensic Science
Module 2	Crime Scene Investigation
Module 3	Latent Prints
Module 4	Trace Evidence
Module 5	Biological Evidence
Module 6	Forensic DNA Analysis
Module 7	Illicit Drugs
Module 8	Forensic Toxicology
Module 9	Firearms and Toolmarks
Module 10	Death Investigation
Module 11	Questioned Documents
Module 12	Fire and Explosive Examination

Course instructor

Nancy Toffolo, Email: ntoffolo@ufl.edu, Phone: 001-352-273-8691

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website. Forensic Science website: <http://forensicscience.ufl.edu/programs/courses/principles-of-forensic-science/>

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2.15 PHA6936 Literature Survey (Drug Chemistry)

Credits: 1

Objectives

This one credit course involves the completion of a term paper on a relevant topic of Drug Chemistry. Students will research scientific literature available to them online, through the UF e-journals, and other relevant sources on one of the drug chemistry topics approved by the instructor. Students will prepare a fully referenced term paper in no less than 3500 words.

Course instructor

Nancy Toffolo, Email: ntoffolo@ufl.edu, Phone: 001-352-273-8691

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website. Forensic Science website: <http://forensicscience.ufl.edu/programs/courses/literature-survey-drug-chemistry/>

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2.16 PHA6936 Special Topics in Drug Chemistry

Credits: 1

Description

This 1-credit course consists of a final online proctored comprehensive examination to fulfill the requirements for the MS program. Students should register for this course in their final semester of their MS degree. The University of Florida requires that you are registered for the following number of credits during the term you are graduating: Summer term: 2 credit hours; Fall/Spring term: 3 credit hours. Since the Special Topics course is only 1 credit, you will need to be sure you meet the credit requirement as noted above.

This course is scheduled to run each semester. Refer to [Critical Dates](#) for specific dates the course will be held each term. Students are required to pass this class in order to receive their MS degree.

Preparations should primarily focus on the detail presented in the core courses for your program (Principles of Forensic Science, Forensic Toxicology 1, Lab QA/QC, Synthetic Medicinal Chemistry, Medicinal Chemistry of Drugs of Abuse and Natural Medicinal Products). Students are expected to know the step-by-step examination, testing and analytical processes used in the forensic laboratory as well as important areas of overlap between courses.

Please note that you will have to take at least one full day off from work and/or other responsibilities to take the written exams. We do recommend taking additional time off before for final preparations. We will attempt to schedule the exam during the day in your time zone and you will be informed by the instructor if you passed the written exams.

Special topics schedule: Morning: Essay paper, 3 hours; Afternoon: Short answer paper, 2 hours

Students should login to this course on Canvas as they would with any other course. Use this site to ask study questions and receive further information about the special topics exams. The written exams will be proctored using HonorLock (please see technical requirements on this website: <https://honorlock.com/students/>).

Course instructor

Nancy Toffolo, Email: ntoffolo@ufl.edu, Phone: 001-352-273-8691

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website.

Forensic Science website: <http://forensicscience.ufl.edu/programs/courses/special-topics-in-drug-chemistry/>

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2.17 PHA6936 Literature survey (DNA and Serology)

Credits: 2

Objectives

This two credit course involves the completion of a term paper on a relevant topic of DNA and Serology, or closely related topic. Students will research the scientific literature available to them online, through the UF e-journals, appropriate websites, and other relevant sources. Students will prepare a fully referenced term paper in no less than 5000 words on a relevant subject approved by the course instructor.

Course instructor

Nancy Toffolo, Email: ntoffolo@ufl.edu, Phone: 001-352-273-8691

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website. Forensic Science website: <http://forensicscience.ufl.edu/programs/courses/literature-survey-dna-and-serology/>

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2.18 PHA6936 Special Topics in DNA and Serology

Credits: 1

Description

This 1-credit course consists of the final online proctored comprehensive examination to fulfill the requirements for the MS program. The final written comprehensive examination will be taken online via HonorLock. Students should register for this course in their final semester of their MS degree. The University of Florida requires that you are registered for the following number of credits during the term you are graduating: Summer term: 2 credit hours; Fall/Spring term: 3 credit hours. Since the Special Topics course is only 1 credit, you will need to be sure you meet the credit requirement as noted above.

This course is scheduled to run each semester. Refer to [Critical Dates](#) for specific dates the course will be held each term. Students are required to pass this class in order to receive their MS degree.

Preparations should primarily focus on the detail presented in the core courses for your program (Biological Evidence, Forensic Analysis of DNA, Blood Spatter and Distribution and Laboratory QAQC). In addition, students are expected to know the step-by-step examination, testing and analytical processes used in the forensic laboratory as well as important areas of overlap between courses.

Please note that you will have to take at least one full day off from work and/or other responsibilities to take the written exams. We do recommend taking additional time off before for final preparations. We will attempt to schedule the exam during the day in your time zone and you will be informed by the instructor if you passed the written exams.

Special topics schedule: Morning: Essay paper, 3 hours; Afternoon: Short answer paper, 2 hours

Students should login to this course on Canvas as they would with any other course. Use this site to ask study questions and receive further information about the special topics exams. The written exams will be proctored using HonorLock (please see technical requirements on this website: <https://honorlock.com/students/>).

Course instructor

Nancy Toffolo, Email: ntoffolo@ufl.edu, Phone: 001-352-273-8691

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website.

Forensic Science website: <http://forensicscience.ufl.edu/programs/courses/special-topics-in-dna-and-serology/>

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2.19 PHA6936 Literature Survey (Forensic Science)

Credits: 2

Objectives

This two credit course involves the completion of a term paper on a relevant topic of forensic science. Students will research scientific literature available to them online, through the UF e-journals, and other relevant sources. Students will prepare a fully referenced term paper in no less than 5000 words on a Forensic Science related subject approved by the course instructor.

Course instructor

Nancy Toffolo, Email: ntoffolo@ufl.edu, Phone: 001-352-273-8691

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website. Forensic Science website: <http://forensicscience.ufl.edu/programs/courses/literature-survey-forensic-science/>

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2.20 PHA6936 Special Topics in Forensic Science

Credits: 1

Description

This 1-credit course consists of the final online proctored comprehensive examination to fulfill the requirements for the MS program. The final written comprehensive examination will be taken online via HonorLock. Students should register for this course in their final semester of their MS degree. The University of Florida requires that you are registered for the following number of credits during the term you are graduating: Summer term: 2 credit hours; Fall/Spring term: 3 credit hours. Since the Special Topics course is only 1 credit, you will need to be sure you meet the credit requirement as noted above.

This course is scheduled to run each semester. Refer to [Critical Dates](#) for specific dates the course will be held each term. Students are required to pass this class in order to receive their MS degree.

Preparations should primarily focus on the detail presented in the core courses for your program (Forensic Toxicology I; Biological Evidence; Principles of Forensic Science, and Laboratory QAQC). In addition, students are expected to know the step-by-step examination, testing and analytical processes used in the forensic laboratory as well as important areas of overlap between courses.

Please note that you will have to take at least one full day off from work and/or other responsibilities to take the written exams. We do recommend taking additional time off before for final preparations. We will attempt to schedule the exam during the day in your time zone and you will be informed by the instructor if you passed the written exams.

Special topics schedule: Morning: Essay paper, 3 hours; Afternoon: Short answer paper, 2 hours

Students should login to this course on Canvas as they would with any other course. Use this site to ask study questions and receive further information about the special topics exams. The written exams will be proctored using HonorLock (please see technical requirements on this website: <https://honorlock.com/students/>).

Course instructor

Nancy Toffolo, Email: ntoffolo@ufl.edu, Phone: 001-352-273-8691

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website.

Forensic Science website: <http://forensicscience.ufl.edu/programs/courses/special-topics-in-forensic-science/>

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2.21 VME6604 Literature Survey (Forensic Toxicology)

Credits: 2

Objectives

This two credit course involves the completion of a term paper on a relevant topic of toxicology. Students will research scientific literature available to them online, through the UF e-journals, and other relevant sources. Students will prepare a fully referenced term paper in no less than 5000 words on a Forensic toxicology related subject approved by the course instructor.

Course instructor

Nancy Toffolo, Email: ntoffolo@ufl.edu, Phone: 001-352-273-8691

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website. Forensic Science website: <http://forensicscience.ufl.edu/programs/courses/literature-survey-forensic-toxicology/>

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2.22 VME6613 Forensic Toxicology I

Credits: 3

Objectives

This course has been developed to introduce students to the concepts, procedures, processes and terminology routinely encountered in the execution of applied forensic toxicological analyses. Our objective is to educate students in the theoretical aspects of drug and analytical chemistry applied to forensic toxicology.

At the completion of this course, students are expected to:

- Be able to comfortably navigate the WWW and know how to locate and use web based resources for their interests and further education
- Understand the procedures and principles involved in the preparation and analyses of drug and toxicology samples, including sample handling, note taking and storage
- Understand the principles and theory of drug extraction procedures such as liquid-liquid extraction, solid phase extraction and the rationale behind screening, preliminary and confirmatory drug testing
- Be familiar with common preliminary tests and understand the chemistry and theory of testing procedures which include thin layer chromatography, microcrystal tests and spot tests
- Be familiar with common analytical techniques and their working mechanisms, including the chemistry and principles of confirmatory drug testing, the basic science of drug ionization, the elutropic series, normal and reverse phase chromatography, immunoassay techniques, infrared spectroscopy and Gas chromatography/mass spectroscopy.
- Be familiar with the testing procedures for the identification of common drugs of abuse
- Understand the importance of, and the procedures involved in, quality assurance and quality control in drug testing and have a conceptual understanding of accuracy and precision, standard curves, reproducibility, limit of detection, linearity and stability
- Be able to develop an analysis procedure for a given drug and to present findings in a report format
- Be able to apply the presented concepts and procedures in the execution and completion of a virtual case study
- Be able to use web based tools for communication and for the education of themselves and others

Topics

Module 1	Sample Preparation and Presumptive Tests
Module 2	Sample Extraction and Thin Layer Chromatography
Module 3	Immunoassays
Module 4	Spectrophotometry in Forensic Chemistry
Module 5	Chromatography in Forensic Chemistry
Module 6	Method Development and Quality Control
Module 7	Forensic Identification of Drugs

Course instructor

Dustin Yeatman, Email: ntoffolo@ufl.edu, Phone: 001-352-273-8691

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website.
Forensic Science website: <http://forensicscience.ufl.edu/programs/courses/forensic-toxicology-i/>

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2.23 VME6614 Forensic Toxicology II

Credits: 3

Objectives

This course will expand on concepts encountered in Forensic Toxicology I (VME6613), providing in-depth knowledge of pharmacology and toxicology as it pertains to commonly encountered abused and toxic substances. This course is unique in offering modules in doping control, expert testimony, human performance and postmortem toxicology.

At the completion of this course students are expected to:

- Be able to comfortably navigate the WWW and know how to locate and use web based resources for their interest and further education
- Understand basic pharmacokinetic parameters such as absorption, distribution, metabolism and elimination (ADME)
- Understand the pharmacology and basic metabolites of the presented illicit drug substances
- Understand the chemical, pharmacological, pharmacokinetic, toxic properties and effects of alcohol and the procedures of quantitative analyses for blood alcohol
- Understand the effects of drugs and alcohol on driving impairment
- Understand the ADME, pharmacology and toxicity of a number of metals commonly encountered in forensic toxicology
- Understand the process of acquisition, preparation, analysis of tissues, bodily fluids and postmortem samples such as liver, vitreous humor, urine, bile and blood
- Understand the pharmacology, testing procedures and regulations concerning commonly abused drugs used in athletics for the enhancement of human performance
- Understand the basic regulations of doping control within the horse and dog racing industry and associated sample acquisition and analyses
- Understand the basic regulations associated with drug testing in the workplace and the acquisition of samples such as blood, urine and hair
- Understand the basic principles of expert testimony and the role of the expert witness in forensic toxicology
- Be able to apply the presented concepts and procedures in the execution and completion of a virtual case study
- Use web based tools for communication and for the education of themselves and others

Topics

Module 1	Pharmacokinetics and Drug Action
Module 2	Drug Classifications and Pharmacology
Module 3	Alcohol and Volatiles
Module 4	Metals
Module 5	Postmortem Forensic Toxicology
Module 6	Doping Control
Module 7	Human Performance Toxicology
Module 8	Expert Testimony

Course instructor

Dustin Yeatman, Email: ntoffolo@ufl.edu, Phone: 001-352-273-8691

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website.
Forensic Science website: <http://forensicscience.ufl.edu/programs/courses/forensic-toxicology-ii/>

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2.24 VME6934 Introduction to Forensic Medicine I

Credits: 4

Objectives

This course covers the basic elements of forensic medicine and focuses on the role of the forensic pathologist in the investigation of crime and death. Although much of forensic medicine, based as it is on observations made at a post-mortem examination, relies on the principles of morbid anatomy as discovered in earlier centuries, more recent techniques are also presented.

This is a University of Edinburgh course, taught by University of Edinburgh faculty and instructors as part of a collaborative venture between the University of Florida and the University of Edinburgh, Scotland.

At the end of the course the student should be able to:

- Understand the basic scientific, medical, ethical and legal principles that are relevant to the practice of forensic medicine.
- Understand the essential techniques and methods used by forensic doctors and be able to discuss their validity, effectiveness and applicability within a professional setting.
- Develop a sensitive awareness of how forensic medicine relates to bereaved relatives and other immediate contacts of a deceased person or victim of crime.
- Develop and maintain the highest standards of professional integrity in all matters relating to the practice of forensic medicine and in the pursuit of justice.
- Work towards improving the quality of forensic provision within his or her local medicolegal and criminal justice system.
- Seek to initiate collaborative relationships with academics and other practitioners in order to contribute to research in the discipline.
- Communicate sensitive information to other professional colleagues and, where necessary, be able to present evidence within a legal setting effectively and with accuracy and precision.

Topics

Module 1	Death
Module 2	Medicolegal Investigation of Death
Module 3	Sudden Natural Death
Module 4	The Autopsy
Module 5	Postmortem Interval
Module 6	Identification of the Dead
Module 7	Wounds of Medicolegal Importance I
Module 8	Wounds of Medicolegal Importance II
Module 9	Thermal Injury and Fire Deaths
Module 10	Suicide
Module 11	Head and Neck Injury
Module 12	Immersion and Drowning
Module 13	Asphyxia Related Deaths
Module 14	Case Study

Course instructor

Nancy Toffolo, Email: ntoffolo@ufl.edu, Phone: 001-352-273-8691

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website.
Forensic Science website: <http://forensicscience.ufl.edu/programs/courses/forensic-medicine-i/>

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2.25 VME6934 Special Topics in Forensic Toxicology

Credits: 1

Description

This 1-credit course consists of the final online proctored comprehensive examination to fulfill the requirements for the MS program. The final written comprehensive examination will be taken online via HonorLock. Students should register for this course in their final semester of their MS degree. The University of Florida requires that you are registered for the following number of credits during the term you are graduating: Summer term: 2 credit hours; Fall/Spring term: 3 credit hours. Since the Special Topics course is only 1 credit, you will need to be sure you meet the credit requirement as noted above.

This course is scheduled to run each semester. Refer to [Critical Dates](#) for specific dates the course will be held each term. Students are required to pass this class in order to receive their MS degree.

Preparations should primarily focus on the detail presented in the core courses for your program (Forensic Toxicology I, Forensic Toxicology 2, Lab QA/QC, Drug Biotransformation, General Toxicology and Toxic Substances). Students are expected to know the step-by-step examination, testing and analytical processes used in the forensic laboratory as well as important areas of overlap between courses.

Please note that you will have to take at least one full day off from work and/or other responsibilities to take the written exams. We do recommend taking additional time off before for final preparations. We will attempt to schedule the exam during the day in your time zone and you will be informed by the instructor if you passed the written exams.

Special topics schedule: Morning: Essay paper, 3 hours; Afternoon: Short answer paper, 2 hours

Students should login to this course on Canvas as they would with any other course. Use this site to ask study questions and receive further information about the special topics exams. The written exams will be proctored using HonorLock (please see technical requirements on this website: <https://honorlock.com/students/>).

Course instructor

Nancy Toffolo, Email: ntoffolo@ufl.edu, Phone: 001-352-273-8691

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website.

Forensic Science website: <http://forensicscience.ufl.edu/programs/courses/special-topics-in-forensic-toxicology/>

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3. Pharmaceutical Chemistry course objectives and topics

3.1 PHA6432 Fundamentals of Pharmaceutical Chemistry

Credits: 1

Objectives

This is a foundation course whose aims are to provide an introduction to the principles of Medicinal chemistry, including an understanding of drug structure-activity relationships, prediction of the physico-chemical properties of a drug, basic knowledge of the major pathways of drug metabolism, and factors that can contribute to drug-drug interactions.

Topics

Module 1	Drug Action and Drug Discovery
Module 2	Drug Design principles
Module 3	Introduction to Pharmacokinetics and Drug Biotransformation
Module 4	Drug Development, Production, and Regulation

Course instructor

Oliver Grundmann, Email: grundman@ufl.edu, Phone: 001-352-888-4536

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website. Pharmaceutical Chemistry website:

<http://pharmchem.cop.ufl.edu/programs/courses/fundamentals-of-pharmaceutical-chemistry/>

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3.2 PHA6444 Pharmaceutical Chemistry 1

Credits: 3

Course Description

The design of new drug structures is a challenging and multidisciplinary process. It involves a multistep process of identifying the target structure, an initial lead structure, optimization of the lead to a drug structure. This process requires knowledge of chemistry, biology, pharmacology, and translation of principles of various other disciplines to develop a feasible drug candidate. This course will incorporate principles of drug design, recognition of potential metabolic vulnerabilities, screening for toxicities and in vitro disease models, and development of formulations for administration in animal testing.

This course incorporates early cross-sectional and competency concepts essential to the drug design & development process:

- Demonstrate the interactions between a target and a drug compound based on functional groups and physicochemical properties
- Design a pharmacophore lead structure based on properties of the target, its physiological role, and the intended route of administration
- Summarize synthesis strategies for designing drugs with specific functional groups
- Assess metabolic liability of functional groups and predict routes of metabolism based on a given drug structure

Course Goal

Despite an active pharmaceutical development and research market, few new drug candidates have entered the pipeline in recent years and made it to market. With a growing demand for both new small molecular weight drugs with fewer adverse effects and new biological drugs with a more targeted mechanism of action, research is focused on rational drug design or modification of existing structures that help to improve characteristics and binding affinity. This course will use a number of available drugs to illustrate the drug design and development process.

Prerequisites: Fundamentals of Pharmaceutical Chemistry (PHA 6432).

Topics

Module 1	Target structures and their identification
Module 2	From hit to lead, initial optimization and design of drug structures
Module 3	Protein therapeutics (biologicals), similarities & differences
Module 4	Modeling of drug-target interactions
Module 5	Lead and analogue synthesis approaches
Module 6	Metabolic screening, vulnerabilities & solutions
Module 7	Suitable disease in vitro screening models & limitations
Module 8	Drug Metabolism & Pharmacokinetics (DMPK) in early drug design
Module 9	Toxicity evaluation & testing
Module 10	Prodrugs & formulation for preclinical testing

Course instructor

Oliver Grundmann, Email: grundman@ufl.edu, Phone: 001-352-888-4536

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website.
Pharmaceutical Chemistry website:

<http://pharmchem.cop.ufl.edu/programs/courses/pharmaceutical-chemistry-1/>

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3.3 PHA6543 Pharmaceutical Chemistry 2

Credits: 3

Course Description

While early-stage drug design and development principles were discussed in PHA6444 Pharmaceutical Chemistry 1, this course will focus on additional *in vivo* testing and necessary data collection and condensation to meet the requirements for submission of an investigational new drug application (IND) to the US FDA. This is a critical step for a drug development company as it narrows down potential lead structures and seeks to gather essential information to ensure that the drug candidate can be approved for First-in-Human trials. An approval by the FDA is commonly associated with passing a hurdle to submit to other regulatory agencies such as the European Medicines Agency (EMA), Health Canada, or the Japanese Pharmaceutical and Medical Devices Agency (PDMA). All steps involved in gathering information and submitting an IND will be addressed in this course.

This course connects concepts covered in PHA6444 Pharmaceutical Chemistry 1 with late-stage cross-sectional drug design & development processes leading up to the IND submission:

- Justify the selection of appropriate data to include with the submission of an investigational new drug (IND) application
- Design a battery of pre-clinical tests that contribute to the requirements for the chemistry, manufacturing, and controls section of the IND submission
- Summarize and support the organizational structures that contribute to a successful and timely IND submission
- Align your current and future expertise within the process of preclinical drug design and development and how your position contributes to the success of a project

Course Goal

Although attempts have been made to streamline the application process to submit a new drug for clinical trials to various regulatory agencies, the intricate nature of the volume of data required for submission often requires coordination of various groups involved in preclinical drug development. Streamlining this process can be challenging given the nature of different locations and specializations that often prevents direct interaction or communication between researchers. Bridging such gaps by introducing an overview of the whole process from early to late preclinical drug development to submission of the IND will help everybody involved at various stages to better understand their critical and interdisciplinary role in bringing a new drug to market through this course.

Prerequisites: PHA6432 Fundamentals of Pharmaceutical Chemistry; PHA6444 Pharmaceutical Chemistry 1

Topics

Module 1	Components of an Investigational New Drug Application
Module 2	Chemistry, Manufacturing, and Controls
Module 3	Good Laboratory Practice
Module 4	PD/PK <i>in vivo</i> drug development studies
Module 5	<i>In vivo</i> disease models, correlations, and limitations
Module 6	Toxicology studies to support First-in-Human trials

Module 7	Allometric scaling, pharmacokinetics, and specific dosing considerations
Module 8	First-in-Human trials and clinical trial design
Module 9	Project management, organizational structure, and international regulations
Module 10	Submission of an IND, final project

Course instructor

Oliver Grundmann, Email: grundman@ufl.edu, Phone: 001-352-888-4536

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website. Pharmaceutical Chemistry website:

<http://pharmchem.cop.ufl.edu/programs/courses/pharmaceutical-chemistry-2/>

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3.4 PHA6935 Dosage Forms and Drug Delivery

Credits: 3

Objectives

Participants in this course will explore the rational formulation and manufacture of dosage forms for all major routes of drug administration. We begin with an overview of the drug development process, followed by a review of the major concepts of biopharmaceutics and pharmaceutical preformulation. With an understanding of these concepts, we will methodically explore how stable and effective dosage forms are developed and manufactured with respect to their intended routes of administration. While the focus will be on small molecule drugs, we will conclude with an overview of the formulation and administration of therapeutic proteins.

Topics

Module 1	Overview of Drug Development and Biopharmaceutics
Module 2	Pharmaceutical Preformulation
Module 3	Oral Drug Delivery and Dosage Forms
Module 4	Buccal, Sublingual, Rectal, and Vaginal Drug Delivery and Dosage Forms
Module 5	Topical Drug Delivery and Dosage Forms
Module 6	Parenteral Drug Delivery and Dosage Forms
Module 7	Intranasal Drug Delivery and Dosage Forms
Module 8	Pulmonary Drug Delivery and Dosage Forms
Module 9	Spatial and Temporal Control of Drug Delivery
Module 10	Formulation and Delivery of Proteins

Course instructor

Cary Mobley, Email: mobley@cop.ufl.edu, Phone: 001-352-888-4536

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website. Pharmaceutical Chemistry website:

<http://pharmchem.cop.ufl.edu/programs/courses/dosage-forms-and-drug-delivery/>

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3.5 PHA6935 Drug Development Strategies

Credits: 3

Objectives

This course provides a strong conceptual foundation of the diverse molecular and cellular processes involved in cancer development and the multiple strategies to fight the disease. The focus of the course will be on colon cancer development. Students will learn to analyze data from high throughput screenings of colon cancer patients, and acquire a good understanding how to use this information to plan and carry out a project in applied research and product development in the field of anti-cancer drug development. Students are expected to present a strategy to design and test a potential anti-cancer lead in the pre-clinical phase and will complete their studies by investigating the patent opportunities of the drug discovery strategy, by writing a concise business plan in which a drug development strategy until entering the clinical phase is presented.

This is a [Hogeschool van Arnhem in Nijmegen \(HAN\)](#) course, taught by HAN faculty and instructors as part of a collaborative venture between the University of Florida and HAN University, the Netherlands.

Prerequisites: Fundamentals of Pharmaceutical Chemistry (PHA6432).

Topics

Module 1	The Cell Biology of Cancer
Module 2	Bioinformatics, Analysis and Statistics of High Throughput Analysis
Module 3	The Drug Discovery, Development, and Delivery Strategy
Module 4	Setting up your Business plan

Course instructor

Oliver Grundmann, Email: grundman@ufl.edu, Phone: 001-352-888-4536

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website. Pharmaceutical Chemistry website:

<http://pharmchem.cop.ufl.edu/programs/courses/drug-development-strategies/>

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3.6 PHA6935 Principles of Drug Action & Development I

Credits: 3

Objectives

Students are shown how to predict the solubilities, structure-activity relationships, basic synthesis routes for selected structures, metabolism and pharmacological activity/potency of drug classes and individual members of classes based on the contribution of their functional groups to their structures. In particular, anticoagulants, ACE inhibitors, glucocorticoid steroids, nitrate esters, adrenergics, cholinergics, diuretics, anesthetics, antihyperlipidemics, muscle relaxants, anxiolytics, antidepressants, sedative hypnotics and vitamins are covered.

Prerequisites: Fundamentals of Pharmaceutical Chemistry (PHA 6432).

Topics

Module 1	General principles
Module 2	Diuretics
Module 3	Anticoagulants
Module 4	Cardiovascular drugs - Vasodilators
Module 5	Cardiovascular drugs - Antihyperlipidemics
Module 6	Glucocorticoid steroids
Module 7	Vitamins
Module 8	Anesthetics and muscle relaxants
Module 9	Central nervous system – Adrenergic agents
Module 10	Central nervous system – Cholinergic agents, Anticholinergics
Module 11	Central nervous system – Antiparkinson and Antialzheimer agents
Module 12	Central nervous system – Antipsychotics, antidepressants

Course instructor

Oliver Grundmann, Email: grundman@ufl.edu, Phone: 001-352-888-4536

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website. Pharmaceutical Chemistry website:

<http://pharmchem.cop.ufl.edu/programs/courses/pharmaceutical-chemistry-1/>

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3.7 PHA6935 Principles of Drug Action & Development II

Credits: 3

Objectives

Students are shown how to predict the solubilities, structure-activity relationships, basic synthesis routes for selected structures, metabolism and pharmacological activity/potency of drug classes and individual members of classes based on the contribution of their functional groups to their structures. In particular antidiabetics, anticonvulsants, H1 and H2 antagonists, analgetics, nonsteroidal anti-inflammatory drugs, hormones, antibiotics, antiviral agents, and antineoplastic agents are covered.

Prerequisites: Fundamentals of Pharmaceutical Chemistry (PHA6432).

Topics

Module 1	Anti-diabetes Drugs
Module 2	Anti-epileptic Drugs
Module 3	Antihistamines
Module 4	Narcotic Analgetics
Module 5	Nonsteroidal Anti-Inflammatory Drugs
Module 6	Sex Hormones & Steroids
Module 7	Antibiotic Agents - Sulfonamides & Quinolones
Module 8	Antibiotic Agents - Penicillins
Module 9	Antibiotic Agents - Cephalosporins, Carbapenems, and Monobactams
Module 10	Antibiotic Agents - Tetracyclines & Macrolides
Module 11	Antibiotic Agents - Aminoglycosides & Other Antibiotics
Module 12	Antiviral Agents
Module 13	Chemotherapeutic Agents

Course instructor

Oliver Grundmann, Email: grundman@ufl.edu, Phone: 001-352-888-4536

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website. Pharmaceutical Chemistry website: <https://pharmchem.cop.ufl.edu/programs/courses/principles-of-drug-action-development-ii/>

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3.8 PHA6935 Veterinary Pharmacy

Credits: 2

Objectives

Pharmacists in suburban or rural community settings often receive prescriptions from veterinarians for animal patients. To prepare graduates to safely fill animal prescriptions and meet the legal counseling requirements, instruction on veterinary disease states and the human and veterinary prescription medications used to treat these conditions is warranted.

Topics

Recall and explain; the Animal Medicinal Drug Use Clarification Act of 1994 and related veterinary compounding guidelines/documents.

Identify, locate and interpret veterinary specific informatics.

List and describe pharmacotherapy options for these disease states or drug categories:

1. Feline diabetes
2. Canine diabetes
3. Congestive heart failure
4. Keratoconjunctivitis in canines
5. Hypothyroidism in canines
6. Hyperthyroidism in felines
7. Primary idiopathic epilepsy
8. Urinary incontinence in canines
9. Addison's disease and Cushing's disease in canines
10. Separation anxiety in canines and felines
11. Osteoarthritis in canines
12. Otitis externa in canines and felines
13. Chemotherapy in companion animals
14. TPN in companion animals
15. Anesthetic and analgesic use in companion animals

Identify the most common pharmacotherapies for heartworm prevention and flea/tick treatment in canines and felines.

Describe the human/animal bond and animal assisted therapy opportunities for pharmacists at their practice sites.

Identify and discuss contemporary issues in veterinary medicine and veterinary pharmacy.

Identify and discuss public health issues affecting veterinary and human medicine such as avian flu and agro-terrorism.

Note to University of Florida Students:

Those wishing to receive credit for this course need to first check with the graduate coordinators of their respective departments. UF PharmD students may receive credit for this course, but are only authorized to take the summer section for credit.

Course instructor

Elaine Blythe, PharmD, Email: eblythe@ufl.edu

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website.

Pharmaceutical Chemistry website: <http://electives.distance.ufhealth.org/courses/graduate-courses/veterinary-pharmacy/>

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3.9 PHA6936 Literature survey (Pharmaceutical Chemistry)

Credits: 2

Objectives

This two credit course involves the completion of a term paper on a relevant topic related to pharmaceutical chemistry. Students will research the scientific literature available to them online, through the UF e-journals, and other relevant sources. Students will prepare a fully referenced term paper in no less than 5000 words on a pharmaceutical chemistry related subject approved by the course instructor.

Course instructor

Oliver Grundmann, Email: grundman@ufl.edu, Phone: 001-352-888-4536

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website. Forensic Science website: <http://pharmchem.cop.ufl.edu/programs/courses/literature-survey-in-pharmaceutical-chemistry/>

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3.10 PHA6936 Special Topics in Pharmaceutical Chemistry

Credits: 1

Objectives

This one-credit course is a two-day orientation and final comprehensive examination. It will include an online orientation via Zoom, the final written comprehensive examination online taken via HonorLock, and an oral examination for completion of the MS degree requirements. Students should register for this course in their final semester of their MS degree. The University of Florida requires that you are registered for the following number of credits during the term you are graduating: Summer term: 2 credit hours; Fall/Spring term: 3 credit hours. Because the Special Topics course is only 1 credit, you will need to be sure you meet the credit requirement as noted above.

This course is scheduled to run each semester. Refer to [UF Calendar of Critical Dates](#) for specific dates the course will be held each term. Students are required to pass this class in order to receive their MS degree.

Please note that you will have to take at least one full day off from work and/or other responsibilities to take the written exams. We do recommend taking additional time off for the oral examination. We will attempt to schedule the exam during the day in your time zone. Please have a photo identification (driver's license, passport) ready so the proctor can identify you and ensure that you are the person taking the exam.

You will be informed by the instructor if you passed the written exams within 24 hours. The oral exam will be scheduled ahead of the written exams and needs to be completed no later than 2 days following the written exams.

We cannot provide make-up exams during the same semester. If you fail to attend the written exams at the predetermined times you will have to enroll in the course again the following semester. If you do not pass the exam you will also need to enroll in the course again the following semester.

Outline of special topics schedule:

- Day 1 (evening via Zoom) – Introduction and Orientation
- Day 2- Morning: Essay paper, 3 hours; Afternoon: Short answer paper, 2 hours
- Day 3- Oral examination

Students should login to this course on Canvas as they would with any other course. Use this site to ask study questions and receive further information about the special topics exams. The written exams will be proctored using HonorLock (please see technical requirements on this website: <https://honorlock.com/students/>).

In order to attend the Zoom session and take the oral examination, you will need the following equipment:

- Web camera or built-in camera for laptops
- Microphone (built-in with web camera or separate)
- Stable (preferably hard-wired) internet connection

Note: Although the focus of the written exams will be on the content of core courses, students are still expected to be able to draw on information from all courses completed as part of their MS degree.

Core courses for Pharmaceutical Chemistry:

- PHA6432 Fundamentals of Pharmaceutical Chemistry
- PHA6444 Pharmaceutical Chemistry 1
- PHA6543 Pharmaceutical Chemistry 2
- PHA6417 Pharmaceutical Analysis 2 (or PHA6935 Organic Structure Elucidation)
- VME6766 Laboratory Quality Assurance & Quality Control

Course instructor

Oliver Grundmann, Email: grundman@ufl.edu, Phone: 001-352-888-4536

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website.

Pharmaceutical Chemistry website: <http://pharmchem.cop.ufl.edu/programs/courses/special-topics-in-pharmaceutical-chemistry/>

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4. Clinical Toxicology course objectives and topics

4.1 PHA6556 Introduction to Clinical Toxicology

Credits: 3

Objectives

This 3-credit course, which is based on written modules, is structured to comprehensively provide the student with the fundamental concepts of clinical toxicology. We aim to supplement this information with frequent case studies, detailed module objectives and critical thinking exercises using online journal articles and assignment for each module.

The objective of this course is to familiarize students with the procedures for using WWW resources for communication and educational purposes and to introduce students to the principles, concepts and terminology utilized in the field of clinical toxicology.

At the completion of this course students should:

- understand the basic principles and methods of clinical toxicology,
- understand why clinical toxicology has a long standing history and how it applies to various fields as an interdisciplinary science,
- be able to describe what a toxic syndrome is,
- understand the basic principles of managing a poisoned or overdosed patient,
- be able to apply basic concepts of laboratory testing principles,
- understand the basic concepts of toxicokinetics,
- understand the concept of differing toxic effects depending on the route of administration,
- understand the processes involved in liberation and absorption of toxicants into the body,
- be able to apply the basic principles involved in distribution and elimination of toxicants, and
- understand the approaches utilized to prevent absorption and enhance elimination of toxicants.

Topics

Module 1	Introduction and history of clinical toxicology
Module 2	Toxidrome
Module 3	Management of the poisoned or overdosed patient
Module 4	Laboratory principles
Module 5	Pharmacokinetics and Toxicokinetics overview
Module 6	Administration, liberation, and absorption of toxicants
Module 7	Prevention of absorption from the gastrointestinal tract
Module 8	Distribution and Metabolism of Toxicants in the body
Module 9	Elimination of toxicants
Module 10	Enhancement of elimination of toxicants

Course instructor

Oliver Grundmann, Email: grundman@ufl.edu, Phone: 001-352-888-4536

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website. Clinical Toxicology website: <http://clintox.cop.ufl.edu/programs/courses/pha-6556-introduction-to-clinical-toxicology/>

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4.2 PHA6935 Epidemiology and Biostatistics in Clinical Toxicology

Credits: 3

Objectives

This 3-credit course, which is primarily book-based, is structured to comprehensively provide the student with the fundamental concepts of epidemiology and biostatistics as they relate to the analysis of data, including reports in the medical literature. We aim to supplement this information with online study guides, detailed module objectives and critical thinking exercises using online journal articles.

The objective of this course is to familiarize students with the procedures for using WWW resources for communication and educational purposes and to introduce students to the principles, concepts and terminology utilized in the field of epidemiology and biostatistics.

At the completion of this course students should:

- understand the basic principles and methods of biostatistics,
- be able to analyze data in independent research according to basic biostatistical methods,
- be able to assess critically the data analyses in the medical literature,
- understand the basic principles that apply to medical testing,
- be able to interpret medical tests according to biostatistical principles,
- understand basic epidemiological concepts to include study design,
- be able to apply epidemiological knowledge to the design of independent research and to the analysis of studies in the medical literature,
- understand association and causation, and
- be able to apply the principles of association and causation to the design of independent research and to the critical assessment of the medical literature.

Topics

Module 1	Investigation of an Epidemic
Module 2	Measures of Mortality, Incidence, and Prevalence
Module 3	Measures of Risk and Probability
Module 4	Biological Variability
Module 5	Screening
Module 6	Sampling and Statistical Significance
Module 7	Correlation and Multiple Regression
Module 8	Case-control (Retrospective) Studies
Module 9	Cohort (Prospective) Studies
Module 10	Randomized Clinical Trials
Module 11	Association and Causation
Module 12	Keys to Understanding Articles on Epidemiologic Studies

Course instructor

Oliver Grundmann, Email: grundman@ufl.edu, Phone: 001-352-888-4536

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website. Clinical Toxicology website: <http://clintox.cop.ufl.edu/programs/courses/pha-6935-epidemiology-and-biostatistics-in-clinical-toxicology/>

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4.3 PHA6557 Clinical Toxicology 1

Credits: 3

Objectives

Clinical Toxicology 1 is a 3-credit course that provides students with knowledge about the toxic effects of a number of important therapeutic drug classes. Specifically, the course will cover the cardiovascular principles and which important drug classes are commonly involved with toxic side effects that might present to healthcare professionals. A number of medications used for the treatment of neurological and psychiatric disorders is also commonly associated with a wide range of toxic effects that require immediate attention in a clinical setting. Also, inherently linked to toxicity is the use of antibiotics and chemotherapeutics which display a number of specific toxic effects. We aim to supplement this information with frequent case studies, detailed module objectives and critical thinking exercises using online journal articles and assignment for each module.

The objective of this course is to familiarize students with the procedures for using WWW resources for communication and educational purposes and to introduce students to the principles, concepts and terminology utilized in the field of clinical toxicology.

At the completion of this course students should:

- understand the basic principles fluid, electrolyte and acid-base balance
- be able to describe the different approaches to antidotal therapy and treatment of the poisoned patient,
- understand cardiovascular principles and how each of the drug classes influences the cardiovascular system,
- be able to identify the class of cardiovascular drug based on the symptoms and which actions have to be taken to treat the patient,
- understand neurological and psychiatric principles and which drug classes are associated with which effects on the patient,
- be able to identify the class of CNS drug based on the symptoms and which actions have to be taken to treat the patient,
- understand ophthalmic and otolaryngologic principles and which drug classes may be associated with toxicities to the ear, nose, and throat as well as the eyes, and
- be able to differentiate among the various antibiotic and chemotherapeutic drug classes.
- understand the various approaches of treating a patient after overdoses or poisoned by an antibiotic or chemotherapeutic.

Topics

Module 1	Fluid, Electrolyte, and Acid-Base Principles
Module 2	Antidotal Therapy
Module 3	Cardiovascular Principles
Module 4	Calcium Channel Blockers and Beta-Adrenergic Antagonists
Module 5	Neurologic and Psychiatric Principles
Module 6	Antipsychotics, Lithium, Cyclic Antidepressants
Module 7	Monoamine Oxidase Inhibitors, Serotonin Reuptake Inhibitors and Atypical Antidepressants
Module 8	Sedative-Hypnotics
Module 9	Narcotic Analgesics and NSAIDs
Module 10	Otolaryngologic and Ophthalmic Principles
Module 11	Anesthetics
Module 12	Antibiotics and Chemotherapeutics

Course instructor

Oliver Grundmann, Email: grundman@ufl.edu, Phone: 001-352-888-4536

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website. Clinical Toxicology website: <http://clintox.cop.ufl.edu/programs/courses/pha-6557-clinical-toxicology-1/>

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4.4 PHA6935 The Toxicology of Licit and Illicit Drugs of Abuse

Credits: 3

Objectives

A wide range of drugs are frequently encountered in the ED and in everyday practice settings. Among them are a majority of cases of substance use disorders that involve both licit and illicit drugs.

Recognizing the symptoms of toxidromes early, providing adequate intervention and treatment to the patient, and ensuring the safety of those delivering care are critical components of this course. Following a brief recap of the basics of medical toxicology and toxidromes, the course will focus on the different classes of drugs, their commonly encountered abuse, treatment approaches, and legal components such as drug testing.

At the completion of this course students should:

- Classify drugs of abuse according to their pharmacology
- Recognize certain toxidromes based on symptom presentation
- Assess the limitations of drug screening as it relates to specific drugs
- Describe potential risks, and relative safety measures, to be considered by healthcare professionals when caring for substance abuse patients
- Discuss the complexity of identification when encountering "polypharmacy" patients
- Understand the concept of "analogs" when screening for drugs of abuse
- Distinguish variance of effects based upon routes of administration
- Recognize licit and illicit drugs of abuse by the drug's physical properties

Topics

Module 1	Principles of Toxicology for Medical Professionals
Module 2	CNS Depressants, Opiates and Opioids
Module 3	CNS Depressants, Licit and Illicit Abuse of Opioids
Module 4	CNS Depressants, Benzodiazepines
Module 5	Hallucinogens, Cathinones
Module 6	Hallucinogens, Natural & synthetic Cannabinoids
Module 7	Hallucinogens, MDMA
Module 8	Hallucinogens, Miscellaneous Hallucinogens
Module 9	CNS Stimulants, Cocaine
Module 10	CNS Stimulants, Methamphetamine
Module 11	CNS Stimulants, Miscellaneous Stimulants
Module 12	Specialized Drugs of Abuse, Drugs of Facilitated Sexual Assault
Module 13	Specialized Drugs of Abuse, Performance Enhancing Drugs

Course instructor

Oliver Grundmann, Email: grundman@ufl.edu, Phone: 001-352-888-4536

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website. Clinical Toxicology website: <https://clintox.cop.ufl.edu/programs/courses/the-toxicology-of-licit-and-illicit-drugs-of-abuse/>

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4.5 PHA6935 Occupational Toxicology

Credits: 3

Objectives

Occupational toxicology is a specialty field of clinical toxicology that investigates and applies the principles of toxicology to potential exposures to chemical and biological toxicants in the workplace. The effects of such exposures can have both acute and chronic long-term implications on the health of the individual.

This course focuses on the growing field of occupational toxicology, the specific toxicants encountered in various work environments, and how both acute and chronic exposure can impact health. Symptom presentation, differential diagnosis, and treatment are being discussed as well as preventive measures that can be implemented to reduce or prevent such exposures.

At the completion of this course students should:

- Be aware of the breadth and importance of occupational toxicology
- Routes of exposure commonly encountered in occupational toxicology
- Recognize and interpret the symptoms and treatment approaches related to occupational exposures to toxicants
- Relate physiology of the respective tissue to the toxic exposure and how it affects pharmacokinetic properties of the exposure
- Explain and interpret toxicant exposure in an occupational context to carcinogenesis and cancer
- Relate occupations to specific hazards such as firefighters, healthcare and agricultural workers

Topics

Module 1	Introduction to Occupational Toxicology
Module 2	Occupational Toxicologic Disasters
Module 3	Exposure Control Measures
Module 4	Occupational Inhalational Exposures
Module 5	Occupational Dermal Exposures
Module 6	Carcinogens and Carcinogenesis
Module 7	Workplace Drug & Alcohol Testing
Module 8	Causation Analysis
Module 9	Risk Assessment and Communication
Module 10	Occupation-specific hazards; Firefighters
Module 11	Occupation-specific hazards; Healthcare workers
Module 12	Occupation-specific hazards; Agriculture

Course instructor

Oliver Grundmann, Email: grundman@ufl.edu, Phone: 001-352-888-4536

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website.

Clinical Toxicology website: <https://clintox.cop.ufl.edu/programs/courses/occupational-toxicology/>

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4.6 PHA6936 Literature survey (Clinical Toxicology)

Credits: 1

Objectives

This one credit course involves the completion of a term paper on a relevant topic of clinical toxicology. Students will research scientific literature available to them online, through the UF e-journals, and other relevant sources. Students will prepare a fully referenced term paper in no less than 5000 words on a Clinical toxicology related subject approved by the course instructor.

Course instructor

Oliver Grundmann, Email: grundman@ufl.edu, Phone: 001-352-888-4536

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website.

Forensic Science website: <http://clintox.cop.ufl.edu/programs/courses/pha-6936-literature-survey-clinical-toxicology/>

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4.7 PHA6936 Special Topics in Clinical Toxicology

Credits: 1

Objectives

This one-credit course is a two-day orientation and final comprehensive examination. It will include an online orientation via Zoom, the final written comprehensive examination online taken via HonorLock, and an oral examination for completion of the MS degree requirements. Students should register for this course in their final semester of their MS degree. The University of Florida requires that you are registered for the following number of credits during the term you are graduating: Summer term: 2 credit hours; Fall/Spring term: 3 credit hours. Because the Special Topics course is only 1 credit, you will need to be sure you meet the credit requirement as noted above.

This course is scheduled to run each semester. Refer to [UF Calendar of Critical Dates](#) for specific dates the course will be held each term. Students are required to pass this class in order to receive their MS degree.

Please note that you will have to take at least one full day off from work and/or other responsibilities to take the written exams. We do recommend taking additional time off for the oral examination. We will attempt to schedule the exam during the day in your time zone. Please have a [photo identification](#) (driver's license, passport) ready so the proctor can identify you and ensure that you are the person taking the exam.

You will be informed by the instructor if you passed the written exams within 24 hours. The oral exam will be scheduled ahead of the written exams and needs to be completed no later than 2 days following the written exams.

We cannot provide make-up exams during the same semester. If you fail to attend the written exams at the predetermined times you will have to enroll in the course again the following semester. If you do not pass the exam you will also need to enroll in the course again the following semester.

Outline of special topics schedule:

- Day 1 (evening via Zoom) – Introduction and Orientation
- Day 2- Morning: Essay paper, 3 hours; Afternoon: Short answer paper, 2 hours

Students should login to this course on Canvas as they would with any other course. Use this site to ask study questions and receive further information about the special topics exams. The written exams will be proctored using HonorLock (please see technical requirements on this website: <https://honorlock.com/students/>).

In order to attend the Zoom session and take the oral examination, you will need the following equipment:

- Web camera or built-in camera for laptops
- Microphone (built-in with web camera or separate)
- Stable (preferably hard-wired) internet connection

Note: Although the focus of the written exams will be on the content of core courses, students are still expected to be able to draw on information from all courses completed as part of their MS degree.

Core courses for Clinical Toxicology:

- PHA6556 Introduction to Clinical Toxicology
- PHA6557 Clinical Toxicology 1
- PHA6935 Epidemiology & Biostatistics in Clinical Toxicology
- VME6602 General Toxicology
- VME6605 Toxic Substances
- VME6766 Laboratory Quality Assurance & Quality Control

Course instructor

Oliver Grundmann, Email: grundman@ufl.edu, Phone: 001-352-888-4536

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website.

Pharmaceutical Chemistry website: <http://clintox.cop.ufl.edu/programs/courses/pha-6936-special-topics-in-clinical-toxicology/>

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5. Cross-concentration course objectives and topics

5.1 Forensic Science, Pharmaceutical Chemistry & Clinical Toxicology

5.1.1 PHA6354 Natural Medicinal Products

Credits: 3

Objectives

This course has been developed to introduce students to the procedures and processes associated with the production, isolation, characterization and use of medicinal drugs of plant origin.

At the completion of this course, students are expected to:

- Understand the biochemical reactions involved in the production of natural medicinal products.
- Understand the effects of external factors on the production of secondary metabolites.
- Be familiar with naturally occurring biologically active compounds such as alkaloids and glycosides.
- Be familiar with the isolation and structural elucidation of plant derived compounds.
- Understand the abuse potential, recognition and analysis of drugs of abuse of natural origin.
- Be familiar with the chemistry and pharmacology of herbal remedies. Problems associated with their lack of standardization and potential drug interactions

Topics

Module 1	Biosynthesis of Natural Products
Module 2	Production Ecology of Secondary Metabolites
Module 3	Alkaloids
Module 4	Glycosides
Module 5	Naturally Occurring Drugs of Abuse
Module 6	Herbal Remedies
Module 7	Analysis of Natural Products

Course instructor

Oliver Grundmann, Email: grundman@ufl.edu, Phone: 001-352-888-4536

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website.

Forensic Science website: <http://forensicscience.ufl.edu/programs/courses/pha-6354-natural-medicinal-products/>

Pharmaceutical Chemistry website: <http://pharmchem.cop.ufl.edu/programs/courses/natural-medicinal-products/>

Clinical Toxicology website: <http://clintox.cop.ufl.edu/programs/courses/pha-6354-natural-medicinal-products/>

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5.1.2 PHA6417 Pharmaceutical Analysis 2

Credits: 3

Objectives

This course focuses on the characterization and the structural proof of drug compounds routinely encountered in Forensic laboratories.

At the completion of this course, students are expected to:

- Be able to comfortably navigate the WWW and know how to locate and use web based resources for their interests and further education
- Understand the procedures and principles involved in the preparation and analyses of drug and toxicology samples
- Be familiar with common preliminary tests, and understand the chemistry and theory of testing procedures
- Be familiar with common analytical techniques, their working mechanisms, and the chemistry and principles of confirmatory drug testing, including Ultra violet spectroscopy, normal and reverse phase chromatography, infrared spectroscopy and Gas chromatography/mass spectroscopy, NMR, Supercritical fluid separations and capillary electrophoresis
- Understand the importance of, and the procedures involved in, quality assurance and quality control in drug testing and have a conceptual understanding of accuracy
- Be able to use web-based tools for communication and for the education of themselves and others

Topics

Module 1	Sample Handling, Storage and Preparation
Module 2	Presumptive Tests
Module 3	Ultraviolet (UV) Spectrophotometry
Module 4	Infrared (IR) Spectrophotometry
Module 5	Nuclear Magnetic Resonance (NMR)
Module 6	Mass Spectroscopy
Module 7	Gas Chromatography
Module 8	High Performance Liquid chromatography
Module 9	Capillary Electrophoresis
Module 10	Supercritical Fluid Separations
Module 11	Trace Analysis
Module 12	Optimization of Experimental Conditions
Module 13	Legal Implications and Data Interpretation

Course instructor

Oliver Grundmann, Email: grundman@ufl.edu, Phone: 001-352-888-4536

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website.

Forensic Science website: <http://forensicscience.ufl.edu/programs/courses/pha-6417-pharmaceutical-analysis-2/>

Pharmaceutical Chemistry website:

<http://pharmchem.cop.ufl.edu/programs/courses/pharmaceutical-analysis-2/>

Clinical Toxicology website: <http://clintox.cop.ufl.edu/programs/courses/pha-6417-pharmaceutical-analysis-2/>

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5.1.3 PHA6425 Drug Biotransformation & Molecular Mechanisms of Toxicity

Credits: 3

Objectives

This course provides a strong conceptual foundation of enzymology and mechanisms of drug biotransformation pathways. As a foundation for learning we will provide examples of drugs and other xenobiotics that exhibit toxicity related to biotransformation.

At the completion of this course students are expected to be able to:

- Predict from the structure of a xenobiotic, the structures of its probable metabolites including intermediates and final products.
- Predict the enzymes (including isozymes where known) likely to be involved in the biotransformation of a xenobiotic and its primary metabolites.
- Understand and correctly use the terminology of the field.
- Understand and be able to predict the effects of prototype inducers of xenobiotic biotransformation on enzymes present in liver and other organs.
- Understand and be able to predict the effects of selective inhibitors of various xenobiotic biotransformation reactions.
- Understand the role of route of administration on the fate of a xenobiotic or the action of a modulator of xenobiotic transformation.
- Understand the roles of transporter proteins in directing uptake and efflux of xenobiotics and their metabolites.
- Understand the basis for interaction between reactive metabolites and cellular macromolecules, and be able to predict the potentially reactive metabolites of a particular xenobiotic.
- Comfortably navigate the WWW and know how to locate and use web based resources for their interest and further education.
- Use web based tools for communication and for the education of themselves and others.

Topics

Module 1	An Overview of Xenobiotic Metabolism
Module 2	Cytochrome P450
Module 3	Flavin Monooxygenase and Other Oxidative Enzymes
Module 4	Ester/Amide Hydrolysis
Module 5	Epoxide Hydrolases
Module 6	Glucuronosyltransferases and Glucosyltransferase
Module 7	Sulfotransferases
Module 8	Glutathione transferases
Module 9	Other Phase II Reactions
Module 10	Transport of Xenobiotics and Their Metabolites
Module 11	Metabolism and Toxicity General Concepts
Module 12	Metabolic Activation of Drugs
Module 13	Metabolic Activation of Industrial Chemicals
Module 14	Metabolic Activation of Pyrolysis Products
Module 15	Metabolic Activation of Natural Products

Course instructor

Margaret O. James, Email: mojames@ufl.edu, Phone: 001-352-273-7707

Required and recommended textbooks

There are no required textbooks, however some textbooks are recommended as background: please go to the course website to view these.

Forensic Science website: <http://forensicscience.ufl.edu/programs/courses/pha-6425-drug-biotransformation-molecular-mechanisms-of-toxicity/>

Pharmaceutical Chemistry website: <http://pharmchem.cop.ufl.edu/programs/courses/drug-biotransformation-molecular-mechanisms-of-toxicity/>

Clinical Toxicology website: <http://clintox.cop.ufl.edu/programs/courses/pha-6425-drug-biotransformation-molecular-mechanisms-of-toxicity/>

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5.1.4 VME6766 Laboratory QA/QC

Credits: 3

Objectives

This course teaches the key components of QA/QC and will help students to understand the need to produce sound scientific data using appropriate standards and controls, written procedures and method validation no matter what field they are employed in. This course will offer a generic description of what is required in the formation of a quality system in any laboratory. This will be achieved by describing the key principles in any QA/QC program with reference to the FDA, EPA and ISO guidelines, together with specific examples from different specializations in those particular fields.

Topics

Module 1	Introduction to QA/QC
Module 2	Key Elements of a QA/QC Program
Module 3	Personnel and Training
Module 4	Validation of Analytical Procedures
Module 5	Equipment
Module 6	Test Article Tracking
Module 7	Standard Operating Procedures
Module 8	Study Protocols
Module 9	The Final Report
Module 10	Archiving, Archivist, Storage and Retrieval
Module 11	Specializations
Module 12	Inspection and Compliance

Course instructor

Nancy Toffolo, Email: ntoffolo@ufl.edu, Phone: 001-352-273-8691

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website.

Forensic Science website: <http://forensicscience.ufl.edu/programs/courses/laboratory-qaqc/>

Pharmaceutical Chemistry website: <http://pharmchem.cop.ufl.edu/programs/courses/laboratory-qaqc/>

Clinical Toxicology website: <http://clintox.cop.ufl.edu/programs/courses/vme-6766-laboratory-qaqc/>

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5.2 Forensic Science & Pharmaceutical Chemistry

5.2.1 PHA6535 Principles of Nucleotide Activity

Credits: 2

Objectives

This course will introduce the students to the chemical structure of DNA and RNA; the synthetic processes for DNA and RNA synthesis; biochemical reactions and pathways for nucleotide synthesis; DNA replication, transcription and translation; covalent and reversible interactions of nucleic acids with small molecules and proteins and an overview of techniques for the analysis of nucleic acids. At the completion of this course students are expected:

- To know the chemical structures of DNA and RNA components
- To understand DNA sequence information as it relates to eukaryotic gene structure and the processes of DNA replication
- To understand RNA sequence information, RNA structural information, and the processes of RNA biosynthesis and catabolism.
- To know the processes involved in the biosynthesis of nucleotides
- To understand the role of RNA in protein synthesis
- To understand and identify non-specific and specific interactions of proteins with nucleic acids
- To recognize the different types, and significance, of chemical interactions with nucleic acids and small molecules
- To know the chemistry of reversible interactions of nucleic acids with small molecules
- To know the steps involved in the chemical synthesis of nucleosides, oligodeoxyribonucleotides, and oligoribonucleotides
- To have a basic understanding of laboratory techniques used in the isolation, sequencing and hybridization of nucleic acids

Topics

MODULE 1	DNA and RNA Structure
MODULE 2	DNA Packaging, Replication, Repair, and Recombination
MODULE 3	RNA Sequence Information
MODULE 4	Nucleotide Biosynthesis
MODULE 5	The Role of Nucleotides in Protein Synthesis and Protein-Nucleic Acid Interactions
MODULE 6	Reversible and Covalent Interactions of Nucleic Acids with Small Molecules
MODULE 7	Chemical Synthesis
MODULE 8	Techniques Applied to Nucleic Acids

Course instructor

Nancy Toffolo, Email: ntoffolo@ufl.edu, Phone: 001-352-273-8691

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website.

Forensic Science website: <http://forensicscience.ufl.edu/programs/courses/pha-6535-principles-of-nucleotide-activity/>

Pharmaceutical Chemistry website: <http://pharmchem.cop.ufl.edu/programs/courses/principles-of-nucleotide-activity/>

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5.2.2 PHA6471 Synthetic Medicinal Chemistry

Credits: 3

Objectives

This course has been developed to introduce students to the chemical principles and procedures surrounding the synthesis of commonly encountered licit and illicit chemical substances, and to introduce you to the processes involved in the forensic analysis of clandestine drug laboratories.

At the completion of this course, students are expected to:

- Be able to comfortably navigate the WWW and know how to locate and use web based resources for their interests and further education
- Be able to recognize chemical functional groups and to know their chemical and physical characteristics
- To understand the basic chemical reactions involved in illicit drug synthesis
- To understand the processes involved in the synthesis of amphetamine, methamphetamine and MDMA
- To understand the processes involved in the synthesis PCP
- To understand the processes involved in the synthesis of opiates and Fentanyl
- To understand the processes involved in the synthesis of cocaine and crack
- To understand the processes involved in the synthesis of LSD
- To be familiar with the steps taken in the forensic investigation of clandestine drug laboratories

Topics

Module 1	Functional Groups
Module 2	Reactions Involved in Illicit Drug Synthesis I
Module 3	Reactions Involved in Illicit Drug Synthesis II
Module 4	Amphetamines, Methamphetamine and MDMA
Module 5	Phencyclidine
Module 6	Opiates
Module 7	Cocaine
Module 8	LSD
Module 9	Clandestine Laboratories
Module 10	Emerging Synthetic Drugs

Course instructor

Dustin Yeatman, Email: ntoffolo@ufl.edu, Phone: 001-352-273-8691

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website. Forensic Science website: <http://forensicscience.ufl.edu/programs/courses/pha-6471-synthetic-medicinal-chemistry/>

Pharmaceutical Chemistry website: <http://pharmchem.cop.ufl.edu/programs/courses/synthetic-medicinal-chemistry/>

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5.2.3 PHA6935 Organic Structure Elucidation

Credits: 3

Objectives

This course focuses on the characterization and the structural proof of drug compounds routinely encountered in Pharmaceutical and Forensic laboratories.

At the completion of this course, students are expected to:

- Be able to comfortably navigate the WWW and know how to locate and use web based resources for their interests and further education
- Understand the procedures and principles involved in the preparation and structural analyses of unknown substances
- Be familiar with the analytical procedures discussed in this course (namely UV, IR, MS, and NMR) and understand the theory of how each technique contributes to the elucidation of an unknown structure
- Understand the differences and specific advantages and disadvantages of each analytical technique introduced in this course
- Be able to apply your knowledge gained during this course to analyze a sample of an unknown substance as well as critically evaluate published literature about the structural elucidation of an unknown substance
- Be able to use web-based tools for communication and for the education of yourself and others

Topics

Module 1	Introduction to Structure Elucidation
Module 2	Separation Techniques and Isolation of Compounds
Module 3	Ultraviolet and Infrared Spectrophotometry
Module 4	Introduction to Mass Spectrometry
Module 5	Advanced Topics and Tools in Mass Spectrometry
Module 6	Introduction to Nuclear Magnetic Resonance Spectroscopy
Module 7	Two-dimensional homo- and Heteronuclear NMR
Module 8	Advanced Topics and Tools in NMR Spectroscopy
Module 9	Organic Solid State Analysis Techniques
Module 10	Practical Applications of Structure Elucidation Techniques

Course instructor

Oliver Grundmann, Email: grundman@ufl.edu, Phone: 001-352-888-4536

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website.

Forensic Science website: <http://forensicscience.ufl.edu/programs/courses/organic-structure-elucidation/>

Pharmaceutical Chemistry website: <http://pharmchem.cop.ufl.edu/programs/courses/organic-structure-elucidation/>

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5.2.4 PHA6935 Applied Statistics for Data Analysis

Credits: 3

Objectives

Applied Statistics for Data Analysis is a 3-credit course that provides students with the basic knowledge of how scientific evidence is classified and how statistical procedures are utilized to analyze data. This encompasses common descriptive measures such as the mean, standard deviation, and uncertainty of measurements as well as comparative statistics that aim to compare two or more population means or perform simple linear regression. These basic statistical operations are important for every-day tasks conducted in an analytical laboratory. No matter which field the student will be working in, a basic understanding of the scientific method and the statistics used to analyze data is essential to the job performance.

Students should have some working knowledge of Microsoft Excel.

The objective of this course is to familiarize students with the procedures for using WWW resources for communication and educational purposes and to introduce students to the basic principles, concepts and terminology utilized in statistics. At the completion of this course students should

- understand the different descriptive statistics commonly used
- be able to describe the mean, standard deviation, and variance of a sample population
- understand probability and how it relates to the various applications within a laboratory
- be able to identify which statistical test is best suitable for a one sample, two sample, and multiple sample comparison
- understand the principles of the null and alternative hypotheses
- be able to perform the correct student t-test for comparison of two sample populations
- understand the differences between parametric and non-parametric tests and when the chi-square test should be used
- be able to perform an ANOVA comparing three or more sample populations
- be able to conduct a post-hoc test for an ANOVA analysis, and
- understand how simple linear regression is utilized to determine regression coefficients and perform linearity checks in an analytical laboratory

Topics

Module 1	Introduction to Scientific Evidence and Statistics
Module 2	Measures of central tendency and the normal distribution
Module 3	Probability
Module 4	Discrete random variables and probability distributions
Module 5	Estimation of mean and standard deviation and the normal distribution
Module 6	Hypothesis testing for one or two population means, Student t-test
Module 7	Hypothesis testing for small sample sizes and multinomial experiments, Fisher's exact test
Module 8	Analysis of Variance and multiple comparison tests
Module 9	Simple linear regression

Course instructor

Nancy Toffolo, Email: ntoffolo@ufl.edu, Phone: 001-352-273-8691

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website.

Forensic Science website: <http://forensicscience.ufl.edu/programs/courses/applied-statistics-for-data-analysis/>

Pharmaceutical Chemistry website: <http://pharmchem.cop.ufl.edu/programs/courses/applied-statistics-for-data-analysis/>

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5.2.5 PHA6935 Metabolic Biochemistry

Credits: 3

Objectives

This course will introduce students to the principles of anabolic and catabolic pathways and cellular energy efficiency. The course also provides an understanding of the biological, physical, and chemical processes for each reaction pathway.

At the completion of this course students are expected:

- To understand the principles of metabolism
- To understand the need for cellular energy conversion
- To understand the sources of cellular energy
- To understand the biological, physical, and chemical processes involved in each major catabolic and anabolic pathway

Topics

Module 1	Amino Acids, Peptides and Proteins
Module 2	Protein Structure and Function
Module 3	Enzymes
Module 4	Carbohydrates
Module 5	Lipids
Module 6	Bioenergetics
Module 7	Glycolysis
Module 8	Gluconeogenesis and Regulation
Module 9	Citric Acid Cycle
Module 10	Oxidation of Fatty Acids
Module 11	Amino acid Degradation and the Urea Cycle
Module 12	Oxidative Phosphorylation
Module 13	Carbohydrate Biosynthesis in Plants/Bacteria and Lipid Biosyntheses
Module 14	Biosynthesis of Amino Acids and Nucleotides
Module 15	Integration and Hormonal Regulation of Metabolism

Course instructor

Joe Pasternak, Email: ntoffolo@ufl.edu, Phone: 001-352-273-8691

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website.

Forensic Science website: <http://forensicscience.ufl.edu/programs/courses/metabolic-biochemistry/>

Pharmaceutical Chemistry website: <http://pharmchem.cop.ufl.edu/programs/courses/metabolic-biochemistry/>

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5.2.6 VME6650 Principles of Mammalian Pharmacology

Credits: 4

Objectives

This introductory course covers key concepts related to the cellular actions, therapeutic uses, side effects and toxic actions of major drug classes used in humans and non-human species. Students will learn key concepts that are important to understanding drug actions, including principles of pharmacokinetics (e.g., absorption, distribution, metabolism and excretion of drugs) as well as the physiological and cellular basis for a host of diverse drug actions. Major drug classes covered in this course include (among others), agents that act upon the nervous system (both central and peripheral), skeletal muscle, the heart, the cardiovascular system and kidneys, as well as agents used to combat microbial diseases. The overall goal of this course is to provide students with an in-depth understanding of how various drugs exert beneficial and untoward actions and to develop an appreciation for the risks associated with drug abuse.

Topics

Module 1	Introduction and Basic Concepts
Module 2	Principles of Drug Action
Module 3	Drug Elimination
Module 4	Autonomic Drugs
Module 5	Central Nervous System Drugs
Module 6	Drugs of Abuse
Module 7	Renal and Cardiovascular Drugs
Module 8	Drugs that Affect Autacoids and Inflammation
Module 9	Antimicrobial Agents
Module 10	Drug Interactions

Course instructor

Joanna Peris, Ph.D., Email: peris@cop.ufl.edu, Phone: 001-352-273-7688

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website. Forensic Science website: <http://forensicscience.ufl.edu/programs/courses/principles-of-mammalian-pharmacology/>

Pharmaceutical Chemistry website: <http://pharmchem.cop.ufl.edu/programs/courses/principles-of-mammalian-pharmacology/>

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5.3 Forensic Science & Clinical Toxicology

5.3.1 PHA6840 Medicinal Chemistry of Drugs of Abuse

Credits: 3

Objectives

This course will introduce the students to the Controlled Substances Act; the Diagnostic and Statistical Manual of Mental Disorders; chemical and pharmacological information relating to CNS depressants, stimulants, inhalants and hallucinogenic drugs of forensic significance and an overview of legal and forensic implications.

At the completion of this course students are expected:

- To understand the structure of the US controlled substances act and the definitions of each drug classification
- To understand the models of addiction and the observations on which they are based
- To understand the pharmacological and abuse profiles of the CNS depressants, barbiturates and benzodiazepines
- To understand the pharmacological and abuse profiles of the CNS depressant, alcohol
- To understand the pharmacological and abuse profiles of the opioid drugs
- To understand the pharmacological and abuse profiles of the hallucinogens
- To understand the pharmacological and abuse profiles of the cannabinoids
- To understand the pharmacological and abuse profiles of the CNS stimulants, cocaine and the amphetamines
- To understand the pharmacological and abuse profiles of inhalants

Topics

Module 1	Drug Classes and Controlled Substances Act
Module 2	Drug Dependence and Addiction
Module 3	CNS Depressants
Module 4	Alcohol
Module 5	Opioids
Module 6	Cannabinoids
Module 7	Hallucinogens
Module 8	CNS Stimulants
Module 9	CNS Volatile Substances

Course instructor

Oliver Grundmann, Email: grundman@ufl.edu, Phone: 001-352-888-4536

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website.

Forensic Science website: <http://forensicscience.ufl.edu/programs/courses/medicinal-chemistry-of-drugs-of-abuse/>

Clinical Toxicology website: <http://clintox.cop.ufl.edu/programs/courses/pha-6840-medicinal-chemistry-of-drugs-of-abuse/>

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5.3.2 PHA6534 Toxicology of Chemical Weapons

Credits: 3

Objectives

This 3-credit course is structured to comprehensively provide the student with the fundamental toxicologically relevant concepts of weapons that can be used to create mass casualties. These weapons are often called weapons of mass destruction, a term that is closely related to but not synonymous with mass-casualty weapons (a technically more appropriate term). This course will focus on chemical agents and toxins as the toxicologically relevant mass-casualty weapons. Each of the eight modules in the course will consist of specific objectives, one or more illustrative cases, a list of the primary references that the student will be expected to acquaint himself or herself with, a brief introduction, a section of teaching material and study tips, and assignments designed to stimulate critical thinking.

The general objectives of this course are to familiarize the student with the toxicological concepts applicable to chemical and toxin weapons of mass destruction; to provide useful references for study, discussion, and reference; and to provide experience in critical thinking about the clinical toxicology of these agents.

Specifically, by the end of this course, students should be able to perform the following tasks, which are summarized here and then as a relevant subset of specific objectives at the beginning of each module:

- List several definitions of weapons of mass destruction (WMD).
- Explain how WMD relates to mass-casualty weapons (MCW), NBC, and CBRNE.
- Be able to define toxin, toxicant, toxic industrial chemical (TIC), LD50, and LCt50.
- Explain what subsets of WMD are relevant to clinical toxicology.
- Discuss the risks of chemical and radiological/nuclear terrorism.
- Review the applicability to chemical, radiation, and nuclear mass casualties of ASBESTOS, POISON, TOXICANT, or a similar version of the agent-environment-host approach to a systematic clinical assessment of mass-casualty event from these kinds of agents.
- Explain what is meant by the ABCDDs of mass-casualty care.
- Explain what NATO codes are.
- Differentiate between WMDs with local effects on the respiratory tract and those with systemic effects.
- Understand the differences and similarities of the pharmacokinetics and pharmacodynamics of WMDs with local and systemic effects.
- Summarize the management of central- and peripheral-compartment damage to the respiratory tract.
- Summarize the pathophysiology, clinical presentation, and management of WMDs.
- List the three major vesicants used as chemical-warfare agents.
- List the differential diagnosis of miosis (pinpoint pupils) in a poisoned patient.
- Define incapacitating, incapacitating agents, disability, and nonlethal.
- List the features of the anticholinergic toxidrome.
- Define “riot-control agent” and be able to list the important riot-control agents.
- Define opioid, opiate, and opioid toxidrome.
- List three separate ways (in addition to the CDC categories) of classifying toxins.
- Explain the differences between a chemical and a biological warfare agent.

Topics

Module 1	Introduction
Module 2	Chem I: Inhaled Toxicants with Local Effects on the Respiratory Tract
Module 3	Chem II: "Blood" Agents
Module 4	Chem III: Vesicants
Module 5	Chem IV: Anticholinesterases
Module 6	Chem V: Incapacitating Agents I: Anticholinergic Agents
Module 7	Chem VI: Anticholinergic Agents II: Riot-control Agents and Opioids
Module 8	Toxins

Course instructor

James Madsen, Email: zmaddoc@gmail.com, Phone: 001-443-686-0126

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website.

Forensic Science website: <http://forensicscience.ufl.edu/programs/courses/pha-6534-toxicology-of-chemical-weapons/>

Clinical Toxicology website: <http://clintox.cop.ufl.edu/programs/courses/pha-6534-toxicology-of-chemical-weapons/>

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5.3.3 PHA6935 Biosecurity and Microbial Forensics

Credits: 3

Objectives

This course is designed to provide an in-depth understanding of the risks associated with intentional and unintentional release of biological agents and the systems and practices used to investigate, contain or control these releases. Each module will introduce various aspects of biosecurity and microbial forensics, with a focus on the types of biological agents or situations that pose a potential security risk. This course will aim to equip students with the skills needed to evaluate potential biological threats and to respond effectively once a biological event has been identified.

This course is taught by Western Sydney University as part of a collaborative venture between the University of Florida and Western Sydney University, Australia.

At the end of this course, students should be able to:

- Understand the concepts of biosecurity and microbial forensics, and have an awareness of the current and historical biological threats
- Describe the general characteristics of the major groups of biological agents, the threat these agents pose to biosecurity and how they may be used as biological weapons
- Appreciate the role modern biotechnology could play in the potential development of designer pathogens
- Understand the role of epidemiology and surveillance in biosecurity, and be able to identify signs of a suspicious outbreak
- Understand the safety issues and regulations involved with handling biological hazards
- Describe the different types of samples and methods of collection, decontamination procedures, storage and transport conditions, and analytical tests that are used during disease outbreak investigations
- Understand the health, environmental, economic, political, legal and social issues related to biosecurity

Topics

Module 1	Fundamentals and History of Biosecurity
Module 2	Biological Agents
Module 3	Epidemiology and Investigation of Disease Outbreaks
Module 4	Sample Collection and Handling
Module 5	Biological Agent Identification and Characterization
Module 6	Responses to Biological Threats and Legal Aspects of Biosecurity

Course instructor

Chris Lennard, Email: clennard@ufl.edu

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website.

Forensic Science website: <http://forensicscience.ufl.edu/programs/courses/biosecurity-and-microbial-forensics/>

Clinical Toxicology website: <https://clintox.cop.ufl.edu/programs/courses/biosecurity-and-microbial-forensics/>

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5.3.4 VME6602 General Toxicology

Credits: 3

Objectives

This 3-credit course, which is primarily book-based, is structured to comprehensively provide the student with the fundamental concepts of toxicology as they relate to specific organ and tissue systems. We aim to supplement this information with online study guides, detailed module objectives and critical thinking exercises using online journal articles.

The objective of this course is to familiarize students with the procedures for using WWW resources for communication and educational purposes and to introduce students to the principles, concepts and terminology utilized in the field of toxicology.

At the completion of this course students should:

- Understand the general principles of toxicology
- Understand the scientific principles of absorption, distribution and metabolism
- Understand the principles and concepts of mutagenesis and chemical carcinogenicity
- Understand the principles and concepts related to reproductive and developmental toxicology
- Understand the principles of Immunotoxicology, including the biology of the immune response, types of immune reactions and disorders, clinical and laboratory tests used in detecting immunotoxicity and knowledge of specific chemicals that adversely affect the immune system
- Understand the principles and concepts of neurotoxicity; have knowledge of agents that affect neuronal and synaptic transmission and appropriate neurotoxicity evaluation methods
- Understand the anatomy and physiology of the lungs, liver, and kidneys, and the mechanisms of related organ toxicity, as well as evaluation methods of organ damage by toxic agents
- Understand the principles and concepts behind chemically-induced toxicity of the blood.
- Understand the basic principles of risk assessment applications
- Be able to use internet resources for communication and education purposes

Topics

Module 1	Principles of Toxicology
Module 2	Xenobiotic Absorption, Distribution, Metabolism, and Elimination
Module 3	Toxicokinetics
Module 4	Toxicity of the Hematopoietic System
Module 5	Hepatotoxicity
Module 6	Nephrotoxicity
Module 7	Neurotoxicity
Module 8	Dermatotoxicity
Module 9	Pulmonotoxicity
Module 10	Immunotoxicity
Module 11	Reproductive and Developmental Toxicity
Module 12	Mutagenesis and Genetic Toxicology
Module 13	Chemical Carcinogenesis
Module 14	Epidemiological Issues
Module 15	Human Health Risk Assessment

Course instructor

Leah Stuchal, Email: ntoffolo@ufl.edu, Phone: 001-352-273-8691

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website.

Forensic Science website: <http://forensicscience.ufl.edu/programs/courses/general-toxicology/>

Clinical Toxicology website: <http://clintox.cop.ufl.edu/programs/courses/vme-6602-general-toxicology/>

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5.3.5 VME6605 Toxic Substances

Credits: 3

Objectives

This course, which is primarily book-based, will comprehensively provide the student with the fundamental concepts of toxicology as they relate to specific organ and tissue systems. We aim to supplement this information with online study guides, detailed module objectives and critical thinking exercises using online journal articles.

The objective of this course is to familiarize students with many of the most important toxic substances, their toxic effects, and ways to treat poisoned patients. Several example toxicants are presented and discussed in detail.

Through the study of these example toxicants, the student should be able to:

- Comfortably navigate the WWW and know how to locate and use web-based resources for their interest and further education
- Understand the nature of acute, chronic, immediate and delayed symptoms of poisoning from drugs and chemicals
- Understand the mechanisms by which the example drugs and chemicals produce toxic effects
- Understand the use of laboratory tests to assist in the diagnosis and management of poisoned patients
- Understand the circumstances in which individuals are typically poisoned with these agents
- Understand the general approach to the treatment of chemical intoxication
- Understand specific treatments available for the example toxicants and the mechanisms by which these treatments are effective
- Use web based tools for communication and for the education of themselves and others

There are literally tens of thousands of chemicals in commerce, and nature offers even greater numbers of chemicals to which individuals are exposed. According to the basic tenets of toxicology, any of these substances in sufficient doses is toxic, although some clearly are of greater health concern than others. The objective of this course is to provide the student with information on the toxic properties of selected chemicals to illustrate principles regarding mechanisms of toxicity, the array of signs and symptoms associated with intoxication, approaches to clinical assessment of poisoning, and methods of treatment. Examples have been selected from several chemical classes and include agents that may be encountered occupationally, environmentally, in medicine, or in the context of substance abuse.

The course is divided into several modules, and each module covers a chemical or group of closely related chemicals. The required text for the course, "Goldfrank's Toxicologic Emergencies" will be the primary source of information regarding the toxicity of these chemicals. The student is free to supplement reading in this text with other sources of information, including clinical toxicology books, web sites, etc. When you think that you have mastered the material for a particular module, you will take a short, time-limited, exam with objective questions (multiple choice and true/false). Also, you will be asked to answer a more detailed, essay-type exam question on the module topic. The essay question will require you to integrate the knowledge that you learned to explain a concept or solve a problem. You can take as much time as you need on the essay-type question, and use the book and any other materials you need to formulate your answer. You cannot, however, collaborate on your answer with someone else, since this is really to test your knowledge and skill. Because some of you are procrastinators (and you know who you are!), we will require that the modules be completed (objective test taken and essay question submitted) weekly throughout the semester.

Reading assignments in the text specific to each module are provided.

Topics

Module 1	Principles of Managing the Poisoned Patient
Module 2	Carbon Monoxide
Module 3	Cyanide and Hydrogen Sulfide
Module 4	Acetaminophen
Module 5	Salicylates
Module 6	Opioids
Module 7	Cocaine
Module 8	Amphetamines
Module 9	Ethanol
Module 10	Arsenic
Module 11	Lead
Module 12	Mercury
Module 13	Organophosphate Pesticides
Module 14	Hydrocarbons
Module 15	Envenomation: Snakes and Other Reptiles

Course instructor

Leah Stuchal, Email: ntoffolo@ufl.edu, Phone: 001-352-273-8691

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website.
Forensic Science website: <http://forensicscience.ufl.edu/programs/courses/toxic-substances/>
Clinical Toxicology website: <http://clintox.cop.ufl.edu/programs/courses/vme-6605-toxic-substances/>

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5.4 Pharmaceutical Chemistry & Clinical Toxicology

5.4.1 PHA6357 Herbal & Dietary Supplements

Credits: 3

Objectives

This 3-credit course, which is based on written modules, is structured to comprehensively provide the student with an overview of the use and pharmacology of common herbal and dietary supplements. We aim to supplement this information with frequent case studies, module objectives and critical thinking exercises using online resources and assignments for each module.

The objective of this course is to familiarize students with the procedures for using WWW resources for communication and educational purposes and to provide healthcare professionals with the principles, concepts and terminology utilized in the field of herbal and dietary supplements for improved counseling and patient care.

At the completion of this course students should:

- understand the definition of and distinction between herbal and dietary supplements,
- understand the basic nomenclature for natural products,
- be able to describe how natural products are standardized,
- understand government regulations and policies as they relate to labeling and marketing of herbal and dietary supplements,
- know the common herbal and dietary supplements sold on the market,
- be able to describe the principle active substances of supplements,
- understand the proposed mechanism(s) of pharmacological action for the supplements discussed,
- be able to detect and counsel the patient on possible interactions of supplements with other medications,
- understand possible adverse effects of supplements and integrate it into counseling of the patient.

Topics

Module 1	Definitions and Drug Extraction Procedures
Module 2	St. John's wort and Other Antidepressant Herbal and Dietary Supplements
Module 3	Kava kava and Other Anxiolytic Supplements
Module 4	Valerian and Other Sleep-inducing Herbal Remedies
Module 5	Ginkgo and Other Neuroprotective Supplements
Module 6	Case Studies I
Module 7	Black Cohosh and Other Supplements for Menstrual Irregularities
Module 8	Saw Palmetto and Other Supplements for Men's Health
Module 9	Ginseng and Other CNS and Weight Loss Supplements
Module 10	Bilberry and Other Supplements for Circulatory Disorders
Module 11	Supplements for Other Disorders
Module 12	Case Studies II

Course instructor

Oliver Grundmann, Email: grundman@ufl.edu, Phone: 001-352-888-4536

Required and recommended textbooks

For the latest update on required and recommended textbooks please go to the course website.

Pharmaceutical Chemistry website: <http://pharmchem.cop.ufl.edu/programs/courses/herbal-dietary-supplements/>

Clinical Toxicology website: <http://clintox.cop.ufl.edu/programs/courses/pha-6357-herbal-and-dietary-supplements/>

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