

**University of Guelph
College of Biological Science
Department of Molecular & Cellular Biology**

**COURSE OUTLINE
Applications in Biology - Forensic Science (BIOL*3650 Sec 02)
Winter 2018**

Course Goal

Forensic science is a multidisciplinary field that applies the scientific method in support of justice systems including criminal and civil courts. You will learn about the scientific as well as social and legal environment in which forensic scientists work. This course will focus on forensic biology and all aspects of DNA analysis, including collection of samples, body fluid testing, DNA extraction, quantitation, amplification and statistical interpretation. How factors such as variation of sample type, degradation and low-level samples affect the limitations of analysis and interpretation will be discussed. You will learn through lectures, demonstrations and case studies covering theory and protocols used for autosomal and Y-chromosome testing. Mitochondrial DNA, single-nucleotide polymorphism, non-human testing and developmental technologies will also be discussed. Students will also learn the importance and practice of trial preparation and expert witness testimony.

Teaching Team

Instructor: Valerie Blackmore

Valerie Blackmore is the founder and CEO of Wyndham Forensic Group, an accredited private forensic biology and DNA testing facility located in Guelph. At Wfg, she has responsibilities both as a forensic biologist as well as overseeing business and laboratory operations. As a forensic biologist, she performs testing, testifies in criminal courts, and provides training to scientists, lawyers and law enforcement. Valerie is also involved in forensic capacity-building and development projects in Canada and abroad.

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Office hours: Tuesdays 2:30-3:30pm or by appointment
SSC 1482

Course Schedule

Lectures Tuesdays 1:00 – 2:20; Thursdays 1:00 – 2:20; MCKN 224

Labs Tuesdays 1:00 – 2:20 (TBA); SSC 2313

Learning Outcomes

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

1. Apply the relevant scientific concepts of transmission and molecular genetics that underlie the production and interpretation of human forensic DNA profiles.
2. Apply technical aspects of identifying body fluids and producing forensic DNA profiles, including validation, current amplification and electrophoretic techniques as well as next generation sequencing applications and processes.
3. Describe the underlying scientific principles on which forensic biology is based, using written or oral communication.
4. Explore current scientific and legal controversies in forensic DNA analysis, including issues of bias and miscarriages of justice through written and oral communication.
5. Interpret and critically evaluate peer-reviewed published research data and case work data to produce reports and letters of opinion for expert opinion/testimony purposes.
6. Explore the professional and personal attributes required for success in Forensic Science occupations.
7. Explore the social and ethical responsibilities of a forensic practitioner.

Course Resources

Students are expected to undertake extensive reading of primary and secondary literature to supplement the in-class lectures. In addition
Various supplemental materials will be assigned throughout the term, including current research papers from peer-reviewed journals, validation data, as well as court transcripts and legal rulings.

Textbooks (recommended but not required):

John M. Butler (2015) *Advanced Topics in Forensic DNA Typing: Interpretation*, Academic Press; ISBN: 978-0-12-405213-0

Peter Gill (2014) *Misleading DNA Evidence: Reasons for Miscarriages of Justice* Academic Press ISBN: 978-0-12-417214-2

Courselink: This course will make use of the University of Guelph's course website on D2L (via Courselink).

Undergraduate Calendar: is the source of information about the University of Guelph's procedures, policies and regulations, which apply to undergraduate programs.

Course Structure

Lectures

Lectures periods will comprise presentations by the instructor. Students will engage in course material through discussion, analysis of specific cases, demonstrations, assignments and discussions of the scientific basis of biological applications based on the primary literature.

Labs

There are 2 labs in this course which are complementary to and will reinforce concepts covered in the lectures. Labs will involve the search and testing of body fluids (blood/semen/saliva) and sampling techniques for DNA analysis. Students will work in groups. Each lab will be 90 minutes in length.

Tentative Lab & Lecture Schedule

Week	Date	Topic
1	T-Jan 9	Introduction to Forensic Biology; history; disciplines
	Th-Jan 11	Role of forensic expert; hierarchy of propositions
2	T-Jan16	Miscarriages of justice
	Th-Jan18	Body fluid identification- blood,semen, saliva
3	T-Jan23	Lab – body fluid identification SSC 2313
	Th-Jan25	Hairs & textiles
4	T-Jan30	Lab – body fluid identification SSC 2313
	Th-Feb 1	DNA Interpretation
5	T-Feb 6	CE data output; validation
	Th-Feb 8	STR profiles, interpretation
6	T-Feb 13	Midterm
	Th-Feb 15	DNA mixtures; Finding and citing resources; Letter of Opinion Topics
Reading week	Feb19-23	No lectures or labs
7	T-Feb 27	Statistics & population genetics
	Th-Mar 1	Kinship analysis; Kinship assignment
8	T-Mar 6	Lineage marker statistics
	Th-Mar 8	Transfer and Persistence
9	T-Mar 13	Laboratory Quality management systems & standards for testing
	Th-Mar 15	Forensic DNA in the courts: R v Awer; R v Browne
10	T-Mar 20	Letter of Opinion Due
	Th-Mar 22	Depositions – time slots TBA
11	T-Mar 27	Depositions – time slots TBA
	Th-Mar 29	Depositions – time slots TBA
12	T-Apr 3	Probabilistic genotyping, SNPs, NGS
	Th-Apr 5	Review

Methods of Assessment

Assessment	Value (% of final grade)	Date	Learning Outcome (see above)	Course activity
Midterm	20	Feb 13		Covers material from weeks 1 to 6 inclusive
Kinship Assignment	20		1,2	Kinship study: Given relevant genotypes, students will assess the likelihood of various relationships

Assessment	Value (% of final grade)	Date	Learning Outcome (see above)	Course activity
				between samples
Letter of Opinion	20 or 30	Mar 20	1,2,3,4,5	Letter of Opinion*: Topics will be provided and students will submit a letter of opinion to the "court".
Deposition	10% for students that choose a hybrid assignment Letter of Opinion + deposition	Mar 22, 27, 29		Deposition: (for students that choose hybrid assignment) Students will submit to a deposition for the court which will involve oral questions from both the "crown attorney" and "defence attorney" regarding the information contained in their submitted letter of opinion.
Final Exam	30			Covers material from weeks 1 to 12 with emphasis on material from weeks 6 to 12.

*Students may choose to write a letter of opinion (a list of topics will be provided) worth 30% of their final mark **OR** they may choose a **hybrid assignment** which involves a written letter of opinion (a list of topics will be provided) worth 20% followed by an oral deposition during class time worth 10%. Preferences must be registered by March 15.

Grades will be assigned according to the standards outlined in the U of G Undergraduate Calendar (p37-38).

Important Dates

Midterm: Tuesday February 13

Kinship assignment: March 1

Letter of Opinion (hardcopy + PDF): Tuesday March 20 (all students)

Depositions: March 22 to March 29 – specific time slots to be assigned

Final exam: April 18 (Wed), 8:30 – 10:30 am. Location TBA

Course & University Policies

When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact, and be prepared to provide supporting documentation. See the Undergraduate Calendar for information on regulations and procedures for Academic Consideration

Policy for Re-grading of Midterm Exams and Assignments

Students who wish to have their midterm exam or assignments re-graded must submit their exam or assignment within 1 week of the return of the midterm exam or assignment. The entire midterm exam or assignment will be re-graded so the mark may go up, down or remain unchanged.

Accessibility

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact the [Student Accessibility Services \(SAS\)](#) (formerly the Centre for Students with Disabilities) as soon as possible.

For more information, contact SAS at 519-824-4120 ext. 56208 or email sas@uoguelph.ca.

Academic Misconduct

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

The [Academic Misconduct Policy](#) is detailed in the Undergraduate Calendar.

E-mail Communication

As per university regulations, all students are required to check their <uoguelph.ca> e-mail

account regularly: e-mail is the official route of communication between the University and its students.

Drop Date

The last date to drop one-semester Winter 2018 courses, without academic penalty, is **Friday March 9, 2018**. For [regulations and procedures for Dropping Courses](#), see the Undergraduate Calendar.

Copies of out-of-class assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

Recording of Materials

Presentations which are made in relation to course work—including lectures—cannot be recorded in any electronic media without the permission of the presenter, whether the instructor, a classmate or guest lecturer.

Grading

If you are absent from classes during the semester, you will be expected to make up missed lecture and laboratory material on your own. Assignments handed in late will be penalized 5% for every day that it is late.

General Campus Resources

If you are concerned about any aspect of your academic program:

Make an appointment with a [Program Counsellor](#) in your degree program.

If you are struggling to succeed academically:

There are numerous academic resources offered by the [Learning Commons](#) including, Supported Learning Groups for a variety of courses, workshops related to time management, taking multiple choice exams, and general study skills. You can also set up individualized appointments with a learning specialist.

If you are struggling with personal or health issues:

[Counselling services](#) offers individualized appointments to help students work through personal struggles that may be impacting their academic performance. [Student Health Services](#) is located on campus and is available to provide medical attention. For support related to stress and anxiety, besides Health Services and Counselling Services, [Kathy Somers](#) runs training workshops and one-on-one sessions related to stress management and high performance situations.

If you have a documented disability or think you may have a disability:

Student Accessibility Services (SAS) formerly Centre for Students with Disabilities (CSD) can provide services and support for students with a documented learning or physical disability. They can also provide information about how to be tested for a learning disability. For more information, including how to register with the centre please see visit the [SAS website](#).