



Department of Electrical and Computer Engineering

COURSE OUTLINE

Elec 485: Data Analysis and Pattern Recognition

Term - **SPRING 2015** (201501)

Instructor

Dr. Stephen W. Neville

Phone: n/a

E-mail: sneville@ece.uvic.ca

Office Hours

Days: Wed.

Time: 2:30 – 3:30 (or by appointment)

Location: EOW 307 or ELW A228

Note: All course emails **MUST** have “Elec485:” in the subject line and **MUST** be sent from UVic email accounts. Emails without proper subject lines or sent from off-campus email accounts will likely be dropped by UVic’s email spam filters or be automatically redirected to junk email folders.

Lectures

A-Section(s): A01 / CRN 21115 and A02 / CRN 21116

Days: Tues., Wed., Fri.

Time: 1:30-2:20pm

Location: ECS 130

Full details of all official course locations and times are available from UVic’s Timetable web page (<http://uvic.ca/timetable>). In the case of any discrepancies between the above denoted times and places and the official UVic timetable web page, the official UVic web page is authoritative.

Required Text

Title: Pattern Classification (2nd Edition)

Author: Richard O. Duda, et al

Publisher: Wiley

Year: 2001

Note: All assignments will come from the North American edition of this text and expressly not from the international addition. The end-of-chapter questions are different between the two editions and it is solely the students responsibility to ensure that they are doing the correct questions from the North American edition.

Assessment:

Assignments: 10%

Mid-term 35%

Final 55%

Date: Feb 27th, 2015

Due Dates for Assignments:

All assignments will be due in one week after they are assigned. Any and all late assignments will not be marked and will receive a zero grade.

The final grade obtained from the above marking scheme will be based on the following percentage-to-grade point conversion:

Passing Grades	Grade Point Value	Percentage for Instructor Use Only	
A+	9	90 – 100	
A	8	85 – 89	
A-	7	80 – 84	
B+	6	77 – 79	
B	5	73 – 76	
B-	4	70 – 72	
C+	3	65 – 69	
C	2	60 – 64	
D	1	50 – 59	
Failing Grades	Grade Point Value	Percentage for Instructor Use Only	Description
E	0	0 - 49	Fail, *Conditional supplemental exam. (For undergraduate courses only)
F	0	0 – 49	Fail, no supplemental.
N	0	0 – 49	Did not write examination, Lab or otherwise complete course requirements by the end of term or session; no supplemental exam.

**Assignment of E grade will be at the discretion of the Course Instructor.*

The rules for supplemental examinations are found on page 80 of the current 2014/15 Undergraduate Calendar.

Term in which E Grade Was Obtained	Application Deadline for Supplemental Exam	Supplemental Exam Date
First term of Winter Session (Sept – Dec)	February 28 in the following term	First week of following May
Second term of Winter Session (Jan – Apr)	June 30 in the following term	First week of following September
Summer Session (May – Aug)	October 31 in the following term	First week of following January

Deferred exams will normally be written at the start of the student's next academic term; i.e., approximately 4 months following the deferral of the exam.

Course Description:

1. Course Objectives:

The objectives of this course are to introduce students to modern approaches to statistical pattern recognition, including the application and assessment of common machine learning techniques. The course focuses on providing the students with an appreciation of the underlying probability and

statistical as they apply to these domains and how these can be used to assess the quality and performance of pattern recognition solutions.

The course project will provide the students with a hands-on learning opportunity to perform apply statistical pattern recognition principals to an actual real-world data set(s) they have identified, where a core goal will be to developed the skills required to be able to properly quantify what is and is not knowable from a given statistical data set.

2. Learning Outcomes:

Students successfully completing this course will gain an understanding of:

- Probability, statistics, and random processes as applied to statistical pattern recognition.
- The nature an importance of statistical stationarity and ergodicity assumptions with respects to pattern recognition problems.
- The differences and distinctions between parametric and non-parametric pattern classification techniques.
- Why the underlying statistics and probability issues are important to the proper assessment of the accuracy and correctness of pattern classification approaches.
- The basic characteristics and distinction between several commonly applied machine learning-based pattern recognition approaches.
- If time permits, a understanding as to how problem domains such as cyber-security and privacy introduce changes to the underlying assumptions.

3. Syllabus

The exact pacing of the syllabus materials will vary in accordance with each class, as such the syllabus solely denotes a provisional pacing which may or may not change during the course delivery.

- Course introduction
- Review of Mathematical Foundations
- Brief review of the basics of Matlab.
- Basic examples of Pattern Recognition & Classification Problems
- Bayesian Decision Theory
- Maximum-likelihood & Bayesian Parameter Estimation
- Non-parametric Techniques
- General Machine Learning Issues
- Unsupervised Learning and Clustering
- Application Area: (if time permits)
 - Applying pattern recognition to Cyber-Security and Privacy problems

Note to Students:

Students who have issues with the conduct of the course should discuss them with the instructor first. If these discussions do not resolve the issue, then students should feel free to contact the ECE Chair by email or the ECE

Chair's Secretary eceasst@uvic.ca to set up an appointment.

Accommodation of Religious Observance

See <http://web.uvic.ca/calendar2014/GI/GUPo.html>

Policy on Inclusivity and Diversity

See <http://web.uvic.ca/calendar2014/GI/GUPo.html>

Standards of Professional Behaviour

You are advised to read the Faculty of Engineering document Standards for Professional Behaviour at <http://www.uvic.ca/engineering/assets/docs/professional-behaviour.pdf> which contains important information regarding conduct in courses, labs, and in the general use of facilities.

Cheating, plagiarism and other forms of academic fraud are taken very seriously by both the University and the Department. You should consult

<http://web.uvic.ca/calendar2014/FACS/UnIn/UARe/PoAcl.html> for the UVic policy on academic integrity.

Note: All materials used in the course are copyrighted by the authors of the materials, whether course notes, exams, assignments, textbook material, etc. Any and all posting, via web sites, social media sources, etc., or reproduction of these materials is a copyright violation and as such contravenes the standards of professional behavior and will therefore be subject to appropriate measures.