Instructor:	Alexander Wong	E2 1303D	a28wong@uwaterloo.ca
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Text:	SD372 Course Notes, Available in DC Copy Centre.
Home Page:	http://www.einfodaily.com/piTunez/syde372.html
Class Times:	Tues, Thurs 8:30–9:50, E5 6006
Tutorials:	Monday 2:30–3:20, E5 6006, every week

Course Description: The course emphasizes pattern recognition as a process of data analysis and focuses on topics such as:

- Pattern features as components in a random vector representation.
- Classification techniques: distance measures in feature space, probabilistic (Bayesian) decision theory, linear discriminants.
- Clustering and feature extraction.

Course Objectives: At the end of the course you should be able to:

- Understand the principles of fundamental pattern recognition concepts such as classification, feature extraction and selection, etc.
- Apply learnt algorithms in practical laboratory exercises using Matlab.
- Understand the usefulness of the learnt concepts in applications of pattern recognition such as optical character recognition, speech recognition, industrial robot vision, medical diagnosis, remote sensing and satellite image analysis, fault detection and diagnosis in complex systems such as nuclear reactors.

Course Grading:

1. Recommended homework problems will be handed out from time to time but will not be graded. The course home page lists recommended problems and will also give additional worked solutions.
2. Three short computer labs will be assigned during the term. The emphasis of these labs will be to provide insights into pattern recognition algorithms, complementing the more analytical material discussed in class. The labs will be undertaken in groups of two or three students. 25% of the course grade will be based upon the lab reports.
3. Midterm in mid-February: 25% of the course grade.
4. Final exam: 50% of the course grade.

Course Outline: (See course notes for detailed breakdown)

1. Introduction, Pattern Recognition Problem Definition
2. Overview of Statistics and Random Vectors
3. Parametric and Nonparametric Distance-Based Classification
4. Probabilistic Methods for Classification
5. Parametric and Nonparametric Density Estimation

6. Discriminant Functions
7. Parametric and Nonparametric Clustering
8. Feature Extraction, Feature Selection

Library References: (Optional)

1. On Reserve: Q327.S27 *Pattern Recognition*, R. Schalkoff, Chapters 1–5
2. On Reserve: Q327.D83 *Pattern Classification*, Duda, Hart, & Stork, Chapters 1–6
3. TK7882.P3.N3 *Pattern Rec. Eng.*, M. Nadler & E. Smith, Chapters 1, 2, 6–8

Note on Plagiarism and Cheating: Both plagiarism and cheating during the course will not be tolerated. Students found cheating or plagiarizing will be given a minimum of zero percent (0on student accademic discipline.

Academic Integrity: In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. [Check www.uwaterloo.ca/academicintegrity/ for more information.]

Grievance: A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70, Student Petitions and Grievances, Section 4, www.adm.uwaterloo.ca/infosec/Policies/policy70.htm. When in doubt please be certain to contact the departments administrative assistant who will provide further assistance.

Discipline: A student is expected to know what constitutes academic integrity [check www.uwaterloo.ca/academicintegrity/] to avoid committing an academic offence, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about rules for group work/collaboration should seek guidance from the course instructor, academic advisor, or the undergraduate Associate Dean. For information on categories of offences and types of penalties, students should refer to Policy 71, Student Discipline, www.adm.uwaterloo.ca/infosec/Policies/policy71.htm. For typical penalties check Guidelines for the Assessment of Penalties, www.adm.uwaterloo.ca/infosec/guidelines/penaltyguidelines.htm.

Appeals: A decision made or penalty imposed under Policy 70 (Student Petitions and Grievances) (other than a petition) or Policy 71 (Student Discipline) may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to Policy 72 (Student Appeals) www.adm.uwaterloo.ca/infosec/Policies/policy72.htm.

Note for Students with Disabilities: The Office for Persons with Disabilities (OPD), located in Needles Hall, Room 1132, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with the OPD at the beginning of each academic term.