UNIVERSITY OF MANITOBA

Electrical and Computer Engineering

Course Outline for | **Term** (Fall, Winter, etc.): Winter | **Year**: 2009

Course title: OPTIMIZATION METHODS FOR COMPUTER-AIDED DESIGN

Auxillary title:

Course number: ECE 7670 **Course section:** 1

Course objectives:

To introduce mathematical optimization techniques for the solution of engineering design and inverse problems. Formulation of multi-variable engineering problems as mathematical statements amenable to computer solution. Study of relevant algorithms to solve such problems.

Contact hours:

3 Hours/week | 13 Lectures/week | Slot 5 | Room No. E2-360

Prerequisites:

A firm grasp of mathematical concepts normally covered in an undergraduate electrical engineering curriculum, including: multivariable calculus, linear analysis, algorithm development, and programming.

Course content:

Most of the following topics will be covered:
1. Mathematical concepts of single and multivariable optimization.
2. Formulation of engineering problems as constrained optimization problems.
3. Classical methods of unconstrained optimization.
4. Zero, first and second order direct search techniques and algorithms for unconstrained optimization.
5. Linear programming.
6. Constraints - equality and inequality, optimality criteria.
7. Numerical and classical techniques for constrained optimization.
8. Neural Networks as an optimization problem.
9. Strategies for global optimization.
10. Minimization of functionals.

Evaluation Component:	No.	%	Total
Project(s)	1	20.0	20.0
Seminar(s)	0	0.0	0.0
Assignment(s)	4	10.0	40.0
Other _____	0	0.0	0.0
Midterm Examination	0	0.0	0.0
Final Examination		40.0	40.0
Total			100

Instructor:	**Joe LoVetri**
Room Number:	**E2-290, EITC**
Phone:	**474-9835 or 6295**
Email:	**Joe_LoVetri@UManitoba.ca**

Textbooks:

E.K.P. Chong, S.H. Zak, “An Introduction to Optimization”, 2nd Edition, John Wiley and Sons, Inc., 2001.

Recommended reference books:

1. G.S.G. Beveridge, R.S. Schechter, “Optimization: Theory and Practice,” McGraw-Hill Book Co., 1970.
2. G.V. Reklaitis, A. Ravindran, K.M. Gagsdell, “Engineering Optimization: Methods and Applications,” John Wiley & Sons, 1983.
3. W.H. Press, B.P. Flannery, S.A. Teukolsky, W.T. Vetterling, “Numerical Recipes in C: The Art of Scientific Computing,” Cambridge University Press, 1988.
4. L.E. Scales, “Introduction to Non-Linear Optimization,” Springer-Verlag, 1985.
5. L. Cooper, D. Steinberg, “Introduction to Methods of Optimization,” W.B. Saunders Co., 1970.
6. D.G. Luenberger, “Optimization by Vector Space Methods,” John Wiley & Sons, 1969.

Course webpage: http://www.ee.umanitoba.ca/~lovetri/cECE7670/index.html

N.B. Attendance at lectures, and examinations is essential to successful completion of this course. Students must satisfy each evaluation component in the course. It is the responsibility of each student to contact the instructor if he or she is uncertain about his or her standing in the course and about his or her potential for receiving a failing grade. Students should also familiarize themselves with Section 4 and 6 of the Regulations dealing with incomplete term work, deferred examinations, attendance and withdrawal.

TBA

Academic intregrity

Students are expected to conduct themselves in accordance with the highest ethical standards of the Profession of Engineering and evince academic integrity in all their pursuits and activities at the university. As such, in accordance with the General Academic Regulations and Requirements of the University of Manitoba, Section 7.1, students are reminded that “plagiarism or any other form of cheating in examinations or term tests (e.g. crib notes) is subject to serious academic penalty (e.g. suspension or expulsion from the faculty or university). A student found guilty of contributing to cheating in examinations or term assignments is also subject to serious academic penalty.”