

SYLLABUS FOR MATH 648Q, SPRING 2011

Tuesday, Thursday 12:30 p.m. - 1:45 p.m.

MTH 1313

Instructor: Dr. Wojciech Czaja

Office: MTH 4406

Office Hours: TT 11:00 a.m. - 12:00 p.m.

Phone: (301) 405 - 5106

Prerequisite: MATH 411 or equivalent.

Text: Lee, Verleysen: Nonlinear Dimensionality Reduction

Presentation: At the end of semester, each student shall give an in-class presentation on a paper related to the class topic. List of papers will be given in February. The presentation is worth up to 100 points.

Homework: Homeworks will be assigned on Fridays and are due the next Friday. Each one is worth 10 points, and there will be 10 of such assignments.

Grading: The maximum point total is 200 points and the total used to calculate the final grade is the minimum of the two numbers: 200 points and the largest score in the class. The setting of letter grades will be based on this number of points and will be **no worse than:** 50% - D, 60% - C, 75% - B, 90% - A.

OUTLINE OF MATERIAL

Class about modern mathematical techniques used in processing of large redundant data systems (like hyperspectral satellite imagery, patient databases, text searches etc).

Topics include:

- nonlinear dimension reduction
- manifold learning

- diffusion wavelets
- endmember demixing
- classification schemes
- compressed sensing
- sparse representations
- fusion frames

Applications to:

- biomedical imaging
- remote sensing
- data classification
- target detection
- distributed sensor networks