Carleton University  
Department of Systems and Computer Engineering  
SYSC 5370W: Multiresolution Signal Decomposition: Analysis and Applications  
Winter 2018  
Course Syllabus

Instructor: Prof. Richard M. Dansereau  
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Office Hours: TBA


Prerequisites: A basic course in Digital Signal Processing such as SYSC 4405 or SYSC 5602 is a necessary prerequisite.

Useful Textbook References:

Grading:  
Assignments: 30% (to be done individually)  
Project: 30% (to be done individually)  
Final Examination: 40%

WWW: Announcements, assignments, and additional material will be posted on the website:  
Login: TBA  
Password: TBA

Final Exam Policy: The final exam is for evaluation purposes only and will not be returned to the student.
Academic Integrity: You are expected to conduct yourself with academic integrity, which includes doing your own work and not sharing your work with others. Please refer to the Academic Integrity Policy at http://carleton.ca/registrar/academic-integrity for more information on different types of instructional offence.

Health and Safety: Every student should have a copy of our Health and Safety Manual. An electronic version of the manual can be found at http://www.sce.carleton.ca/courses/health-and-safety.pdf

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Academic Accommodation
You may need special arrangements to meet your academic obligations during the term. For an accommodation request the processes are as follows:

Pregnancy/parental leave obligation: write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details visit the Equity Services website:
http://www.carleton.ca/equity/accommodation/academic/

Religious obligation: write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details visit the Equity Services website
http://www.carleton.ca/equity/accommodation/academic/

Academic Accommodations for Students with Disabilities: The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at 613-520-6608 or pmc@carleton.ca for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send me your Letter of Accommodation at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). Requests made within two weeks will be reviewed on a case-by-case basis. After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made. Please consult the PMC website (http://www.carleton.ca/pmc) for the deadline to request accommodations for the formally-scheduled exam (if applicable):
http://www.carleton.ca/pmc/students/dates-and-deadlines/

Course Content (preliminary):

- Time-frequency distributions, frames, multiresolution approximations, windowed Fourier transform, orthogonal and bio-orthogonal bases
- Multirate signal processing; downsampling and upsampling; general sampling rate conversion; polyphase representation
- Filter banks; perfect reconstruction, two-channel filter banks, mirror filter banks, $M$-band filters, power complementary filters; tree-structured filter banks; pyramid and overcomplete expansions
- Series expansions using wavelets and modulated bases; construction of wavelets, wavelet series and properties
- Algorithms and complexity; complexity of multirate discrete-time processing, filter banks, and wavelet series computation
- (if time permits) Sparse representations, compressive sensing