

## Syllabus - ARCH 541 - Acoustics and the Environment

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Instructor: Nils Peters  
Credits: 3  
Prerequisite: none  
Email: nils.peters@mcgill.ca  
Teaching Hours: Thursdays 10 am - 5 pm  
Office Hours: upon request via email

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### Synopsis

Acoustics in architectural design, and in environmental control of buildings. Acoustical requirements in the design of auditoria such as theatres, lecture halls, opera houses, concert halls, churches, motion picture theatres, studios. Acoustical room design using the EASE simulation software. Principles of noise and vibration control, sound insulating in building construction. Practical noise control in various types of buildings.

# Course Outline

1. Fundamental Acoustic Concepts
  - Frequency and harmonic motions
  - Sound propagation
  - Form of sound representation
  - Impedance, Sound Power, Sound Pressure
2. Human Sound Perception
  - Human hearing mechanism
  - Spatial Hearing
  - Loudness
  - Masking
  - Intelligibility & annoyance
3. Acoustics in rooms (2 lectures)
  - Sound reflections and space-time distribution
  - Reverberation
  - Introduction to various room acoustical terms
  - Room resonances and standing waves
  - Surface materials
  - Case studies
4. Noise isolation (2 lectures)
  - sound transmission
  - Mass law and discontinued construction
  - Sound transmission class
  - Impact isolation class
  - Construction materials and assemblies
  - Vibration control
  - Case studies
5. Computer Lab using EASE (3 lectures)
  - Introduction to EASE
  - Constructing room models
  - Import/export to CAD applications
  - Calculating room acoustic properties
  - Auralization
6. Field Trip to New Music Building, Schulich School of Music

## 7. Guest Lecture

- TBA

## Course Evaluation

The course grading weight is distributed as:

Presentation on a case study related to the outlined topics (20-30 min):	30%
Participation & attendance:	20%
Final Project:	50%

Final project should be an acoustical analysis of the student's design studio project.

## Reading Material

Selected excerpts from the following sources will be assigned and/or suggested readings:

Core Literature:

Apfel, R. E. (1998). *Deaf Architects & Blind Acousticians? - A Guide to the Principles of Sound Design*. Apple Enterprises Press, New Haven, US.

Long, M. (2006). *Architectural acoustics*. Elsevier Academic Press, Boston, US.

please see the "ARCH 541" class bookshelf at google books:

[http://books.google.com/books?uid=750033085967598526&as\\_coll=1005](http://books.google.com/books?uid=750033085967598526&as_coll=1005)

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It should be noted that, in accordance with article 15 of the Charter of Students' Rights, student may submit examination answers in either French or English.