PROFESSORS IN MUSIC/TECHNOLOGY:

MUSIC/CS:
Andrew Schloss (NIME, ICMC)

MUSIC/AUDIO:
Kirk McNally (recording technology) (AES, ASA)

CS/MUSIC:
George Tzanetakis (ISMIR, DAFX, ASA)

ENGINEERING/MUSIC:
Peter Driessen (DSP, DAFX, IEEE)

ANTHROPOLOGY/MUSIC
Alexandrine Boudreault-Fournier: Anthropology of Sound

COMPOSERS in the School of Music:

Daniel Biro
Christopher Butterfield
John Celona

MUSIC TECHNOLOGY COURSES:

207 306 307 320C 401C 406(A,B) 407 507 511

POTENTIALLY RELEVANT MUSIC COURSES:

MUS 101A

Language of Music

Units: 1.5, Hours: 3-0

The rudiments of music, musical notation and an introduction to strict counterpoint.

MUS 101B

Language of Music

Units: 1.5, Hours: 3-0

A continuation of 101A, introducing harmonic concepts and practices.

MUS 105

Introduction to Composition

Units: 2.0, Hours: 2-0

This course is designed to enhance one's understanding of and development in compositional systems, processes and techniques through written exercises and assignments related to 20th century musical idioms.

MUS 115

Listening to Music

Units: 3.0, Hours: 3-0

A course for the non-professional, designed to enhance understanding and appreciation of Western music. Assignments include listening to recordings and attendance at selected University concerts.

MUS 170A

Basic Musicianship IA

Units: 0.5, Hours: 2-1

Beginning sightsinging, dictation and corresponding keyboard skills.

MUS 170B

Basic Musicianship IB

Units

MUS 180

Ensembles (ALSO BEAN – LAPTOP ENSEMBLE!)

Units: 1.0, Hours: 0-4

Large Ensembles including University Orchestra, University Wind Symphony, University Chorus, Chamber Singers, Jazz Orchestra, and Jazz Ensemble.

MUS 181

Chamber Music

Units: 1.0, Hours: 0-3

Ensembles include the standard chamber groups as well as New Music Ensemble (Sonic Lab), Opera Ensemble, Brass Choir, Vocal Jazz Ensemble and Accompanying.

MUS 270A

Basic Musicianship IIA

Units: 0.5, Hours: 2-1

A continuation of 170B.

Notes: - All components must be completed in order to pass the course.

MUS 270B

Basic Musicianship IIB

Units: 0.5, Hours: 2-1

A continuation of 270A.

MUS 201A

Language of Music

Units: 1.5, Hours: 3-0

The structural principles, harmonic and contrapuntal practices of tonal music of the late 18th century explored through analysis and composition.

MUS 201B

Language of Music

Units: 1.5, Hours: 3-0

A continuation of 201A. The structural principles, harmonic and contrapuntal practices of tonal music of the 19th century explored through analysis and composition.

MUS 301A

Language of Music

Units: 1.5, Hours: 3-0

Theory and practice of 20th century music: 1900-1945.

MUS 301B

Language of Music

Units: 1.5, Hours: 3-0

A continuation of 301A. History, theory and practice of 20th century music: 1945-present.

POTENTIALLY RELEVANT MATH COURSES:

MATH 100

Calculus: I

Units: 1.5, Hours: 3-0-1

Review of analytic geometry; functions and graphs; limits; derivatives; techniques and applications of differentiation; antiderivatives; the definite integral and area; logarithmic and exponential functions; trigonometric functions; Newton's, Simpson's and trapezoidal methods.

MATH 101

Calculus: II

Units: 1.5, Hours: 3-0

Volumes; arc length and surface area; techniques of integration with applications; polar coordinates and area; l'Hospital's rule; Taylor's formula; improper integrals; series and tests for convergence; power series and Taylor series; complex numbers.

MATH 211

Matrix Algebra: I

Units: 1.5, Hours: 3-0

Matrices: simultaneous equations; determinants; vectors in 2-, 3- and n-tuple space; inner product; linear independence and rank; change of coordinates; rotation of axes in 2- and 3-dimensional Euclidean space; orthogonal matrices; eigenvalues and eigenvectors.

POTENTIALLY RELEVANT CS COURSES:

CSC 110

Fundamentals of Programming: I

Units: 1.5, Hours: 3-2

Introduction to designing, implementing, and understanding computer programs using an object-oriented programming language. Topics include an introduction to computing and problem solving, selection and iteration, arrays and collections, objects and classes, top-down design and incremental development.

CSC 115

Fundamentals of Programming: II

Units: 1.5, Hours: 3-2

Techniques, methods, and tools for systematic development and maintenance of software systems and documentation; basic algorithms and data structures; and fundamental concepts of object-oriented programming. Topics include control and data abstraction, modularization, abstract data types, layers of abstraction, information hiding, separation of concerns, type checking, program design, separate compilation, software libraries, techniques for the development of high-quality software components, program understanding.

CSC 225

Algorithms and Data Structures: I

Units: 1.5, Hours: 3-1

An introduction to algorithm design and analysis. Random access machine model. Time and space complexity, average and worst case analysis, upper and lower bounds. Application of correctness proof techniques. Algorithms: internal searching, merging, sorting, selection, hashing; graphs: traversals, topological sort, transitive closure, strongly connected components, shortest path, minimum spanning tree. The existence of intractable problems, heuristics. Data structures: B-trees, heaps and graphs.

FEATURED COURSES FOR COMPUTER MUSIC

CSC 475

Music Retrieval Techniques

Units: 1.5, Hours: 3-0

A comprehensive introduction to the emerging research area of Music Information Retrieval (MIR). Topics include techniques from signal processing, machine learning, information retrieval, human-computer interaction, and software engineering are applied in the design and development of MIR algorithms and systems.

ELEC 484

Audio Signal Processing

Units: 1.5, Hours: 3-0

Introduction to digital audio effects and applications. Parametric filters, shelving filters, time-varying filters. Delay structures, delay-based audio effects. Dynamics processing, non-linear processing. Spatial effects, 3D audio, reverberation. Time segment processing, pitch shifting, time stretching. Time-frequency processing, phase vocoder.

DIGITAL SIGNAL PROCESSING (DSP) COURSES

ELEC 260

Signal Analysis

Units: 1.5, Hours: 3-0-1

Continuous time signals and waveform calculations. The Fourier series in the analysis of periodic signals. The impulse and other elementary functions. Resolution of signals into impulse and unit step functions. The Fourier transform in spectral analysis. Functions of a complex variable. Analytic functions. Partial fractions. The Laplace transform in the representation of signals. Interrelation between the Fourier and Laplace transforms.

ELEC 310

Digital Signal Processing: I

Units: 1.5, Hours: 3-0

Generation of discrete-time signals through the sampling process and their spectral representation. Mathematical representation and properties of digital signal processing (DSP) systems. Typical DSP systems, e.g., digital filters, and applications. The z transform and its relation to the Laurent series. Evaluation of the inverse z transform using complex series and contour integrals. Application of the z transform for representation and analysis of DSP systems. The processing of continuous time signals using DSP systems. The discrete-Fourier transform and the use of fast Fourier transforms for its evaluation. Introduction to the design of DSP systems

ELEC 407

Digital Signal Processing: II

Units: 1.5, Hours: 3-0

Characterization of digital signal processing (DSP) systems. Frequency-domain and stability analysis. Design methodology. Structures for recursive and nonrecursive digital filters. VLSI implementation. Solution of the approximation problem for nonrecursive digital filters through the Fourier series. Solution of the approximation problem for recursive digital filters through the transformation of Chebyshev, inverse-Chebyshev, and elliptic analog filter approximations. Design for recursive digital filters satisfying prescribed specifications. Finite word-length effects. Applications.

ELEC 459

Digital Signal Processing: III

Units: 1.5, Hours: 3-1.5

Decimation and interpolation of discrete signals. Least-squares signal modeling. The LMS algorithm and applications in adaptive interference and system identification. Basic multirate DSP systems. Polyphase representation and design of multirate systems. Application of multirate systems in signal compression and noise removal. Representation and digital processing of speech signals. Neural networks and applications.

SOFTWARE DEVELOPMENT COURSES

SENG 265

Software Development Methods

Units: 1.5, Hours: 3-1.5

Systematic methods for designing, coding, testing and documenting medium-sized programs. Tools and techniques to promote programming productivity and software quality. Topics include specifications, code review and inspection techniques, testing and debugging methods and tools, reusable software components and templates, file system navigation, scripting languages, software tools, environments, instrumenting and profiling, and the fundamentals of software configuration management.

SENG 310

Human Computer Interaction

Units: 1.5, Hours: 3-2

Understanding human behaviour as it applies to user interfaces: work activity analysis, observational techniques, questionnaire administration and unobtrusive measures. Operating parameters of the human cognitive system, task analysis and cognitive modelling techniques and their application to designing interfaces. Interface representation and prototyping tools. Cognitive walkthroughs, usability studies and verbal protocol analysis. Case studies of specific user interfaces.

SENG 330

Object-Oriented Software Development

Units: 1.5, Hours: 3-0

Aspects of object-oriented analysis, design and development. Definition and comparison of object-oriented metrics. Overview of classical functional metrics and their effectiveness in measuring productivity for management or design quality of OO-systems. Verification methods for OO-software and how it differs from functional design testing. Maintenance and reuse issues.