

MATH 330 Numerical Analysis (3 sem. hrs.)

Numerical techniques for solving problems in applied mathematics. Error analysis, roots of equations, interpolation, numerical differentiation and integration, ordinary differential equations, matrix methods.
NB: Not offered every year. See Department chair.
 Cross-listed: CMPT 330.
 Prerequisite(s): MATH 223, 250; CMPT 140 or equivalent. (3-0 or 3-0)

MATH 340 Computing with Discrete Structures (3 sem. hrs.)

This course continues CMPT 150 and MATH 150. It also includes models of computation, formal languages and algorithms.
NB: Not offered every year. See Department chair.
 Cross-listed: CMPT 340.
 Prerequisite(s): CMPT 150 or MATH 150. (0-0; 3-0)

MATH 350 Operations Research (3 sem. hrs.)

Linear programming, duality, network analysis, queuing theory, inventory theory, dynamic programming, non-linear programming.
NB: Not offered every year. See Department chair.
 Cross-listed: CMPT 350.
 Prerequisite(s): Knowledge of a programming language, MATH 223, 250. (3-0 or 3-0)

MATH 370 Geometry (3 sem. hrs.)

Finite geometries, transformations, Euclidean geometry, constructions, inverse geometry, projective geometry, non-Euclidean geometry, introduction to topology.
NB: Not offered every year. See Department chair.
 Prerequisite(s): MATH 223, 250. (3-0 or 3-0)

MATH 380 Modern Algebra (3 sem. hrs.)

Linear algebra and matrix theory; abstract algebra including group, field, and ring theory; algebraic systems, polynomial theory; an introduction to number theory.
NB: Not offered every year. See Department chair.
 Prerequisite(s): MATH 150; 250. (0-0; 3-0)

MATH 400 Directed Studies in Mathematics (3 sem. hrs.)

Students are required to produce an outline of the topic to be studied in consultation with the instructor. A course of reading and/or research is pursued according to the approved outline. Assessment may be via examination and/or a final written report.
NB: This course with the appropriate choice of topics can be used as a preparation for the senior thesis (MATH 410).
 Prerequisite(s): Advanced standing in Mathematics or instructor's consent.

MATH 409 Thesis Preparation (1 sem. hr.)

Students are required to choose a topic for their senior thesis (MATH 410) in consultation with an instructor. Selected readings and references pertinent to the topic are assigned. A final written report is presented consisting of a detailed thesis proposal and a review of the literature.
 Prerequisite(s): Advanced standing in Mathematics or instructor's consent.

MATH 410 Senior Thesis (2 sem. hrs.)

Research in a chosen area of mathematics with a final written report.
NB: Normally 2 sem. hrs. are assigned unless arrangements are made with the Department chair.
 Prerequisite(s): MATH 409, a related directed study in preparation, or instructor's consent.

MATH 411 Senior Thesis (3 sem. hrs.)

Research in a chosen area of mathematics with a final written report.
NB: Normally 2 sem. hrs. are assigned unless arrangements have been made with the Department chair.
 Prerequisite(s): MATH 409, a related directed study in preparation, or instructor's consent.

MATH 420 Topics in Applied Mathematics (3 sem. hrs.)

Possible topics could include mathematical models of social and natural phenomena, linear programming, applied mathematics in physics and astronomy, etc.
NB: Not offered every year. See Department chair. Entry restricted to third and fourth year students who meet the prerequisites for the topic to be offered. (3-0 or 3-0)

MATH 430 Numerical Analysis II (3 sem. hrs.)

Numerical solution of systems of equations, eigenvalues, approximation theory, non-linear systems, boundary-value problems, numerical solution of partial differential equations.
NB: Not offered every year. See Department chair.
 Cross-listed: CMPT 430.
 Prerequisite(s): CMPT/MATH 330. (3-0 or 3-0)

MATH 440 The Theory of Numbers (3 sem. hrs.)

A study of the ideas of classical number theory from the early Greek mathematicians through the European contributions of the 17th century to modern times. Topics include divisibility and primes, modular arithmetic, primality tests, primitive roots, quadratic reciprocity, Diophantine equations, continued fractions.
NB: Not offered every year. See Department chair.
 Prerequisite(s): Third year standing and one or more of MATH 340, 370, or 380, or a course in abstract algebra or analysis at the third year level from another university, or instructor's consent. (3-0 or 3-0)

MATH 480 Foundations of Mathematical Sciences (3 sem. hrs.)

A study of basic issues in the history and philosophy of mathematics and physics. Topics include logic, infinity, Godel's theorems, time, space, determinism, the nature of mathematical and scientific truth, the ontological status of theoretical entities, implications of relativity, quantum mechanics, and modern cosmology. Particular attention is paid to philosophical/theological presuppositions, implications, and applications in the mathematical sciences.
NB: This course meets the University's upper level IDIS core requirement. In combination with NATS 490, it meets the Faculty of Natural and Applied Sciences' Interdisciplinary Studies core requirement. Not offered every year. See Department chair.
 Prerequisite(s): Third year standing, including 9 sem. hrs. in Mathematics, Physics, or Philosophy. (3-0 or 3-0)

MUSIC

MUSI 100 Repertory and Studio Class (0 sem. hrs.)

A performance class for students of applied music for the purpose of gaining experience in public performance and increasing knowledge of music literature. Required of all Music majors in each semester of the program; recommended for all other students registered for applied music lessons.
NB: Pass/Fail course.
 Prerequisite(s): None. (0-1; 0-1)

MUSI 110 Fundamentals of Music (3 sem. hrs.)

A course for teachers, youth workers, and recreation workers, as well as students who wish to pursue advanced theory studies but lack the appropriate background. Some topics covered: notation of pitch and rhythm, intervals, scales and modes, concept of key, triads and seventh chords, introductory melody, and accompaniment writing.
 Prerequisite(s): None. (3-0 or 3-0)

MUSI 131, 132 Music History from 1600 to Present (3, 3 sem. hrs.)

A study of music styles, forms, and composers from 1600 to the present day. This encompasses an evaluation of baroque, classical, and romantic music as well as significant trends and developments in the 20th century.
 Prerequisite(s): Satisfactory performance on the music placement test or MUSI 110; MUSI 110 may be taken concurrently. (3-0; 3-0)

MUSI 140 Applied Keyboard Musicianship (1 sem. hr.)

The course is designed to prepare Music majors with keyboard skills generally expected of all musicians. Skills covered include score reading, transposition, simple harmonization, and improvising simple chordal accompaniment.

NB: Opened to declared Music majors only.

Prerequisite(s): None. (0-2 or 0-2)

MUSI 150 Music Appreciation: The Art of Listening (3 sem. hrs.)

An introductory course for which previous musical background is helpful but not required. Lectures and prescribed listening are designed to encourage familiarity with compositions from the concert repertoire representative of significant musical styles and periods.

NB: Not offered every year. See Department chair.

Prerequisite(s): None. (3-0 or 3-0)

MUSI 225, 226 Music Theory (3, 3 sem. hrs.)

An integrated course including a brief review of basic rudiments of music, four-part written harmony, analysis, introduction to form and counterpoint. Harmonic elements include diatonic triads and their inversions, harmonizing of melodies and basses, dominant and diminished seventh chords and secondary seventh chords. Sight singing and musical dictation including melodic, harmonic, and rhythmic materials are included.

Prerequisite(s): Satisfactory performance on the music placement test or MUSI 110. (3-2; 3-2)

MUSI 300 Current Worship Leadership Issues (3 sem. hrs.)

An examination of contemporary trends and leadership issues in worship practice set in the context of the larger cultural shifts of the last 25 years. The course has two main areas of concern: theological and philosophical leadership issues for a biblical worship practice in a postmodern culture, and practical concerns relating to development of a vibrant local church worship ministry.

NB: Offered on alternate years. See coordinator for details.

Cross-listed: WSTU 300.

Prerequisite(s): WSTU 200. (0-0; 3-0)

MUSI 310 Special Topics in Music (3 sem. hrs.)

Topics vary from year to year.

NB: Not offered every year. Course may be repeated.

Prerequisite(s): 6 sem. hrs. of Music or instructor's permission. (3-0 or 3-0)

MUSI 320 Arranging for Worship Teams (2 sem. hrs.)

An introduction to arranging techniques for the most common instruments and voice groupings found in church worship teams. Materials are taken from contemporary songs and more traditional church repertoire. Student arrangements are performed as often as possible.

NB: Offered on alternate years. See coordinator for details.

Prerequisite(s): MUSI 225, 226 or permission of the instructor. (0-0; 2-0)

MUSI 325, 326 Advanced Music Theory (3, 3 sem. hrs.)

Advanced integrated study of music theory, including written harmony, form and analysis, and counterpoint. Harmonic elements include secondary seventh chords, dominant 9th, 11th, and 13th chords, chromatic harmony, modulation, and writing in two, three, and four parts. Further studies in harmonic and melodic dictation and sight-singing.

Prerequisite(s): MUSI 225, 226. (3-2; 3-2)

MUSI 327, 329 Composition (2 or 3 sem. hrs.)

The study of composition with emphasis on the student producing pieces in a variety of genres and styles. The course format involves weekly sessions of a private or semi-private nature, with the instructor guiding the student in his or her work. (The workload expectations vary with the credit assigned, since the course may be taken for 2 or 3 sem. hrs. credit.)

NB: May not be available every semester.

Prerequisite(s): Prior studies in music theory, preferably MUSI 225, 226, and permission of the instructor.

(0-1-0 or 0-1-0)

MUSI 330 Music History to 1600 (3 sem. hrs.)

A study of musical styles, forms, and composers up to 1600. This encompasses an evaluation of ancient, medieval, and Renaissance music.

NB: Not offered every year. See Department chair.

Prerequisite(s): MUSI 131, 132; 225, 226. (3-0 or 3-0)

MUSI 331 Instrumental Literature (2 sem. hrs.)

The course is an introduction to representative instrumental solo, ensemble, and orchestra literature for the students' particular instruments. Through study of primary literature (musical scores), source readings and secondary material the student is acquainted with standard instrumental literature and a variety of musicological and pedagogical perspectives on this body of music.

Prerequisite(s): Admission to the instrumental performance stream or instructor's consent (upper level standing).

(3-0 or 3-0)

MUSI 333 Keyboard Literature (2 sem. hrs.)

A survey of solo music for keyboard instruments from the Renaissance to the present. Works for the harpsichord, clavichord, and piano are reviewed.

NB: Not offered every year. See Department chair.

Prerequisite(s): MUSI 131, 132; 225, 226; and 325, 326 (may be taken concurrently). (2-0 or 2-0)

MUSI 335 Choral Literature (3 sem. hrs.)

The development of sacred and secular choral music from the Middle Ages to the present. Forms and stylistic considerations are examined in representative choral works including the mass, the cantata, the oratorio, and other genres.

NB: Not offered every year. See Department chair.

Prerequisite(s): MUSI 131, 132; 225, 226; and 330 (latter may be taken concurrently). (3-0 or 3-0)

MUSI 336 Vocal Literature (2 sem. hrs.)

A study of forms, idioms, and styles characteristic of solo and chamber song in western art music. Emphasis is on the literature available in Central Europe, the British Isles, and North America from the 16th through the 20th centuries.

NB: Not offered every year. See Department chair.

Prerequisite(s): MUSI 131, 132; 225, 226; 325, 326 (may be taken concurrently). (2-0 or 2-0)

MUSI 339 Vocal Performance Class (1 sem. hr.)

A study of body movement and stage poise for various types of singing. The student learns correct diction in a number of common singing languages and becomes acquainted with repertoire for the voice.

Prerequisite(s): MUSI 131, 132; 225, 226; or permission of instructor. (1-0 or 1-0)

MUSI 340 Introduction to Digital Recording (3 sem. hrs.)

An introduction to various aspects of the recording arts with emphasis on working within the digital (virtual) studio environment. Through lectures, demonstrations, lab assignments, and projects, students gain a basic working understanding of a studio recording facility; various recording techniques; the role of computers in the recording arts; Cubase software as a digital editing platform; how to record digital audio on a computer; MIDI and the use of the sequencing software; and studio hardware such as microphones and mixers.

Cross-listed: COMM 334.

Prerequisite(s): MUSI 226 or instructor's permission.

(1-3 or 1-3)

MUSI 341 Advanced Studio Techniques (3 sem. hrs.)

A continuation of MUSI 340. In Advanced Digital Recording students gain a thorough understanding of: Nuendo recording/post production software; Reason electronic composition software; MIDI arranging for live

musicians; synchronized film composition; and a variety of related topics.

Cross-listed: COMM 434.

Prerequisite(s): MUSI 340 or instructor's permission. (3-0 or 3-0)

MUSI 350 Popular Music in the 20th Century

This course examines the sources and evolution of popular music in the last century, popular music as both an expression of and a creative force in popular culture, popular music as the rhythmic antithesis of repression, popular music as a commodity of mass production and mass culture, and the means by which the development and cultural importance of popular music can be evaluated. Content and method emphasize inquiry arising from America's religious influence on popular culture and the reciprocal influence of popular culture on the Church, to develop a reasoned Christian perspective about popular music.

Prerequisite(s): Upper level standing or instructor's permission. (3-0 or 3-0)

MUSI 370 Junior Recital (1 sem. hr.)

A 30-minute recital given by a student in the third year of the performance option. Recital program must be submitted to the Department coordinator for approval.

Prerequisite(s): Admission to the performance option or by special permission.

MUSI 371, 372, 373, 374 Instrumental Techniques (1 sem. hr. each)

The study of brass (MUSI 371), woodwinds (MUSI 372), elementary school classroom instruments (MUSI 373), percussion (MUSI 374), methods, and materials. Students are given basic instruction on several of the instruments in each section with strong components in performance (at the beginning level) and in instrumental pedagogical techniques for purposes of teaching in public or private schools or in church-related instrumental music programs.

Prerequisite(s): MUSI 225, 226, minimum of four semesters of applied music lessons on major instrument or voice, or instructor's consent. (0-2 or 0-2)

MUSI 401 Worship Design and Leadership I (1 sem. hr.)

A study of the principles and practice of designing effective worship services. This course is the classroom component related to local church practica, MUSI/WSTU 402 and 403.

Cross-listed: WSTU 401.
Prerequisite(s): MUSI 300 and upper level standing, or permission of the instructor. (1-0; 0-0)

MUSI 402 Worship Design and Leadership 2 (1 sem. hr.)

A local church practicum covering the entire semester, with scheduled involvement to be determined early in the semester in cooperation with the ministry leadership of the local church. It is expected that the student is given individual hands-on responsibilities over the semester in areas of strength, as well as opportunities for growth in other areas. The student works under the immediate supervision of a staff or qualified lay leader in the local church and within the general supervision of a TWU instructor.

NB: Pass/Fail course.

Cross-listed: WSTU 402.

Co-requisite: MUSI 401.

Prerequisite(s): WSTU 300 and upper level standing; plus for those involved in leading worship teams in the practicum, MUSI 220 is required; MUSI 405 is recommended. For those involved in leading choir/ensembles in the practicum, MUSI 405 is required. (1-0; 0-0)

MUSI 403 Worship Design and Leadership 3 (1 sem. hr.)

A continuation of the local church practicum of MUSI 402, typically in the same church. The practicum covers the entire semester, with scheduled involvement to be determined early in the semester in cooperation with the ministry leadership of the local church. It is expected that hands-on responsibilities in this semester are increased over those of MUSI 402. The student works under the immediate supervision of a staff

or qualified lay leader in the local church, and within the general supervision of a TWU instructor.

NB: Pass/Fail course.

Cross-listed: WSTU 403.

Prerequisite(s): MUSI 402. (0-0; 1-0)

MUSI 405 Introduction to Conducting (3 sem. hrs.)

An introduction to the principles and techniques of choral and instrumental conducting. The acquisition of fundamental conducting skills, facility in score reading and analysis, and rehearsal techniques are emphasized.

Prerequisite(s): MUSI 131, 132; 325, 326; open to non-Music majors by instructor's consent. (3-0; 0-0)

MUSI 406 Advanced Conducting (3 sem. hrs.)

The study of conducting techniques required for difficult examples using traditional compositional techniques and contemporary compositions, including aleatory music.

Topics include the refinement of patterns and gestures, score preparation, and the psychology of musical organizations. Students from the class may be selected for performances with the campus ensembles.

NB: Not offered every year. See Department chair.

Prerequisite(s): MUSI 405. (0-0; 3-0)

MUSI 407 Choral Arranging (3 sem. hrs.)

An introduction to choral arranging techniques. Materials are taken from classical music, popular melodies, carols, and original melodies. Student arrangements are performed and discussed in class as often as possible.

NB: Not offered every year. See Department chair.

Prerequisite(s): MUSI 325, 326 (may be taken concurrently). (3-0 or 3-0)

MUSI 425 20th Century Music (3 sem. hrs.)

The exploration of 20th century systems of pitch organization and attitudes toward counterpoint, including polytonality, modal systems, neo-classical tonality, and serialism. Significant recent trends are also examined.

NB: Not offered every year. See Department chair.

Prerequisite(s): MUSI 325, 236. (3-0 or 3-0)

MUSI 427, 428, 429 Composition (2 or 3 sem. hrs.)

A continuation of MUSI 329, with emphasis on major works for larger ensembles.

NB: May not be available every semester.

Prerequisite(s): MUSI 329 and permission of the instructor. (0-1-0 or 0-1-0)

MUSI 430 Foundations and Principles of Music Education (3 sem. hrs.)

An introduction to the historical, philosophical, sociological, and psychological foundations of music education. Topics covered include: program development, teaching methods, administration, supervision, and evaluation.

NB: Not offered every year. See Department chair.

Cross-listed: EDUC 430.

Prerequisite(s): MUSI 131, 132; 225, 226; and third or fourth year standing. (3-0 or 3-0)

MUSI 432 Songs of Faith (1 sem. hr.)

An examination of meanings and purposes of sacred/church song in the context of the believing community, from Old Testament psalm to early church hymn, chant to Reformation hymn, revival hymn and gospel song to contemporary worship chorus. The course is concerned with seeing the varied musical and textual expression of God's people throughout their history, understanding these expressions within the worship culture of their time, and appreciating the breadth of repertoire of the church's songs.

NB: Offered on alternate years. See coordinator for details.

Cross-listed: WSTU 400.

Prerequisite(s): WSTU 200 and upper level standing, or permission of the instructor. (0-0; 1-0)

MUSI 435 Concepts of Music Therapy in Special Education (3 sem. hr.)

An examination of the underlying philosophical, methodological, and technical aspects of music therapy in special education; identification of aetiological and symptomological factors in various categories of exceptionalities; study of the physical, developmental, psychological, behavioural and social characteristics of the exceptional child; explanation of the ways in which music can be used to help meet the needs of the mainstreamed exceptional child in the regular music classroom.

NB: Not offered every year. See Department chair.

Prerequisite(s): MUSI 325, 326; EDUC 302, 310 (or concurrent enrolment); PSYCH 105, 106; 214; and at least third year standing or instructor's consent. (3-0 or 3-0)

MUSI 450 Keyboard Pedagogy (1 sem. hr.)

The study of methods and materials are combined with the consideration of the interaction of teacher and pupil in private teaching. Students in the course give basic instruction in piano under the supervision of the instructor.

NB: Not offered every year. See Department chair.

Prerequisite(s): Third or fourth year standing in performance option or permission of the instructor. (1-1 or 1-1)

MUSI 460 Vocal Pedagogy (1 sem. hr.)

The study of methods and materials are combined with the consideration of the interaction of teacher and pupil in private teaching. Students in the course give basic instruction in voice under the supervision of the instructor.

NB: Not offered every year. See Department chair.

Prerequisite(s): Third or fourth year standing in performance option or permission of the instructor. (1-1 or 1-1)

MUSI 470 Senior Recital (1 sem. hr.)

A one-hour recital, demonstrating ability in a wide range of musical styles, given by a student in the fourth year of the performance option. Recital program must be submitted to the Department coordinator for approval.

Prerequisite(s): MUSI 370 and normally two semesters of private study subsequent to the junior recital.

APPLIED MUSIC**A. PRIVATE LESSONS****MUSI 091, 092, 093, 094, 095, 096, 097, 098:**

For students with little or no previous instruction in applied music.

MUSI 191, 192, 193, 194, 195, 196, 197, 198:

For first year Music majors or others with substantial previous instruction.

MUSI 291, 292, 293, 294, 295, 296, 297, 298:

For second year Music majors or others with prerequisite. Prerequisite(s): Two semesters of lessons at the 100 level.

MUSI 391, 392, 393, 394, 395, 396, 397, 398:

For third year Music majors or others with prerequisite. Prerequisite(s): Two semesters of lessons at the 200 level.

MUSI 491, 492, 493, 494, 495, 496, 497, 498:

For fourth year Music majors or others with prerequisite. Prerequisite(s): Two semesters of lessons at the 300 level.

Numbers ending with 1 and 2 indicate private voice lessons during first and second semesters respectively.

Numbers ending with 3 and 4 indicate private keyboard lessons (piano or organ) during first and second semesters respectively.

Numbers ending with 5 and 6 indicate private winds or percussion lessons during first and second semesters respectively.

Numbers ending with 7 and 8 indicate private string (including guitar) lessons during first and second semesters respectively.

There are 12 weekly lessons in each semester, Section A denoting half-hour lessons for 1 sem. hr. of credit, Section B denoting one-hour lessons for 2 sem. hrs. of credit.

B. PERFORMING ENSEMBLES

Unless otherwise stated, membership is by audition and director's consent. Ensembles rehearse for three to four hours each week of the semester for 1 sem. hr. of credit.

CHAMBER CHOIRS

MUSI 153, 154; 253, 254; 353, 354; 453, 454.

CONCERT CHOIR

MUSI 181, 182; 281, 282; 381, 382; 481, 482.

WOMEN'S CHORUS

MUSI 163, 164; 263, 264; 363, 364; 463, 464.

VOCAL ENSEMBLES

MUSI 161, 162; 261, 262; 361, 362; 461, 462.

ORCHESTRA

MUSI 145, 146; 245, 246; 345, 346; 445, 446.

CONCERT BAND

MUSI 147, 148; 247, 248; 347, 348; 447, 448.

INSTRUMENTAL ENSEMBLES

MUSI 165, 166; 265, 266; 365, 366; 465, 466.

NATURAL AND APPLIED SCIENCES**NATS 487 Developing a Christian Worldview in the Natural and Applied Sciences (2 sem. hrs.)**

With NATS 490 (1 sem. hr.), this course meets the University's 400 level Interdisciplinary Studies core requirement. The topics deal with the integration of Christianity with the various disciplines taught within the Faculty of Natural and Applied Sciences. Christian beliefs found in Scripture are applied to an understanding and evaluation of modern science and technology. Students research materials and present an outline for a major paper which is completed and presented in NATS 490.

NB: The course is intended primarily for students pursuing a B.Sc. but is open to all.

Prerequisite(s): Completion of at least 70 sem. hrs. of study by end of preceding semester. (2-0; 0-0)

NATS 490 Seminar: Christianity and the Natural Sciences (1 sem. hr.)

Presentation and discussion of special topics concerned with the relationship between science and the Christian faith. Cross-listed: RELS 490.

Prerequisite(s): NATS 487; CMPT 480; or MATH 480. (0-0; 0-1)

NURSING**NURS 111 Health and Lifestyles (3 sem. hrs.)**

This course is intended to facilitate the assessment and development of healthful personal lifestyle behaviours, acknowledging the importance of nurses to be healthy role models. Definitions and determinants of health are examined in the contexts of life cycle stages, cultural diversity, and selected environmental and social considerations. Healthy behaviour development is promoted for biological, psychosocial, and spiritual well being, emphasizing health promotion for the whole person. Prerequisite(s): Admission to the Nursing program. (3-3; 0-0)