

introduction to the grammar and syntax of German for the purpose of translating written German into English. May count toward a general elective only.

## Major in Mathematical Studies—30

MATH141, 142, 215, 240 and at least 15 credits in additional courses chosen in consultation with a Mathematics Department advisor from STAT340, CPTR125, MATH271, 286, 315, 355, 389, 405, 408, 426, 431, 432, 441, 442, 475, 487, 495, CPTR436. This major is available only as a second major, to those taking a major in another field.

## Minor in Mathematics—20

MATH141, 142, 215 and at least 9 credits in additional courses chosen in consultation with a departmental advisor from MATH240, 286, 315, 355, 389, 405, 408, 426, 431, 432, 441, 442, 475, 487, 495; STAT340, CPTR436.

## BS: Mathematics Education—30

MATH141, 142, 215, 240, 355, 475; STAT285, 340 and one additional course chosen in consultation with a Mathematics Department advisor from MATH286, 426. This major is available only to those who are obtaining elementary or secondary teacher certification. Cognate Course: CPTR125.

## Minor in Mathematics Education—20

(pending Michigan Department of Education approval)  
MATH145, 167, 182, 215, 220, 355, STAT285. This minor is available only to those obtaining elementary teacher certification. The regular minor listed above will also suffice for elementary certification.

### SPECIAL REQUIREMENTS AND PLACEMENT TEST

**Sequential Course Numbering.** All courses with more than one course number must be taken sequentially.

**Non-overlapping Credit Restrictions.** Because there is substantial overlap in material covered in the following groups of courses, no student is granted credit (other than general elective credit) in more than one course from each group:

1. MATH141, 182 (Calculus I, Calculus with Applications)
2. MATH145, 166, 168 (Reasoning with Functions, Precalculus Algebra, Precalculus)

**Minimum grade for prerequisites, except for MATH141, is C-.**

**Mathematics Placement Examination (MPE).** See pp. 35–36 for information on the MPE and the General Education Mathematics requirement.

Program (Math Endorsement Program) for Middle School Educators. Courses for this Program are listed under “Mathematics Education.” Inquiries about this program should be directed to Larry Burton (269) 471-3465, burton@andrews.edu; Lynelle Weldon (269) 471-3866, weldon@andrews.edu; or Judy Wheeler (269) 471-7725 ext. 302, jwheele@remc11.k12.mi.us.

## Courses

(Credits)

See inside front cover for symbol code.

ME).

## Graduate Programs

The Mathematics Department collaborates in the Master of Science: Mathematics and Physical Science. See the Interdisciplinary Studies section, p. 140.

**Mathematics Endorsement Program** for Middle School Educators. The Mathematics Department collaborates with the School of Education and the Berrien County Intermediate School District to administer the Alternative Certification Experimental

<b>MATH165</b>	<b>V (3)</b>	<b>MATH315</b>	<b>Alt (3)</b>
AU/HSI course. A study of linear equations and inequalities; algebraic, logarithmic, and exponential functions; polynomials and complex numbers. Includes applications in business and science. Fulfills the General Education Mathematics reasoning requirement. Prerequisite: MPE $\geq$ P2.		Vector spaces, linear transformations, bilinear and quadratic forms. Prerequisites: MATH215 and 355.	
<b>MATH166</b>	<b>(3)</b>	<b>MATH355</b>	<b>(3)</b>
Equations and inequalities; algebraic, logarithmic, exponential, polynomial and rational functions, complex numbers; and selected topics. Fulfills the General Education Mathematics reasoning requirement. Prerequisite: MPE $\geq$ P2.		Selected topics in discrete mathematics, including logic, set theory, relations, functions, algebraic structures and graph theory. Prerequisites: MATH141 or 182.	
<b>MATH167</b>	<b>Alt (2)</b>	<b>MATH389</b>	<b>(0.5)</b>
Trigonometric functions and identities, vectors, and selected topics. Fulfills the General Education Mathematics reasoning requirement. Prerequisite: MPE $\geq$ P3 or MATH166 or MATH145.		Participation in at least 10 mathematics colloquia or approved colloquia of other departments. Grade is based on attendance and notes taken at the colloquium. Repeatable to 2 credits. S/U.	
<b>MATH168</b>	<b>(4)</b>	<b>MATH405</b>	<b>◆ Alt (3)</b>
Covers most of the content of MATH166 and MATH167. A study of equations and inequalities; algebraic, logarithmic, exponential, polynomial and rational functions; trigonometric functions and identities, vectors. Fulfills the General Education Mathematics reasoning requirement. Prerequisite: MPE $\geq$ P2.		Solutions of first and second order partial differential equations, and applications. Prerequisites: MATH240, 286.	
<b>MATH168</b>	<b>V (4)</b>	<b>MATH408</b>	<b>◆ Alt (3)</b>
AU-HSI course—see content above. Fulfills the General Education Mathematics reasoning requirement. Prerequisite: MPE $\geq$ P2.		Elementary complex analysis, contour integrals, complex series. Prerequisites: MATH240 and 355.	
<b>MATH182</b>	<b>Alt (3)</b>	<b>MATH426</b>	<b>◆ Alt (3)</b>
Introduction to calculus of functions of one variable, including finding maxima and minima; partial derivatives; applications to problems in business and the social sciences. Fulfills the General Education Mathematics reasoning requirement. Prerequisite: MPE $\geq$ P4 or MATH166, 167 or 168 preferred; MATH145 is acceptable.		Theory and application of linear and nonlinear mathematical models of biological processes. Topics selected from discrete- and continuous-time deterministic and stochastic modeling, analytic solution techniques, linearization, bifurcations, chaos, computer simulation, model parameterization, and model validation. Prerequisite: MATH141.	
<b>MATH215</b>	<b>(3)</b>	<b>MATH431, 432</b>	<b>◆ Alt (3, 3)</b>
Vectors, matrices, determinants, and eigenvalues, with emphasis on applications and computation. Prerequisite: MATH182 or 141.		Theorems on continuity, differentiation, integration, and convergence; additional selected topics such as topology, differentiable manifolds, and real analysis. Prerequisites: MATH240 and 355.	
<b>MATH220</b>	<b>Alt (3)</b>	<b>MATH441</b>	<b>◆ Alt (3)</b>
Euclidean geometry and number systems for elementary and middle school teachers. Topics include proofs, algorithms, and historical development. Prerequisite: MATH145.		Study of groups, rings, fields, modules, vector spaces, and algebras. Prerequisites: MATH240 and 355.	
<b>MATH240</b>	<b>(4)</b>	<b>MATH442</b>	<b>◆ Alt (3)</b>
Curves and surfaces, partial derivatives, multivariable calculus; multiple integrals, line and surface integrals; Stokes', Green's and divergence theorems. Prerequisite: MATH142.		Continuation of MATH441. Prerequisite: MATH441.	
<b>MATH286</b>	<b>(3)</b>	<b>MATH475</b>	<b>◆ Alt (3)</b>
Elementary differential equations, first order equations, higher order linear equations, systems. Prerequisite: MATH142.		Axiomatic development of Euclidean, non-Euclidean, affine, and projective spaces. Relation of these topics to secondary teaching. Prerequisite: MATH355.	
		<b>MATH487</b>	<b>Alt (1–3)</b>
		Consult the instructor in regard to the topic to be covered. Prerequisite: Consent of teacher. Repeatable in different areas.	



**MAED610**

(4)

Investigation of concepts and practices of mathematical modeling with an emphasis on application to middle grades education. The pedagogy of the course models that of effective middle school mathematics teachers.

**MAED625**

(2)

Participants investigate topics in mathematics, including probability, programming, fractals, and chaos theory. Emphasis is placed on participant understanding of these topics and their appropriate use as investigations with middle grades students. The pedagogy of the course models that of effective middle school mathematics teachers.

**MAED 630**

(1-4)

Seminar in specific topics relevant to mathematics education. Each seminar examines one topic in detail. Repeatable with different topics. May be graded S/U.

# MUSIC

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pcooper@andrews.edu

**Faculty**

Peter J. Cooper,  
Lilianne Doukhan  
Carlos A. Flores  
Claudio Gonzalez  
Julia S. Lindsay  
Kenneth D. Logan  
Alan F. Mitchell  
Carla L. Trynchuk  
Stephen P. Zork

**Academic Programs****Credits**

BA: Music	min. 41
With BBA	min. 110
With Minor in one of the following:	min. 62
Business	
Economics	
Marketing	
BMus (Bachelor of Music)	49
Music Education	min. 26-34
Music Performance	min. 37
Minor in Music	min. 24

Faculty of the Department of Music are committed to providing a vibrant musical and learning environment to nurture artistic and creative growth in all students of music, to encourage and guide students through dynamic interaction in classroom and practical experiences as they mature into tomorrow's music professionals, and to mentor students in responsible use of their talents for service to Christ and to humanity.

Bachelor of Music curricula provide a comprehensive exposure to and experience with the performance, history, and theory of music. Students receive hands-on supervised teaching experience in studio or classroom teaching. Bachelor of Arts curricula are for students wishing to pursue concerted study in music within a liberal arts context.

Non-music majors may take courses in music or participate in music lessons or ensembles for credit or non-credit. See General Education section and course descriptions below for further clarification.

The Andrews University Department of Music has been a member of the National Association of Schools of Music since 1964. Music majors may choose to join the student chapter of Music Educators National Conference.