AIMS OF THE PROGRAM

First, we aim to give each student an understanding of basic mathematics and its application to solving problems expressible by algebraic equations and inequalities. Second, we aim to train students to understand the fundamental concepts of mathematics so that they can teach the subject on the elementary or secondary level. Third, we aim to give a solid foundation in the area of mathematics which will prepare students to pursue further studies in mathematics, the physical sciences, economics, and the engineering sciences.

PROGRAMS

B.A. Mathematics - 33 hours (21 u.d.)
B.S. Mathematics - 36 hours (24 u.d.)
B.S. Mathematical Physics - 52 hours (30 u.d.)
Minor in Mathematics - 18 hours (6 u.d.)
B.S. Mathematics - Secondary Certification - 36 hours (21 u.d.)
Minor in Mathematics - Secondary Certification - 26 hours (12 u.d.)

Mathematics, B.A.

MATH 181 Calculus I ......................................................... 4
MATH 282 Calculus II ....................................................... 4
MATH 283 Calculus III ....................................................... 4
MATH 321 Differential Equations .................................... 3
MATH 341 Geometry ....................................................... 3
MATH 361 Introduction to Linear Algebra .................. 3
MATH 431 Modern Algebra ............................................. 3
MATH 471 Advanced Calculus ....................................... 3
MATH Electives (upper division) .................................. 6
TOTAL (21 upper division) ............................................. 33

Required cognates: MATH 201

Mathematics, B.S.

MATH 181 Calculus I ......................................................... 4
MATH 282 Calculus II ....................................................... 4
MATH 283 Calculus III ....................................................... 4
MATH 321 Differential Equations .................................... 3
MATH 341 Geometry ....................................................... 3
MATH 361 Introduction to Linear Algebra .................. 3
MATH 431 Modern Algebra ............................................. 3
MATH 471 Advanced Calculus ....................................... 3
MATH Electives (upper division) .................................. 6
TOTAL (24 upper division) ............................................. 36

Required cognate: MATH 201; CSIS 110 or equivalent.

Mathematics Minor - Secondary Teaching Area

MATH 181 Calculus I ......................................................... 4
MATH 282 Calculus II ....................................................... 4
MATH 283 Calculus III ....................................................... 4
MATH Electives (upper division) .................................. 6
TOTAL (6 upper division) .................................................. 18

Required cognates: MATH 201

Mathematical Physics, B.S.

MATH 181 Calculus I ......................................................... 4
MATH 282 Calculus II ....................................................... 4
MATH 283 Calculus III ....................................................... 4
MATH 321 Differential Equations .................................... 3
MATH 361 Introduction to Linear Algebra .................. 3
MATH 381 Complex Variables .................................... 3
MATH 411 Numerical Analysis .................................... 3
MATH 431 Modern Algebra ............................................. 3
MATH 471 Advanced Calculus ....................................... 3
MATH 455 Probability Theory ......................................... 3
PHYS 121 General Physics I ........................................ 4
PHYS 122 General Physics II ....................................... 4
PHYS 221 General Physics with Calculus I ............... 1
PHYS 222 General Physics with Calculus II ............ 1
PHYS 311 Modern Physics ............................................. 3
PHYS 322 Classical Mechanics .................................... 3
PHYS 351 Electromagnetic Fields .................................. 3
PHYS 411 Quantum Mechanics .................................. 3
TOTAL (30 upper division) ............................................. 52

Required cognates: MATH 201 or CHEM 201; CHEM 111, 112; and CSIS 110; or equivalent.

The B.S. in Mathematical Physics is a composite major, therefore no minor is required.

TEACHING CERTIFICATION PROGRAM

The following mathematics major and minor are for teaching certification only. Requirements for certification are listed in the Education section of this bulletin.

You must make formal application for admittance to the Teacher Education Program. Applications are available at the Education Department office.

Mathematics, B.S. - Secondary Teaching Area

MATH 181 Calculus I ......................................................... 4
MATH 241 Intro to Probability & Statistics .................... 3
MATH 282 Calculus II ....................................................... 4
MATH 283 Calculus III ....................................................... 4
MATH 321 Differential Equations .................................... 3
MATH 341 Geometry ....................................................... 3
MATH 361 Introduction to Linear Algebra .................. 3
MATH 431 Modern Algebra ............................................. 3
MATH Electives (upper division) .................................. 2
TOTAL (21 upper division) ............................................. 36

Required cognates: MATH 201

Mathematics Minor - Secondary Teaching Area

Option II

MATH 121 Precalculus ..................................................... 3
MATH 181 Calculus I ......................................................... 4
MATH 241 Intro to Probability & Statistics .................... 3
MATH 282 Calculus II ....................................................... 4
MATH 341 Geometry ....................................................... 3
MATH 361 Introduction to Linear Algebra .................. 3
MATH Electives (upper division) .................................. 6
TOTAL (12 upper division) ............................................. 26
MATHEMATICS ADVISING PROFILE (M.A.P.)

The Mathematics Advising Profile (M.A.P.) is an advising tool administered on-line and used by the department as part of an overall evaluation to guide a student into the most appropriate mathematics course, or scored above 500 on the SAT Math or 21 on the ACT Math section. Any student who has not either completed a university level mathematics course will need to sit for the M.A.P. prior to completing their first registration at Southwestern Adventist University.

<table>
<thead>
<tr>
<th>Score</th>
<th>Course Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-11</td>
<td>MATH 011 (Required)</td>
</tr>
<tr>
<td>12-14</td>
<td>MATH 011</td>
</tr>
<tr>
<td>15-24</td>
<td>MATH 012</td>
</tr>
<tr>
<td>25-30</td>
<td>MATH 012 or 101</td>
</tr>
<tr>
<td>31-40</td>
<td>MATH 101 or 110</td>
</tr>
<tr>
<td>41-53</td>
<td>MATH 101, 110, or 241</td>
</tr>
<tr>
<td>54-60</td>
<td>MATH 101, 110, 121, or 241*</td>
</tr>
</tbody>
</table>

*Mathematics scores above 500, on the SAT, or 21 on the ACT, will also allow registration in these classes.

MATHEMATICS FOUNDATION COURSES

It is recognized that attempting a mathematics course for which a student is not prepared can be challenging and frustrating. In order that the mathematics experience be as smooth and gentle as possible, the department offers two review courses, MATH 011 and MATH 012 to provide a foundation for college-level mathematics courses. These are available for any student who needs to take advantage of the additional time and exposure and build a solid basis in algebra. Students whose previous mathematics courses or M.A.P. recommends they register for MATH 101, MATH 110 or a higher-level mathematics course are not permitted to register for either MATH 011 or MATH 012 except by the permission of the department.

MATHEMATICS PROGRESSION

It is important that the general education mathematics requirement be completed early in a student's university experience. All students need to plan their schedules to complete the mathematics general education requirement by the end of their sophomore year. Students whose academic plan indicate they are to take the review mathematics courses need to register for these starting with their first semester at Southwestern Adventist University and continue until their mathematics general education requirement has been met. No student is permitted to register for any courses at Southwestern Adventist University after completing 56 semester hours if his or her general education mathematics requirement has not been satisfactorily met. Students who have taken a mathematics course twice without passing (F or W) may not re-enroll for that course without first passing the prerequisite course.

COURSES

MATH 011 Introduction to Algebra 3 hours

The course begins the review of the arithmetic and algebra of the real numbers. Topics include problem solving, sets, arithmetic operations on integers, rational numbers, and real numbers, variable expressions, rectangular coordinate system and graphs, relations and functions, properties of functions, solution techniques and applications of first-degree equations, absolute value, linear functions, introduction to linear regression, systems of linear equations, applications and solution methods for simultaneous linear equations.

This course is available only for those students who have a need to review elementary algebra. It schedules extra help and instruction and progresses through the material in a paced manner. Students whose M.A.P. recommends that they register for Intermediate Algebra, MATH 012, or a higher level mathematics course are not allowed to register for MATH 011 except by permission of the department. The course meets five days a week. A student may withdraw from this course only in the event he or she withdraws from all courses. This course does not apply toward general education or graduation requirements. (Fall, Spring)

MATH 012 Intermediate Algebra 3 hours

Prerequisite: MATH011 with a grade of at least a C, or high school Algebra I with a grade of at least a C and acceptable M.A.P. recommendation, or permission of the department.

A continuation of the review of algebra begun in MATH011. Topics include rational expressions and rational equations, proportions, radical expressions and rational exponents, the pythagorean theorem, operations on radical expressions, radical functions, introduction to complex numbers, quadratic equations, solution methods for quadratic equations, and properties of quadratic functions.

This review course is available only for those students who have a need to prepare for a further mathematics course. It schedules extra help and instruction and progresses through the material in a paced manner. Students whose M.A.P. recommends that they register for College Algebra, MATH110, or a higher level mathematics course are not allowed to register for MATH012 except by permission of the department. This course meets five days a week. A student may withdraw from this course only in the event he or she withdraws from all courses. This course does not apply toward general education or graduation requirements. (Fall, Spring)

MATH 101 Mathematics for Liberal Arts 3 hours

Prerequisite: MATH012 with a grade of at least a C, or high school Algebra II with a grade of at least a C and acceptable M.A.P. recommendation, or permission of the department.

Introduction to sets, Venn diagrams, truth tables, applications of Venn diagrams to logic, logical arguments, probability, sample spaces, permutations, combinations, statistics, averages, normal distributions, the metric system, measurement, consumer interest, and loans. (Fall)

MATH 110 College Algebra 3 hours

Prerequisite: MATH012 with a grade of at least a C, or high school Algebra II with a grade of at least a C and acceptable M.A.P. recommendation, or permission of the department.

College Algebra is a study of equations, inequalities, certain classes of functions (polynomial, rational, exponential, and logarithmic), and their graphs and systems of equations. (Fall)
## Mathematics

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 121</td>
<td>Precalculus</td>
<td>3 hours</td>
<td>High school algebra II with a grade of at least a B and acceptable M.A.P. recommendation, or MATH 110, or permission of the department.</td>
</tr>
<tr>
<td>MATH 181</td>
<td>Calculus I</td>
<td>4 hours</td>
<td>MATH 121, or a high school precalculus course and permission of the instructor.</td>
</tr>
<tr>
<td>MATH 201</td>
<td>Research Methods in Mathematics</td>
<td>1 hour</td>
<td>ENGL 121, MATH 181</td>
</tr>
<tr>
<td>MATH 241</td>
<td>Intro. to Probability &amp; Statistics</td>
<td>3 hours</td>
<td>High school Algebra II with a grade of at least a B and acceptable M.A.P. recommendation, or MATH 110, or permission of the department.</td>
</tr>
<tr>
<td>MATH 280</td>
<td>Calculus II</td>
<td>4 hours</td>
<td>MATH 181</td>
</tr>
<tr>
<td>MATH 283</td>
<td>Calculus III</td>
<td>4 hours</td>
<td>MATH 282</td>
</tr>
<tr>
<td>MATH 291</td>
<td>Selected Topics</td>
<td>1 hour</td>
<td>Approval by department chair</td>
</tr>
<tr>
<td>MATH 321</td>
<td>Differential Equations</td>
<td>3 hours</td>
<td>MATH 283</td>
</tr>
<tr>
<td>MATH 341</td>
<td>Geometry</td>
<td>3 hours</td>
<td>MATH 282</td>
</tr>
<tr>
<td>MATH 361</td>
<td>Introduction to Linear Algebra</td>
<td>3 hours</td>
<td>MATH 283, MATH 282 and permission of the instructor.</td>
</tr>
<tr>
<td>MATH 381</td>
<td>Complex Variables</td>
<td>3 hours</td>
<td>MATH 283</td>
</tr>
<tr>
<td>MATH 411</td>
<td>Numerical Analysis with Application</td>
<td>3 hours</td>
<td>MATH 283 and knowledge of a computer programming language</td>
</tr>
<tr>
<td>MATH 431</td>
<td>Modern Algebra</td>
<td>3 hours</td>
<td>MATH 361</td>
</tr>
<tr>
<td>MATH 455</td>
<td>Probability Theory</td>
<td>3 hours</td>
<td>MATH 282</td>
</tr>
<tr>
<td>MATH 461</td>
<td>Number Theory</td>
<td>3 hours</td>
<td>MATH 282</td>
</tr>
<tr>
<td>MATH 471</td>
<td>Advanced Calculus</td>
<td>3 hours</td>
<td>MATH 283</td>
</tr>
<tr>
<td>MATH 491</td>
<td>Selected Topics</td>
<td>1-3 hours</td>
<td>Approval by department chair</td>
</tr>
</tbody>
</table>

- **MATH 121 Precalculus**: A study of algebraic and transcendental functions of one variable, limits, continuity, differentiation, integration, and applications of integrals. (Spring)
- **MATH 181 Calculus I**: A study of the calculus of transcendental functions, techniques of integration, and infinite series. (Fall)
- **MATH 201 Research Methods in Mathematics**: An introduction to the library research skills used in mathematics. (Fall, Spring)
- **MATH 241 Intro. to Probability & Statistics**: An introduction to the statistical processes of sampling, descriptive statistics, presentation of data, and inferential statistics. Included are elements of probability, discrete and continuous random variables, and the probability basis for hypothesis testing. Specific statistical techniques and concepts include use of the normal distribution, the t-distribution, Chi-squared distribution, analysis of variance, correlation, and linear regression. (Fall, Spring)
- **MATH 282 Calculus II**: A study of vectors in two and three dimensions, motion in space, polar, cylindrical and spherical coordinate systems, functions of several variables, partial derivatives, multiple integrals, and differentiation and integration in vector fields. (Spring)
- **MATH 291 Selected Topics**: Designed for the student who wishes to do independent study or research. Content and method of study must be arranged prior to registration. May be repeated for a total of 2 credits.
- **MATH 321 Differential Equations**: This is a study of ordinary differential equations with emphasis on the analytic methods for solving them. (Offered periodically)
- **MATH 341 Geometry**: This course is a study of Euclidean and non-Euclidean geometry. This course meets the upper division writing component for senior year English. (Offered periodically)
- **MATH 361 Introduction to Linear Algebra**: This course is a study of analytic functions, power series, calculus of residues, and conformal mappings. (Offered periodically)
- **MATH 381 Complex Variables**: This course is a study of analytic functions, power series, calculus of residues, and conformal mappings. (Offered periodically)
- **MATH 411 Numerical Analysis with Application**: This is a course in numerical methods for solving mathematical problems. The writing of computer programs for solving problems is a part of the course. (Offered periodically)
- **MATH 431 Modern Algebra**: A study of the abstract systems: groups, rings, fields, and integral domains. (Offered periodically)
- **MATH 455 Probability Theory**: A study of the basic ideas of probability theory, discrete and continuous random variables, and their distributions. (Offered periodically)
- **MATH 461 Number Theory**: A study of topics including Diophantine equations, congruences, prime numbers, and applications. This course meets the upper division writing component for senior year English. (Offered periodically)
- **MATH 471 Advanced Calculus**: This is a study of functions of one real variable, and the conditions for differentiability and for integrability of these functions. Emphasis is placed on proving theorems. (Offered periodically)
- **MATH 491 Selected Topics**: Designed for the student who wishes to do independent study or research. Content and method of study must be arranged prior to registration. May be repeated for a total of 3 credits.