MATHEMATICS TRANSFER PATHWAY (AA) - 60 CREDITS

OVERVIEW

WHY CHOOSE MATHEMATICS?

Mathematics is an essential tool for understanding other disciplines and the world around us. This program will help students develop logical reasoning and problem solving skills forming a basis for success in their careers and future studies.

SKILLS ACQUIRED

(iSeek.org)

Here is a list of skills you will gain when you study mathematics:

- Algebra
- Calculus
- Functional analysis
- Number theory

CAREERS IN MATHEMATICS

Projected Job Growth

Here is the projected job growth in the state of Minnesota for a variety of professions that use skills from mathematics (according to iSeek.org):

- Employment of actuaries is projected to grow 30.8% through 2020, much faster than the average occupation
- Employment of mathematicians is projected to grow 16.1% through 2020
- Employment of operations research analysts is projected to grow 10.8% through 2020
- Employment of statisticians is projected to grow 20% through 2020.

Types of Jobs

(iSeek.org)

Individuals who study Mathematics typically pursue careers in the field of:

- Actuaries
- College Mathematical Science Teachers
- High School Teachers
- Mathematicians
- Natural Sciences Managers
- Operations Research Analysts
- Statisticians

Average State Pay

According to iSeek.org, the median annual pay in the state of Minnesota for the following positions in mathematics is:

- Actuaries - $93,808 ($45.10 per hour)
- Mathematicians - $100,555 ($49.69 per hour)
- Operations Research Analyst - $82,555 ($39.69 per hour)
- Statisticians - $63,012 ($39.91 per hour).

Description

(iSeek.org)

Mathematics programs teach people how to use math to solve problems.

DEGREES & CERTIFICATES IN MATHEMATICS

The Associate of Arts degree with an emphasis in Math is designed to certify that students have completed the requirements through the sophomore level for a baccalaureate degree in mathematics at most 4-year institutions. These courses also provide a solid foundation for most science and technical programs.
The Mathematics Transfer Pathway (AA) offers students a powerful option: the opportunity to complete an Associate of Arts degree with course credits that directly transfer to designated Mathematics bachelor's degree programs at Minnesota State universitites.* The curriculum has been specifically designed so that students completing this pathway degree and transferring to one of the seven Minnesota State universities enter the university with junior-year status. All courses in the Transfer Pathway associate degree will directly transfer and apply to the designated bachelor's degree programs in a related field.

*Universities within the Minnesota State system include Bemidji State University, Metropolitan State University, Minnesota State University, Moorhead, Minnesota State University, Morris, Minnesota State University, Saint Paul, St. Cloud State University, and Winona State University.

REQUIRED COURSES
Incorporate the following Required Courses into the General Education/Minnesota Transfer Curriculum or Additional Course Requirements sections below:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 1510</td>
<td>Calculus 1</td>
<td>5</td>
</tr>
<tr>
<td>MATH 1520</td>
<td>Calculus 2</td>
<td>5</td>
</tr>
<tr>
<td>MATH 2510</td>
<td>Multivariable Calculus</td>
<td>5</td>
</tr>
<tr>
<td>MATH 2520</td>
<td>Calculus 4: Differential Equations with Linear Algebra</td>
<td>5</td>
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GENERAL EDUCATION/MINNESOTA TRANSFER CURRICULUM (MNTC) - 40 CREDITS

*See MnTC Curriculum for specific course options

GOAL 1: COMMUNICATION - 2 COURSES

- ENGC 1101
- COMM 1100 or COMM 1101 or COMM 1111 or COMM 1121

GOAL 2: CRITICAL THINKING

(met by completion of all 40 credits of the MnTC)

GOAL 3: NATURAL SCIENCES - 2 COURSES (Select from two different departments; at least one must include a lab)

- Course #1
- Course #2

GOAL 4: MATHEMATICAL/LOGICAL REASONING - 1 COURSE

- Course - met by taking MATH courses

GOAL 5: HISTORY AND SOCIAL/BEHAVIORAL SCIENCES - 2 COURSES (Select from two different departments)

- Course #1
- Course #2

GOAL 6: HUMANITIES AND FINE ARTS - 2 COURSES

(Select from two different departments)

- Course #1
- Course #2

GOAL 7: HUMAN DIVERSITY - 1 COURSE

- Course

GOAL 8: GLOBAL PERSPECTIVE - 1 COURSE

- Course

GOAL 9: ETHICAL AND CIVIC RESPONSIBILITY - 1 COURSE

- Course

GOAL 10: PEOPLE AND THE ENVIRONMENT - 1 COURSE

- Course

ADDITIONAL COURSE REQUIREMENTS

- One Health (HLTH) course.
- One Exercise Science (EXSC) course.
- Elective credits - additional course(s) numbered 1000 and above, if needed to complete the 60 credit requirement

OTHER DEGREE REQUIREMENTS - 20 CREDITS

- Earn a minimum cumulative grade point average (GPA) of 2.0 for college-level coursework (courses numbered 1000 and above) completed at Normandale.
- Earn a minimum cumulative grade point average (GPA) of 2.0 in the MnTC.
- Earn a minimum of 20 college-level credits at Normandale.

COURSES

CSCI 2111 DISCRETE STRUCTURES OF COMPUTER SCIENCE | 4 CR

Prerequisites: MATH 1510 MnTC Goals: 4

Concepts fundamental to the theory of algorithms. Topics include logic, sets, methods of proof, including mathematical induction, combinatorics, relations, solution of recurrence relations, graphs, trees.

Credits: 4 Semesters: Fall, Spring

CSCI 2031 INTRODUCTION TO NUMERICAL COMPUTING | 4 CR

Prerequisites: MATH 1510 and concurrent with CSCI 2111

Concepts fundamental to the theory of algorithms. Topics include logic, sets, methods of proof, including mathematical induction, combinatorics, relations, solution of recurrence relations, graphs, trees.

Credits: 4 Semesters: Fall, Spring
Introduction to numerical analysis. Explores various numerical methods for solving scientific and technical problems including Newton’s method, numerical integration, and a variety of interactive methods.

Credits: 4

CSCI 2033 ELEMENTARY COMPUTATIONAL LINEAR ALGEBRA | 4 CR
Prereq: MATH 1510

Credits: 4 Semesters: Fall, Spring

MATH 1510 CALCULUS 1 | 5 CR
Prereq: MATH 1150, (C or higher), MATH 1500, (C or higher) or eligible for MATH 1510 MnTC Goals: 4
Topics include functions, limits, derivatives, and an introduction to integration. Applications include but are not limited to science, engineering, economics, and ecology.

Credits: 5 Semesters: Fall, Spring

MATH 1520 CALCULUS 2 | 5 CR
Prereq: MATH 1510, (C or higher) MnTC Goals: 4
Continued development of the properties and applications of integration. Topics include infinite sequences and series, introduction to differential equations, calculus of polar coordinates, and parametric equations. Applications include but are not limited to science, engineering, economics, and ecology.

Credits: 5 Semesters: Fall, Spring

MATH 2400 PROBABILITY AND STATISTICS WITH CALCULUS | 4 CR
Prereq: MATH 1520, (C or higher) MnTC Goals: 4
Descriptive statistics, elementary probability and probability distributions, sampling and the elements of statistical inference including point/interval estimation, and hypothesis tests.

Credits: 4 Semesters: Fall, Spring

MATH 2510 CALCULUS 3: MULTIVARIABLE CALCULUS | 5 CR
Prereq: MATH 1520, (C or higher) MnTC Goals: 4
Multivariable functions, three-dimensional analytic geometry, vectors, partial derivatives, optimization, multiple integrals, curves and surfaces, vector fields, divergence, curl, line and surface integrals, Green’s Theorem, Stokes’ Theorem, and the Divergence Theorem. Applications include but are not limited to science, engineering, economics, and ecology.

Credits: 5 Semesters: Fall, Spring

MATH 2520 CALCULUS 4: DIFFERENTIAL EQUATIONS WITH LINEAR ALGEBRA | 5 CR
Prereq: MATH 1520, (C or higher) MnTC Goals: 4
Matrices and systems, vector spaces, subspaces, linear independence, basis, dimension, linear transformations, eigenvectors, first and second order differential equations, Euler’s method, phase plane analysis of linear and non-linear systems, extensive modeling. Possible topics from numerical methods: Laplace Transforms, power series solutions, or partial differential equations. Applications include but are not limited to science, engineering, economics, and ecology.

Credits: 5 Semesters: Fall, Spring

MATH 2700 FOUNDATIONS OF MATHEMATICS AND LOGIC: WRITING INTENSIVE | 4 CR
Recommended: MATH 2510, MATH 2520, or MATH 2400 Prereq: MATH 1520 MnTC Goals: 4
This course will be useful to all students pursuing advanced mathematics at four-year institutions, including but not limited to those intending majors in mathematics or mathematics education. Topics include basic logic, techniques of mathematical proof, set theory, relations and functions, sequences and series, and basic number theory. The course may include additional topics at the discretion of the instructor. Writing is an important part of this course and will be comprehensively integrated into the course and will be a significant part of the course work and course grade. Writing proofs will be explained and practiced in the course and some assignments will be refined through revisions.

Credits: 4 Semesters: Spring

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