**MATHEMATICS**

**Description**
A strong mathematics background is essential to an increasing variety of careers. The Department of Mathematics encourages students to select a coherent body of courses in mathematics and in other disciplines that are consistent with their academic and career goals.

The Department of Mathematics offers a bachelor of arts program as well as a bachelor of science program with four specialty options. Each student pursuing the bachelor of science should select an option that meets their academic and career needs by completing a Program Declaration form in consultation with the department's faculty advisor. Ideally, this should be done prior to completing two mathematics courses beyond the calculus sequence. As appropriate, students can change their Program Declaration to select a different option or modify the program of study subject to the approval of the faculty advisor.

**Program Assessment.** In order to assist the department in evaluating its programs, all majors should plan to participate in an exit interview during their last semester before graduation. Please make arrangements with the faculty advisor.

**College Requirements**

**College Admission**

**College Admission**
The entrance requirements for the College of Arts and Sciences are the same as the University of Nebraska–Lincoln General Admission Requirements. Students who are admitted through the Admission by Review process may have certain conditions attached to their enrollment at Nebraska. These conditions are explained under "Removal of Deficiencies."

In addition to these requirements, the College of Arts and Sciences strongly recommends a third and fourth year of one foreign language. Four years of high school course work in the same language will fulfill the College of Arts and Sciences' language requirement. It will also allow students to continue language study at a more advanced level at the University of Nebraska–Lincoln, and provide more opportunity to study abroad.

**Transfer Students**
To be considered for admission as a transfer student, Nebraska resident or nonresident, students must have an accumulated average of C (2.0 on a 4.0 scale) and a minimum C average in the last semester of attendance at another college. Transfer students who graduated from high school January 1997 and after must also meet the University of Nebraska–Lincoln General Admission Requirements. Those transfer students who graduated before January 1997 must have completed in high school, 3 years of English, 2 years of the same foreign language, 2 years of algebra, and 1 year of geometry. Transfer students who have completed less than 12 credit hours of college study must also submit either their ACT or SAT scores.

Ordinarily, hours earned at a similarly accredited college or university are applicable to the University of Nebraska–Lincoln degree. The College, however, will evaluate all hours submitted on an application for transfer, and reserves the right to accept or reject any of them, based upon its exclusion and restriction policies. Sixty (60) is the maximum number of hours the University will accept on transfer from a two-year college or international institution. Transfer credit in the major or minor must be approved by the departmental advisor on a Request for Substitution Form to meet specific course requirements, group requirements, or course level requirements in the major or minor. At least half of the hours in the major field must be completed at the University regardless of the number of hours transferred.

The College of Arts and Sciences will accept no more than 15 semester hours of C- and D grades from other schools. The C- and D grades cannot be applied toward requirements for a major or minor. This policy does not apply to the transfer of grades from UNO or UNK to the University of Nebraska–Lincoln. All D grades may be transferred from UNO or UNK, but they are not applicable to a major or minor.

**Readmitted Students**
University of Nebraska–Lincoln students who choose not to take courses for more than two consecutive terms, must reapply to the University of Nebraska–Lincoln. Students readmitted to the College of Arts and Sciences will follow the requirements stated in the catalog for the academic year of readmission and re-enrollment as a degree-seeking student in Arts and Sciences. In consultation with advisors, a student may choose to follow a catalog for any academic year in which they are admitted to and enrolled as a degree-seeking student at Nebraska in the College of Arts and Sciences. Students must complete all degree requirements from a single catalog year. Beginning in 1990-1991, the catalog which a student follows for degree requirements may not be more than 10 years old at the time of graduation.

**Admission Deficiencies/Removal of Deficiencies**
Students must remove entrance deficiencies in geometry and foreign language as soon as possible, and before graduating from the College of Arts and Sciences. For questions and more information, students should consult a college advisor in the Academic and Career Advising Center in 107 Oldfather Hall.

**Removing Foreign Language Deficiencies**
Students must complete the second semester of a first year language sequence to clear the deficiency and the second semester of the second year language sequence to complete the college graduation requirement in language.

**Removing Geometry Deficiencies**
A deficiency of one year of geometry can be removed by taking high school geometry courses through an approved independent study program, or by completing a geometry course from an accredited community college or a four-year institution. Neither of these options will count for college credit.

**College Degree Requirements**

**College Distribution Requirements**

**Bachelor of Arts or Bachelor of Science (16 hours + Language)**
The College of Arts and Sciences' distribution requirements are designed to further the purposes of liberal education by encouraging study in several different areas within the College. All requirements are in addition to University ACE requirements. A student may not use a single course to satisfy more than one of the following five distribution requirements. A student cannot use a single course to satisfy both an ACE outcome, and a College distribution requirement. A student cannot use a course from their primary major to satisfy the Breadth Requirement (F), but may apply an ancillary requirement of the primary major or a course from their secondary major toward this requirement. Independent study or reading courses and internships cannot be used to satisfy distribution requirements.
requirements. To see a complete list of excluded courses, run a degree audit through MyRED.

Courses from interdisciplinary programs will count in the same area as courses from the home/cross-listed department(s).

**College Distribution Requirements**

<table>
<thead>
<tr>
<th>CDR A - Written Communication</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select from courses approved for ACE outcome 1.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CDR B and BL - Natural, Physical, and Mathematical Sciences with Lab</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select from biochemistry, biological sciences, chemistry, computer science, geology, meteorology, mathematics, physics and statistics. Must include one lab in the natural or physical sciences. Lab courses may be selected from biochemistry, biological sciences, chemistry, geology, meteorology and physics. Some courses from geography and anthropology may also be used to satisfy the lab requirement above.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CDR C - Humanities</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select from classics, English, history, modern languages and literatures, philosophy, and religious studies.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CDR D - Social Science</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select from: anthropology, communication studies, geography, political science, psychology, or sociology.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CDR E - Language</th>
<th>0-16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fulfilled by the completion of the 6-credit-hour second-year sequence in a single foreign language in one of the following departments: Classics and religious studies, modern languages and literatures, or anthropology. Instruction is currently available in Arabic, Chinese, Czech, French, German, Greek, Japanese, Latin, Omaha, Russian, and Spanish. A student who has completed the fourth-year level of one foreign language in high school is exempt from the languages requirement.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CDR F - Additional Breadth</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select from: natural, physical and mathematical sciences (Area B), humanities (Area C), or social sciences (Area D). Cannot be a course from the primary major.</td>
<td></td>
</tr>
</tbody>
</table>

Credit Hours Subtotal: 16-32

1 See degree audit or a College of Arts and Sciences advisor for approved geography and anthropology courses that apply as natural science.

2 Language courses numbered 210 or below apply only for the foreign language requirement.

3 See degree audit or College of Arts and Sciences advisor for list of natural/physical science courses in anthropology, geography, and psychology that do not apply as social science.

**Scientific Base**

**Bachelor of Science Only (60 hours)**

The bachelor of science degree requires students to complete 60 hours in mathematical, physical and natural sciences. Approved courses for scientific base credit come from the following College of Arts and Sciences disciplines: actuarial science, anthropology (selected courses), astronomy, biochemistry (excluding BIO 101), biological sciences (excluding BIOS 203), chemistry (excluding CHEM 101), computer science (excluding CSCE 10), geography (selected courses), geology, life sciences, mathematics (excluding courses below MATH 104), meteorology, microbiology, physics and statistics.

See your degree audit or a College of Arts and Sciences advisor for a complete list including individual classes that fall outside of the disciplines listed above. Up to 12 hours of scientific and technical courses offered by other colleges may be accepted toward this requirement with approval of a college advisor.

**Foreign Languages/Language Requirement**

Languages Exemption Policy

The University of Nebraska–Lincoln and the College of Arts and Sciences will exempt or waive students from the Nebraska entrance requirement of two years of the same foreign language or from the College’s language distribution requirement based on documentation only. The following are the options and procedures for documentation:

**High School Transcripts**

For the University entrance requirement, students must show an official high school transcript with two or more years of the same foreign language.

For the College of Arts and Sciences College Distribution Requirement E-Language, students must show an official high school transcript with four or more years of the same foreign language in high school, or show evidence of graduation from a non-English-speaking foreign high school. Students whose native language is not English must show English as a Second Language study on an official high school transcript. Four years of ESL at the high school level (9th, 10th, 11th and 12th grades) will be the basis for a waiver of the CDR E Language requirement.

**Proficiency Examination at UNL**

For the University entrance requirement, students who do not have transcript documentation can request to take a proficiency exam in the language. (This is not the same test as the Modern Languages Placement Exam.) However, the University will provide testing only in the languages it teaches. Currently, these languages are: Arabic, French, German, Spanish, Russian, Czech, Japanese, Chinese.

For the College of Arts and Sciences College Distribution Requirement E-Language, the Department of Modern Languages will oversee the test at the 202 level. If the student passes the test, the department will sign the College Request for Waiver form and indicate the level of proficiency. The form is then forwarded to the Arts and Sciences Advising Center for approval.

The Department of Modern Languages will oversee the test and provide written documentation to the Arts and Sciences Advising Center the level of proficiency passed.

**Distance Education**

For the University entrance requirement, students without transcript documentation who claim proficiency in a language not taught at the University of Nebraska–Lincoln, have the option of seeking out a distance education program in languages. If the student completes the equivalent of 102 from an approved distance education program, the student will meet the University’s entrance requirement. The student must have the course work approved before he/she takes/completes the course as equivalent to 102 by a College advisor. The student then completes the course and has the distance education program send the transcript to the Admissions Office.

For the College of Arts and Sciences College Distribution Requirement E-Language, the student can seek out a distance education program and complete the equivalent of the 202-level course. The student must submit
the request on the College Request for Substitution form and have the course work approved by a College advisor. The student then completes the course and has the distance education program send the transcript to the Admissions Office.

Third Language Option
If a student demonstrates knowledge of two foreign languages at the 102 level, the College of Arts and Sciences may consider waiving two semesters of the four semester College Distribution Requirement E-Languages requirement. If this waiver were granted, the student would then be required to complete 101 and 102 in another, 3rd foreign language at Nebraska.

Minimum Hours Required for Graduation
A minimum of 120 semester hours of credit is required for graduation from the College of Arts and Sciences. A total grade point average of at least 2.0 is required.

Grade Rules
Restrictions on C- and D Grades
The College will accept no more than 15 semester hours of C- and D grades from other schools except for UNO and UNK. No transfer C- and D Grades
Restrictions on C- and D Grades
The College will accept no more than 15 semester hours of C- and D grades from other schools except for UNO and UNK. No transfer C- and D grades can be applied toward requirements in a major or a minor. No University of Nebraska–Lincoln C- and D grades can be applied toward requirements in a major or a minor.

Pass/No Pass Privilege
University regulations for the Pass/No Pass (P/N) privilege state:

- The Pass/No Pass option is designed for your use by seeking to expand your intellectual horizons by taking courses in areas where you may have had minimal preparation.
- Neither the P nor the N grade contribute to your GPA.
- P is interpreted to mean C or above.
- A change to or from a Pass/No Pass may be made until mid-term (see academic calendar for specific dates per term).
- The Pass/No Pass or grade registration cannot conflict with the policy of the professor, department, college, or University governing the grading option.
- Changing to or from Pass/No Pass requires using the MyRED system to change the grading option or filing a Drop/Add form with the Office of the University Registrar, 107 Canfield Administration Building. After mid-term of the course, a student registered for Pass/No Pass cannot change to a grade registration unless the Pass/No Pass registration is in conflict with the policy of the professor, department, college, or University governing Pass/No Pass.
- The Pass/No Pass grading option cannot be used for the removal of C- or D or F grades.

Pass/No Pass privileges in the College of Arts and Sciences are extended to students according to the following additional regulations:

- Departments may specify that certain courses of theirs can be taken only on a P/N basis.
- The college will permit no more than a total of 24 semester hours of P/N grades to be applied toward degree requirements. This total includes all Pass grades earned at the University and other U.S. schools. NOTE: This 24-hour limit is more restrictive than the University regulation.

Grading Appeals
A student who feels that he/she has been unfairly graded must ordinarily take the following sequential steps in a timely manner, usually by initiating the appeal in the semester following the awarding of the grade:

1. Talk with the instructor concerned. Most problems are resolved at this point.
2. Talk to the instructor’s department chairperson.
3. Take the case to the Grading Appeal Committee of the department concerned. The Committee should be contacted through the department chairperson.
4. Take the case to the College Grading Appeals Committee by contacting the Dean’s Office, 1223 Oldfather Hall.

Course Level Requirements
Courses Numbered above 299
Thirty of the 120 semester hours of credit must be in courses numbered above 299. Of the 30 hours above 299, 15 hours (1/2) must be completed in residence at UNL.

Graduate Courses
Seniors in the University who have obtained in advance the approval of the dean for Graduate Studies may receive up to 12 hours credit for graduate courses taken in addition to the courses necessary to complete their undergraduate work, provided that such credits are earned within the calendar year prior to receipt of the baccalaureate. For procedures, inquire at the Office of Graduate Studies.

Course work taken prior to receipt of the baccalaureate may not always be accepted for transfer to other institutions as graduate work.

Residency
Residency Requirement and Open Enrollment and Summer Independent Study Courses
Students must complete at least 30 of the 120 total hours for their degree at the University of Nebraska–Lincoln. Students must complete at least 1/2 of their major course work including 6 hours above 299 in their major, and 15 of the 30 hours required above 299 in residence. Credit earned during education abroad may be used toward the residency requirement if students register through the University and participate in prior-approved education abroad programs. The University of Nebraska–Lincoln open enrollment and summer independent study courses count toward residence.

ACE Requirements
Consistent with the mission and values of the University, ACE is based on a shared set of four institutional objectives and ten student learning outcomes. The ACE program was approved by faculty in all eight undergraduate colleges and endorsed by the Faculty Senate, the student government, and the Academic Planning Committee in January 2008 for implementation in the fall 2009. ACE aligns with current national initiatives in general education.
Key characteristics of ACE demonstrate the benefits of the program to students:

- Students receive a broad education with exposure to multiple disciplines, critical life skills and important reasoning, inquiry, and civic capacities.
- ACE is simple and transparent for students, faculty and advisors. Students complete the equivalent of 3 credit hours for each of the ten student learning outcomes.
- Students connect and integrate their ACE experiences with their selected major.
- Students can transfer all ACE certified courses across colleges within the institution to meet the ACE requirement and any course from outside the institution without direct equivalents may be considered with appropriate documentation for ACE credit (see academic advisor).

ACE allows faculty to assess and improve their effectiveness and facilitate students’ learning.

**ACE Institutional Objectives and Student Learning Outcomes**

To meet the ACE Program requirement, a student will complete a minimum of 3 credit hours for each of the ten ACE Student Learning Outcomes (a total of 30 ACE credit hours). See the ACE website at: http://ace.unl.edu for the most current information and the most recently certified courses.

**Catalog Rule**

Students must fulfill the requirements stated in the catalog for the academic year in which they are first admitted to and enrolled as a degree-seeking student at the University of Nebraska—Lincoln. In consultation with advisors, a student may choose to follow a subsequent catalog for any academic year in which they are admitted to and enrolled as a degree-seeking student at Nebraska in the College of Arts and Sciences. Students must complete all degree requirements from a single catalog year. Beginning in 1990-1991 the catalog which a student follows for degree requirements may not be more than 10 years old at the time of graduation.

**Learning Outcomes**

Majors in mathematics will be able to:

1. Reason quantitatively, using numeric, algebraic, and analytic methods.
2. Use mathematics to model and address real-world problems.
3. Understand, create, and explain mathematical arguments, organized by means of definitions, results, proofs and examples.

**Major Requirements**

**Bachelor of Science**

Complete the core requirements and one of four options:

- Standard
- Education
- Statistics
- Research

**Core Requirements**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 106</td>
<td>Calculus I</td>
<td>5</td>
</tr>
<tr>
<td>MATH 107</td>
<td>Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>MATH 208</td>
<td>Calculus III</td>
<td>4</td>
</tr>
<tr>
<td>MATH 310</td>
<td>Introduction to Modern Algebra</td>
<td>3</td>
</tr>
<tr>
<td>MATH 314</td>
<td>Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>MATH 325</td>
<td>Elementary Analysis</td>
<td>3</td>
</tr>
<tr>
<td>Total Credit Hours</td>
<td></td>
<td>22</td>
</tr>
</tbody>
</table>

**Specific Major Requirements**

Select and complete one of the following options: Standard, Education, Research, or Statistics. Under any option, students may substitute a more advanced course in the same area for a required mathematics course.

**Standard Option**

This option is ideal for students wishing to combine a strong mathematics education with a coherent body of course work in another discipline.

**Standard Option Mathematics Courses**

Select one course from:

- MATH 221 Differential Equations 3
- MATH 380 / STAT 380 Statistics and Applications 3

Select four additional advanced MATH courses with at least two at the 400 level. 1

Credit Hours Subtotal: 15

1. One 400-level course in the area of the concentration may be substituted for one of the required two additional 400-level advanced mathematics courses, provided the course makes significant use of advanced mathematics. The faculty advisor must approve the substitution.

**Education Option**

This option is ideal for students planning to pursue endorsement and certification to teach mathematics at the secondary level through an undergraduate degree in the College of Education and Human Sciences or through a graduate program.

**Education Option Mathematics Courses**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 350</td>
<td>Geometry for High School Teaching</td>
<td>3</td>
</tr>
<tr>
<td>MATH 380</td>
<td>Statistics and Applications</td>
<td>3</td>
</tr>
<tr>
<td>MATH 405</td>
<td>Discrete and Finite Mathematics for High School Teaching</td>
<td>3</td>
</tr>
<tr>
<td>MATH 407</td>
<td>Mathematics for High School Teaching I</td>
<td>3</td>
</tr>
<tr>
<td>MATH 408</td>
<td>Mathematics for High School Teaching II</td>
<td>3</td>
</tr>
<tr>
<td>Credit Hours Subtotal:</td>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>

An education major, minor, or approved 18-hour concentration

**Research Experience Option**

This option is recommended for students interested in independent work and for students planning to pursue graduate work in mathematics.

**Research Experience Option Mathematics Courses**

Select four additional advanced mathematics courses with at least three at the 400 level.
An approved undergraduate research experience
A variety of options exist for meeting this requirement including a senior thesis, or an REU or UCARE experience that leads to a project or paper. Students must file a plan with the faculty advisor.

Statistics Option
This option is recommended for students interested in a mathematics major and a strong body of course work in statistics.

Statistics Option Mathematics Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 380 / STAT 380</td>
<td>Statistics and Applications</td>
<td>3</td>
</tr>
</tbody>
</table>

Select four additional advanced mathematics courses with at least two at the 400 level.¹

Credit Hours Subtotal: 12

Statistics Courses
Select three additional statistics courses at 300 or 400 level.

Credit Hours Subtotal: 9

¹ One 400-level statistics course may be substituted for one of the required two 400-level additional advanced mathematics courses, provided the course makes significant use of advanced mathematics. The faculty advisor must approve the substitution.

Bachelor of Arts
The BA program is ideal for the student who wants to combine a mathematics major with another major or several minors in the humanities or the social sciences or for the student dual matriculating with another college.

Core Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 106</td>
<td>Calculus I</td>
<td>5</td>
</tr>
<tr>
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<td>Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>MATH 208</td>
<td>Calculus III</td>
<td>4</td>
</tr>
<tr>
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<td>Introduction to Modern Algebra</td>
<td>3</td>
</tr>
<tr>
<td>MATH 314</td>
<td>Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>MATH 325</td>
<td>Elementary Analysis</td>
<td>3</td>
</tr>
<tr>
<td>MATH 221</td>
<td>Differential Equations</td>
<td>3</td>
</tr>
</tbody>
</table>

or MATH 380 / Statistics and Applications

STAT 380

Total Credit Hours 25

Specific Major Requirements (9 hours)

Additional Advanced Mathematics Courses
Select three additional advanced mathematics courses with at least two at the 400 level.

Credit Hours Subtotal: 9

Total Credit Hours 9

Additional Major Requirements

Prerequisite Requirements/Rules
The prerequisites listed for a course may be replaced by equivalent preparation. One prerequisite for all advanced mathematics courses is successful completion of MATH 106, MATH 107, MATH 208. Two courses past calculus are required prerequisites for all 400-level mathematics courses. All topics, independent study, reading courses and seminars require permission of the instructor before registering; and these courses do not count toward the major requirements unless approved by the faculty advisor.

Grade Rules

C- and D Grades
A grade of C or higher is required in all courses in the major or minor.

Pass/No Pass
No calculus course can be taken Pass/No Pass. No more than 3 hours of the advanced courses taken as Pass/No Pass will be counted toward the major or minor.

Requirements for Minor Offered by Department

Plan A Minor (19 hours)
A complete calculus sequence plus two advanced mathematics courses.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 106</td>
<td>Calculus I</td>
<td>5</td>
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<tr>
<td>MATH 107</td>
<td>Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>MATH 208</td>
<td>Calculus III</td>
<td>4</td>
</tr>
<tr>
<td>Two advanced mathematics courses</td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

Total Credit Hours 19

Plan B Minor (13 hours)
A complete calculus sequence.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 106</td>
<td>Calculus I</td>
<td>5</td>
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<td>4</td>
</tr>
<tr>
<td>MATH 208</td>
<td>Calculus III</td>
<td>4</td>
</tr>
</tbody>
</table>

Total Credit Hours 13

Grade Rules

C- and D Grades
A grade of C or higher is required in all courses in the major or minor.

Pass/No Pass
No calculus course can be taken Pass/No Pass. No more than 3 hours of the advanced courses taken as Pass/No Pass will be counted toward the major or minor.

MATH 100A Intermediate Algebra

Prerequisites: Appropriate score on the Math Placement Exam.

Notes: Y

Description: Review of the topics in a second-year high school algebra course taught at the college level. Includes: real numbers, 1st and 2nd degree equations and inequalities, linear systems, polynomials and rational expressions, exponents and radicals. Heavy emphasis on problem solving strategies and techniques.

Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

Prerequisite for: MATH 100A; MATH 101; MATH 103
Groups: Introductory Mathematics
MATH 101 College Algebra
Prerequisites: Appropriate score on the Math Placement Exam; or grade of P, C, or better in MATH 100A.
Notes: Y
Description: Real numbers, exponents, factoring, linear and quadratic equations, absolute value, inequalities, functions, graphing, polynomial and rational functions, exponential and logarithmic functions, system of equations.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: CHEM 105; CRIM 300; MATH 102; MATH 104; METR 100; METR 140; MSYM 109; NAVS 222; PHYS 260; PHYS 261
Groups: Introductory Mathematics

MATH 102 Trigonometry
Prerequisites: Appropriate score on the Math Placement Exam; or grade of P, C, or better in MATH 101.
Notes: Y
Description: Trigonometric functions, identities, trigonometric equations, solution of triangles, inverse trigonometric functions and graphs.
Credit Hours: 2
Max credits per semester: 2
Max credits per degree: 2
Format: LEC
Prerequisite for: AGRO 361, GEOL 361, NRES 361, SOIL 361, WATS 361; AGRO 458, AGRO 858, NRES 458, NRES 858, SOIL 458; ASCI 340; CHEM 109; CSCE 155A; CSCE 155E; CSCE 155H; CSCE 155N; CSCE 155T; GEOL 400; MATH 104; MATH 106; METR 100; METR 140; MSYM 109; NAVS 331; PHYS 141; PHYS 141H; PHYS 151; PHYS 260; PHYS 261
Groups: Introductory Mathematics

MATH 103 College Algebra and Trigonometry
Prerequisites: Appropriate score on the Math Placement Exam; or grade of P, C, or better in MATH 100A.
Notes: Y
Description: First and second degree equations and inequalities, absolute value, functions, polynomial and rational functions, exponential and logarithmic functions, trigonometric functions and identities, laws of sines and cosines, applications, polar coordinates, systems of equations, graphing, conic sections.
Credit Hours: 5
Max credits per semester: 5
Max credits per degree: 5
Format: LEC
Prerequisite for: AGRO 361, GEOL 361, NRES 361, SOIL 361, WATS 361; AGRO 458, AGRO 858, NRES 458, NRES 858, SOIL 458; ASCI 340; CHEM 109; CSCE 155A; CSCE 155E; CSCE 155H; CSCE 155N; CSCE 155T; MATH 104; MATH 106; MSYM 109; NAVS 331; PHYS 141; PHYS 141H; PHYS 151; PHYS 260; PHYS 261; SOFT 160; SOFT 160H
Groups: Introductory Mathematics

MATH 104 Applied Calculus
Prerequisites: Appropriate score on the Math Placement Exam; or grade of P, C, or better in MATH 101, MATH 102 or MATH 103.
Notes: Y
Description: Rudiments of differential and integral calculus with applications to problems from business, economics, and social sciences.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: ABUS 341, MRKT 341; ACCT 200; ACCT 308; ACCT 309; ACCT 313; AGEN 112, BSEN 112; AGEN 225, BSEN 225; AGRO 361, GEOL 361, NRES 361, SOIL 361, WATS 361; AGRO 472, AGRO 872, NRES 472, NRES 872, SOIL 472, WATS 472; ASCI 340; BLAW 371; BLAW 371H; BLAW 372; BLAW 372H; BSEN 355; CSCE 155A; CSCE 155E; CSCE 155H; CSCE 155N; CSCE 155T; ECON 215; ECON 215H; ECON 311; FDS 363, MSYM 363; FINA 361; FINA 361H; MATH 104; METR 100; METR 140; MNST 301; MNST 301H; MRKT 341H, RAUS 341H; MSYM 109; PHYS 141; PHYS 141H; PHYS 151; PHYS 260; PHYS 261; SCMA 331; SCMA 350; SCMA 350H
ACE: ACE 3 Math/Stat/Reasoning
Groups: Introductory Mathematics

MATH 106 Calculus I
Prerequisites: Appropriate score on the Math Placement Exam; or grade of P, C, or better in MATH 102 or MATH 103.
Notes: Y
Description: Functions of one variable, limits, differentiation, exponential, trigonometric and inverse trigonometric functions, maximum-minimum, and basic integration theory (Riemann sums) with some applications.
Credit Hours: 5
Max credits per semester: 5
Max credits per degree: 5
Format: LEC
Prerequisite for: ABUS 341, MRKT 341; ACCT 200; ACCT 308; ACCT 309; ACCT 313; AGEN 112, BSEN 112; AGEN 225, BSEN 225; AGRO 361, GEOL 361, NRES 361, SOIL 361, WATS 361; AGRO 472, AGRO 872, NRES 472, NRES 872, SOIL 472, WATS 472; ASCI 330; ASCI 340; BIOS 316, MATH 316, NRES 316; CHEM 114; CIVE 221, CONE 221; CIVE 252; CSCE 235; CSCE 235H; ECEN 103; ECON 215; ECON 215H; ECON 311; FDS 363, MSYM 363; FINA 361; FINA 361H; GEOL 410; MATH 106; MATH 107; MATH 107H; MENG 220; MENG 100; MENG 140; MENG 205; MNST 301; MNST 301H; MRKT 341H, RAUS 341H; MSYM 109; PHYS 141; PHYS 141H; PHYS 151; PHYS 261; PHYS 261; SCMA 331; SCMA 335; SCMA 350; SCMA 350H
ACE: ACE 3 Math/Stat/Reasoning
Groups: Introductory Mathematics
MATH 107 Calculus II
Prerequisites: A grade of P, C or better in MATH 106.
Description: Integration theory; techniques of integration; applications of definite integrals; series, Taylor series, vectors, cross and dot products, lines and planes, space curves.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Format: LEC
Prerequisite for: ABUS 341, MRKT 341; ACCT 200; AGRO 361, GEOL 361, NRES 361, SOIL 361, WATS 361; AREN 211; ASTR 204; BLAW 371; BLAW 371H; BLAW 372; BLAW 372H; BSEN 244; CHME 202; CHME 331; CSCE 155A; CSCE 155E; CSCE 155H; CSCE 155N; CSCE 155T; ECEN 211; ECEN 224; ECON 215; ECON 311; FINA 361; FINA 361H; MATH 107; MATH 208; MATH 208H; MATH 380; MATH 380H; STAT 380; STAT 380H; RAIK 270H; MECH 223; MECH 223H; METR 100; METR 140; METR 223; MNGT 301; MNGT 301H; MRKT 341H; RAIK 341H; PHYS 141; PHYS 141H; PHYS 151; PHYS 212; PHYS 212H; PHYS 260; PHYS 261; SCMA 331; SCMA 335; SCMA 350; SCMA 350H
ACE: ACE 3 Math/Stat/Reasoning
Groups: Introductory Mathematics

MATH 107H Honors: Calculus II
Prerequisites: Good standing in the University Honors Program or by invitation; and a grade of "B" or better in MATH 106 or equivalent
Description: For course description, see MATH 107.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Format: LEC
Prerequisite for: ABUS 341, MRKT 341; ACCT 200; AGRO 361, GEOL 361, NRES 361, SOIL 361, WATS 361; AREN 211; ASTR 204; BLAW 371; BLAW 371H; BLAW 372; BLAW 372H; BSEN 244; CHME 202; CHME 331; CSCE 155A; CSCE 155E; CSCE 155H; CSCE 155N; CSCE 155T; ECEN 211; ECEN 224; ECON 215; ECON 311; FINA 361; FINA 361H; MATH 107; MATH 208; MATH 208H; MATH 380; MATH 380H, STAT 380; STAT 380H; RAIK 270H; MECH 223; MECH 223H; METR 100; METR 140; METR 223; MNGT 301; MNGT 301H; MRKT 341H, RAIK 341H; PHYS 141; PHYS 141H; PHYS 151; PHYS 212; PHYS 212H; PHYS 260; PHYS 261; SCMA 331; SCMA 335; SCMA 350; SCMA 350H
ACE: ACE 3 Math/Stat/Reasoning
Groups: Introductory Mathematics

MATH 189H University Honors Seminar
Prerequisites: Good standing in the University Honors Program or by invitation; placement score on the Math Placement Examination (MPE) at the MATH 104-level or above.
Notes: Y
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: METR 100; METR 140; PHYS 141; PHYS 141H; PHYS 260; PHYS 261
ACE: ACE 3 Math/Stat/Reasoning
Groups: Introductory Mathematics

MATH 198 Freshman Seminar
Credit Hours: 1-3
Min credits per semester: 1
Max credits per semester: 3
Max credits per degree: 6
Format: LEC
Prerequisite for: METR 100; METR 140; PHYS 141; PHYS 141H; PHYS 260; PHYS 261
Groups: Seminars,Ind Study, Topics

MATH 198H Honors: Freshman Seminar
Prerequisites: Good standing in the University Honors Program or by invitation.
Credit Hours: 1-3
Min credits per semester: 1
Max credits per semester: 3
Max credits per degree: 6
Format: LEC
Prerequisite for: METR 100; METR 140; PHYS 141; PHYS 141H; PHYS 260; PHYS 261
Groups: Seminars,Ind Study, Topics

MATH 203 Contemporary Mathematics
Notes: Y
Description: Applications of quantitative reasoning and methods to problems and decision making in the areas of management, statistics, and social choice. Includes networks, critical paths, linear programming, sampling, central tendency, inference, voting methods, power index, game theory, and fair division problems.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
ACE: ACE 3 Math/Stat/Reasoning
Groups: Introductory Mathematics
MATH 203J Contemporary Math
Prerequisites: Must be admitted to the College of Journalism
Notes: Y
Description: Applications of quantitative reasoning and methods to problems and decisions making in areas of particular relevance to College of Journalism and Mass Communication, such as governance, finance, statistics, social choice, and graphical presentation of data. Financial mathematics, statistics and probability (sampling, central tendency, and inference), voting methods, power index, and fair division problems.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
ACE: ACE 3 Math/Stat/Reasoning
Groups: Introductory Mathematics

MATH 208 Calculus III
Prerequisites: A grade of P, C or better in MATH 107
Description: Vectors and surfaces, parametric equations and motion, functions of several variables, partial differentiation, maximum-minimum, Lagrange multipliers, multiple integration, vector fields, path integrals, Green's Theorem, and applications.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Format: LEC
Prerequisite for: ABUS 341, MKT 341; ACCT 200; ACTS 401; BLAW 371; BLAW 371H; BLAW 372; BLAW 372H; CSCE 155A; CSCE 155E; CSCE 155H; CSCE 155N; CSCE 155T; ECON 311; FINA 361; FINA 361H; MATH 208; MATH 221H; MATH 310; MATH 310H; MATH 314H; MATH 325; MATH 495; MECH 318; MECH 321; ECON 311; FINA 361; MATH 208; MATH 221H; MATH 310; MATH 310H; MATH 314H; MATH 325; MATH 495; MECH 318; MECH 321; MATH 821; CHME 825; CHME 835; CIVE 310; CIVE 310H; CIVE 326H; ECON 306; ECON 311; ECON 328; MATH 430; MATH 435; MATH 442; MATH 456; MECH 310; MECH 310H; MECH 318; MECH 330; MECH 381; MECH 480; MECH 880; MECH 881; MECH 925; MECH 933; MECH 936; MECH 938; METR 312; PHYS 311; PHYS 422, PHYS 822, ECEN 422, ECEN 822
ACE: ACE 3 Math/Stat/Reasoning
Groups: Introductory Mathematics

MATH 208H Honors: Calculus III
Prerequisites: Good Standing in the University Honors Program and a grade of P, C, or better in MATH 107 or MATH 107H
Description: Vectors and surfaces, parametric equations and motion, functions of several variables, partial differentiation, maximum-minimum, Lagrange multipliers, multiple integration, vector fields, path integrals, Green's Theorem, and applications.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Format: LEC
Prerequisite for: ABUS 341, MRKT 341; ACCT 200; ACTS 401; BLAW 371; BLAW 371H; BLAW 372; BLAW 372H; CSCE 155A; CSCE 155E; CSCE 155H; CSCE 155N; CSCE 155T; ECON 311; FINA 361; FINA 361H; MATH 208; MATH 221H; MATH 310; MATH 310H; MATH 314H; MATH 325; MATH 495; MECH 318; MECH 321; ECON 311; FINA 361; MATH 208; MATH 221H; MATH 310; MATH 310H; MATH 314H; MATH 325; MATH 495; MECH 318; MECH 321; MATH 821; CHME 825; CHME 835; CIVE 310; CIVE 310H; CIVE 326H; ECON 306; ECON 311; ECON 328; MATH 430; MATH 435; MATH 442; MATH 456; MECH 310; MECH 310H; MECH 318; MECH 330; MECH 381; MECH 480; MECH 880; MECH 881; MECH 925; MECH 933; MECH 936; MECH 938; METR 312; PHYS 311; PHYS 422, PHYS 822, ECEN 422, ECEN 822
ACE: ACE 3 Math/Stat/Reasoning
Groups: Introductory Mathematics

MATH 221 Differential Equations
Crosslisted with: MATH 821
Prerequisites: A grade of P, C, or better in MATH 208 or MATH 208H
Notes: Y
Description: First- and second-order methods for ordinary differential equations including: separable, linear, Laplace transforms, linear systems, and some applications.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: AGN 303, BSN 303; AGN 344, BSN 344; AGN 350, BSN 350; AGN 957, BSN 957, CIV 957, GEL 957; BSEN 260, AGN 260; BSEN 311; BSEN 317; BSEN 326, CIV 326; BSEN 326H, CIVO 326H; BSEN 943; BSEN 954, NRES 954, CHME 312; CHME 815; CHME 825; CHME 835; CIVE 310; CIVE 310H; CIVE 813; CIV 216; ECEN 304; ECEN 306; ECEN 328; IMSE 328; MATH 430; MATH 435; MATH 442; MATH 456; MECH 310; MECH 310H; MECH 318; MECH 330; MECH 381; MECH 480; MECH 880; MECH 881; MECH 925; MECH 933; MECH 936; MECH 938; METR 312; PHYS 311; PHYS 422, PHYS 822, ECEN 422, ECEN 822
ACE: ACE 3 Math/Stat/Reasoning
Groups: Advanced Mathematics Courses

MATH 221H Honors: Differential Equations
Prerequisites: A grade of P, C, or better in MATH 208 or MATH 208H
Description: For course description, see MATH 221/821.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: AGN 303, BSN 303; AGN 344, BSEN 344; AGN 350, BSEN 350; AGN 957, BSEN 957, CIV 957, GEL 957; BSEN 260, AGN 260; BSEN 311; BSEN 317; BSEN 326, CIVO 326; BSEN 326H, CIVO 326H; CIVO 312; CIVE 310; CIVE 310H; CIVE 813; CIV 216; ECEN 304; ECEN 306; ECEN 328; IMSE 328; MATH 430; MATH 435; MATH 442; MATH 456; MECH 310; MECH 310H; MECH 318; MECH 330; PHYS 311
ACE: ACE 3 Math/Stat/Reasoning
Groups: Advanced Mathematics Courses

MATH 300 Mathematics Matters
Prerequisites: TEAC 308 or TEAC 416D or parallel.
Notes: Y
Description: Teaching numbers and operations. Develop an understanding of mathematics taught in the elementary school.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: MATH 301; TEAC 297E, TEAC 308
Groups: Introductory Mathematics
MATH 300M Mathematics as a Second Language
Prerequisites: Must be degree seeking in the College of Education & Human Sciences.
Notes: Y
Description: Develop a deeper understanding of "number and operations". The importance of careful reasoning, problem solving, and communicating mathematics, both orally and in writing. Connections with other areas of mathematics and the need for developing the "habits of mind of a mathematical thinker".
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Groups: Introductory Mathematics

MATH 301 Geometry Matters
Prerequisites: MATH 300, with a grade of C or Pass or better.
Notes: Y
Description: Geometry and measurement. Develop an understanding of geometry as taught in the elementary school.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Groups: Introductory Mathematics

MATH 302 Math Modeling
Notes: Y
Description: Using mathematics to model solutions or relationships for realistic problems taken from the middle school curriculum. The mathematics for these models are a mix of algebra, geometry, sequences (dynamical systems, queuing theory), functions (linear, exponential, logarithmic), and logic. Mathematical terminology, concepts and principles. Calculator based lab devices, graphing calculators, and computers as tools to collect data, to focus on concepts and ideas, and to make the mathematics more accessible.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Groups: Introductory Mathematics

MATH 304 Experimentation, Conjecture, and Reasoning
Prerequisites: Must be degree seeking in the College of Education & Human Sciences.
Description: How to express mathematical solutions and ideas logically and coherently in both written and oral forms in the context of problem solving. Inductive and deductive logical reasoning skills through problem solving. Present and critique logical arguments in verbal and written forms. Problem topics taken from topics nationally recommended for middle school mathematics.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Groups: Introductory Mathematics

MATH 306 Number Theory and Cryptology for Middle Level Teachers
Prerequisites: Must be degree seeking in the College of Education & Human Sciences.
Description: Basic number theory results which are needed to understand the number theoretic RSA cryptography algorithm. Primes, properties of congruences, divisibility tests, linear Diophantine equations, linear congruences, Chinese Remainder Theorem, Wilson's Theorem, Fermat's Little Theorem, Euler's Theorem, and Euler's phi function. Integers with connections to the middle school curriculum and mathematical reasoning.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Groups: Introductory Mathematics

MATH 310 Introduction to Modern Algebra
Prerequisites: A grade of P, C, or better in MATH 208 or MATH 208H
Description: Elementary number theory, including induction, the Fundamental Theorem of Arithmetic, and modular arithmetic. Introduction to rings and fields as natural extension of the integers. Particular emphasis on the study of polynomials with coefficients in the rational, real, or complex numbers.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: MATH 350; MATH 407; MATH 408; MATH 417; MATH 430; MATH 450; MATH 452; MATH 471; MATH 809, MATH 409
ACE: ACE 3 Math/Stat/Reasoning
Groups: Advanced Mathematics Courses

MATH 314 Linear Algebra
Prerequisite for: MATH 350; MATH 407; MATH 408; MATH 417; MATH 430; MATH 450; MATH 452; MATH 471; MATH 809, MATH 409
Description: For course description, see MATH 310.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: MATH 350; MATH 407; MATH 408; MATH 417; MATH 430; MATH 450; MATH 452; MATH 471; MATH 809, MATH 409
ACE: ACE 3 Math/Stat/Reasoning
Groups: Advanced Mathematics Courses

MATH 319 Introduction to Modern Algebra Honors
Prerequisites: Good Standing in the University Honors Program and a grade of P, C, or better in MATH 208 or MATH 208H
Description: For course description, see MATH 310.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: MATH 350; MATH 407; MATH 408; MATH 417; MATH 430; MATH 450; MATH 452; MATH 471; MATH 809, MATH 409
ACE: ACE 3 Math/Stat/Reasoning
Groups: Advanced Mathematics Courses

MATH 336 Number Theory
Prerequisites: A grade of P, C, or better in MATH 208 or MATH 208H
Notes: Y
Description: Fundamental concepts of linear algebra, including properties of matrix arithmetic, systems of linearequations, vector spaces, inner products, determinants, eigenvalues and eigenvectors, and diagonalization.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: CSCE 970; CSCE 973; MATH 405; MATH 435; MATH 442; MATH 456; MATH 471; MATH 809, MATH 409; MECH 350; MECH 888; STAT 970
ACE: ACE 3 Math/Stat/Reasoning
Groups: Advanced Mathematics Courses
MATH 314H Honors: Applied Linear Algebra (Matrix Theory)
Prerequisites: Good Standing in the University Honors Program and a grade of P, C, or better in MATH 208 or MATH 208H
Description: For course description, see MATH 314.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: CSCE 970; MATH 405; MATH 435; MATH 442; MATH 456; MATH 471; MATH 809, MATH 409; MECH 350
ACE: ACE 3 Math/Stat/Reasoning
Groups: Advanced Mathematics Courses

MATH 316 Case Studies in Theoretical Ecology
Crosslisted with: BIOS 316, NRES 316
Prerequisites: MATH 106 or higher OR LIFE 121. Parallel registration in BIOS 316L.
Notes: Y
Description: Introduction to biological literature, applied mathematics, computer programming, and/or statistical techniques relevant to field questions in ecology, evolution, and behavior. Typical mathematical topics include discrete dynamics, systems of differential equations, matrix algebra, or statistical inference and probability.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
ACE: ACE 4 Science
Groups: Advanced Mathematics Courses

MATH 322 Advanced Calculus
Crosslisted with: MATH 822
Description: Uniform convergence of sequences and series of functions, Green's theorem, Stoke's theorem, divergence theorem, line integrals, implicit and inverse function theorems, and general coordinate transformations.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: MATH 456; MECH 812; METR 965
Groups: Advanced Mathematics Courses

MATH 325 Elementary Analysis
Prerequisites: A grade of P, C, or better in MATH 208 or MATH 208H
Description: An introduction to mathematical reasoning, construction of proofs, and careful mathematical writing in the context of continuous mathematics and calculus. Topics may include the real number system, limits and continuity, the derivative, integration, and compactness in terms of the real number system.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: MATH 425; MATH 430; MATH 450; MATH 452; MATH 471
ACE: ACE 3 Math/Stat/Reasoning
Groups: Advanced Mathematics Courses

MATH 350 Geometry for High School Teaching
Prerequisites: A grade of P, C, or better in MATH 310 or MATH 310H
Notes: Y
Description: Modern elementary geometry, plane transformations and applications, the axiomatic approach, Euclidean constructions. Additional topics vary.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: MATH 408
Groups: Introductory Mathematics

MATH 380 Statistics and Applications
Crosslisted with: MATH 380H, STAT 380, STAT 380H, RAiK 270H
Prerequisites: A grade of P, C, or higher in MATH 107 or MATH 107H.
Notes: Y
Description: Probability calculus; random variables, their probability distributions and expected values; t, F and chi-square sampling distributions; estimation; testing of hypothesis; and regression analysis with applications.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: ABUS 341, MRKT 341; BLAW 371; BLAW 371H; BLAW 372; BSD 371H, RAiK 371H; CSCE 970; ECEN 325, ECEN 850, ECEN 450; ECON 311; FINA 361; FINA 361H; MATH 435; MATH 809, MATH 409; MECH 343; MNGT 301; MNGT 301H; MRKT 345; MRKT 350; MRKT 446; RAiK 370H, CSCE 370H; SCMA 331; SCMA 335; SCMA 350; SCMA 350H; SCMA 350L; STAT 412; STAT 414; STAT 450
ACE: ACE 3 Math/Stat/Reasoning
Groups: Advanced Mathematics Courses

MATH 380H Statistics and Applications
Crosslisted with: MATH 380H, STAT 380, STAT 380H, RAiK 270H
Prerequisites: A grade of P, C, or higher in MATH 107 or MATH 107H.
Notes: Y
Description: Probability calculus; random variables, their probability distributions and expected values; t, F and chi-square sampling distributions; estimation; testing of hypothesis; and regression analysis with applications.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: ABUS 341, MRKT 341; BLAW 371; BLAW 371H; BLAW 372; BSD 371H, RAiK 371H; CSCE 970; ECEN 325, ECEN 850, ECEN 450; ECON 311; FINA 361; FINA 361H; MATH 435; MATH 809, MATH 409; MECH 343; MNGT 301; MNGT 301H; MRKT 345; MRKT 350; MRKT 446; RAiK 370H, CSCE 370H; SCMA 331; SCMA 335; SCMA 350; SCMA 350H; SCMA 350L; STAT 412; STAT 414; STAT 450
ACE: ACE 3 Math/Stat/Reasoning
Groups: Advanced Mathematics Courses

MATH 398 Special Topics in Mathematics
Prerequisites: Permission.
Credit Hours: 1-24
Min credits per semester: 1
Max credits per semester: 24
Max credits per degree: 24
Format: LEC
Groups: Seminars, Ind Study, Topics
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<th>Course Code</th>
<th>Title</th>
<th>Prerequisites</th>
<th>Credits per Degree</th>
<th>Format</th>
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<td>Independent Study in Mathematics</td>
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<td>3-24</td>
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<td>Seminars, Ind Study, Topics</td>
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<td>MATH 405</td>
<td>Discrete and Finite Mathematics for High School Teaching</td>
<td>A grade of P, C, or better in MATH 314 or MATH 314H</td>
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<td>Mathematics for High School Teaching I</td>
<td>MATH 208 and 310</td>
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<td>MATH 408</td>
<td>Mathematics for High School Teaching II</td>
<td>MATH 310 and 350</td>
<td>3</td>
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<td>MATH 409</td>
<td>Math for High School Teachers II, Using Math to Understand Our World</td>
<td>Math 310, Math 314, Math 380/Stat 380</td>
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<tr>
<td>MATH 415</td>
<td>Theory of Linear Transformations</td>
<td>MATH 314/814 and either MATH 325 or MATH 310</td>
<td>3</td>
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<td>ACE 10 Integrated Product</td>
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<td>MATH 417</td>
<td>Group Theory</td>
<td>A grade of P, C, or better in MATH 310 or MATH 310H</td>
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<td>MATH 423</td>
<td>Complex Analysis</td>
<td>A grade of P, C, or better in MATH 208 or MATH 208H</td>
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<td>MATH 424</td>
<td>Introduction to Partial Differential Equations</td>
<td>A grade of P, C, or better in MATH 221 or MATH 221H</td>
<td>3</td>
<td>LEC</td>
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<td>Advanced Mathematics Courses</td>
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MATH 425 Mathematical Analysis
Prerequisites: A grade of P, C, or better in MATH 325
Description: Real number system, topology of Euclidean space and metric spaces, compactness, sequences, series, convergence and uniform convergence, and continuity and uniform continuity.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Groups: Advanced Mathematics Courses

MATH 427 Mathematical Methods in the Physical Sciences
Crosslisted with: MATH 827
Prerequisites: A grade of P, C, or better in MATH 221 or MATH 221H
Notes: Y
Description: Matrix operations, transformations, inverses, orthogonal matrices, rotations in space. Eigenvalues and eigenvectors, diagonalization, applications of diagonalization. Curvilinear coordinate systems, differential operations in curvilinear coordinate systems, Jacobians, changes of variables in multiple integration. Scalar, vector and tensor fields, tensor operations, applications or tensors. Complex function theory, integration by residues, conformal mappings.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Groups: Advanced Mathematics Courses

MATH 428 Principles of Operations Research
Crosslisted with: MATH 828
Prerequisites: MATH 314; STAT 380 or MECH 321.
Description: Introduction to techniques and applications of operations research. Includes linear programming, queueing theory, decision analysis, network analysis, and simulation.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
ACE: ACE 10 Integrated Product
Groups: Advanced Mathematics Courses

MATH 430 Ordinary Differential Equations
Prerequisites: MATH 221 or 221H; MATH 310 or MATH 310H or MATH 325.
Description: Qualitative behavior of solutions of systems of differential equations, including existence and uniqueness, extendibility, and periodic solutions. The Putzer algorithm, Floquet theory, matrix norms, linearization, stability theory, and period-doubling and chaos.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Groups: Advanced Mathematics Courses

MATH 432 Linear Optimization
Crosslisted with: MATH 832
Prerequisites: MATH 314 or 314H; MATH 310 or 310H or MATH 325
Description: Mathematical theory of linear optimization, convex sets, simplex algorithm, duality, multiple objective linear programs, formulation of mathematical models.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Groups: Advanced Mathematics Courses

MATH 433 Nonlinear Optimization
Crosslisted with: MATH 833
Prerequisites: MATH 314/814 and MATH 310 or MATH 325
Description: Mathematical theory of unconstrained and constrained optimization for nonlinear multivariate functions, particularly iterative methods, such as quasi-Newton methods, least squares optimization, and convex programming. Computer implementation of these methods.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Groups: Advanced Mathematics Courses

MATH 435 Math in the City
Prerequisites: MATH 221 or 221H and MATH 314 or 314H; or MATH 221 or 221H and MATH 380; or MATH 314 or 314H and MATH 380.
Description: A research experience modeling problems of current interest to the local community, businesses, or government.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
ACE: ACE 10 Integrated Product
Groups: Advanced Mathematics Courses

MATH 439 Mathematical Models in Biology
Crosslisted with: MATH 839
Prerequisites: A grade of P, C, or better in MATH 107 or MATH 107H
Notes: Y
Description: Discrete and continuous models in ecology: population models, predation, food webs, the spread of infectious diseases, and life histories. Elementary biochemical reaction kinetics; random processes in nature. Use of software for computation and graphics.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Groups: Advanced Mathematics Courses
MATH 440 Numerical Analysis I
Crosslisted with: CSCE 440, CSCE 840, MATH 840
Prerequisites: CSCE 155A, CSCE 155E, CSCE 155H, CSCE 155N, CSCE 155T, or SOFT 160; MATH 107.
Notes: Y
Description: Principles of numerical computing and error analysis covering numerical error, root finding, systems of equations, interpolation, numerical differentiation and integration, and differential equations. Modeling real-world engineering problems on digital computers. Effects of floating point arithmetic.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: CSCE 942, MATH 942

MATH 441 Approximation of Functions
Crosslisted with: CSCE 441, CSCE 841, MATH 841
Prerequisites: MATH 221/MATH 221H and MATH 314/MATH 314H.
Description: Polynomial interpolation, uniform approximation, orthogonal polynomials, least-first-power approximation, polynomial and spline interpolation, approximation and interpolation by rational functions.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: CSCE 942, MATH 942

MATH 442 Methods of Applied Mathematics I
Prerequisites: MATH 221 and 314, or their equivalents.
Description: Derivation, analysis, and interpretation of mathematical models for problems in the physical and applied sciences. Scaling and dimensional analysis. Asymptotics, including regular and singular perturbation methods and asymptotic expansion of integrals. Calculus of variations.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Groups: Advanced Mathematics Courses

MATH 445 Number Theory
Crosslisted with: MATH 845
Prerequisites: MATH 310 or 310H
Description: Fundamentals of number theory, including congruences, primality tests, factoring methods. Diophantine equations, quadratic reciprocity, continued fractions, and elliptic curves.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Groups: Advanced Mathematics Courses

MATH 447 Numerical Linear Algebra
Crosslisted with: CSCE 447, CSCE 847, MATH 847
Prerequisites: MATH 314
Description: Mathematics and algorithms for numerically stable matrix and linear algebra computations, including solution of linear systems, computation of eigenvalues and eigenvectors, singular value decomposition, and QR decomposition.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: CSCE 942, MATH 942

MATH 450 Combinatorics
Prerequisites: MATH 310 or 310H or 325.
Description: Theory of enumeration and/or existence of arrangements of objects: Pigeonhole principle, inclusion-exclusion, recurrence relations, generating functions, systems of distinct representatives, combinatorial designs and other applications.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Groups: Advanced Mathematics Courses

MATH 452 Graph Theory
Prerequisites: MATH 310 or MATH 325
Notes: Y
Description: Theory of directed and undirected graphs. Trees, circuits, subgraphs, matrix representations, coloring problems, and planar graphs. Methods which can be implemented by computer algorithms.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Groups: Advanced Mathematics Courses

MATH 456 Differential Geometry I
Prerequisites: MATH 221 or 221H; MATH 314 or 314H; and MATH 322.
Description: Introduction to a selection of topics in modern differential manifolds, vector bundles, vector fields, tensors, differential forms, Stoke's theorem, Riemannian and semi-Riemannian metrics, Lie Groups, connections, singularities. Includes gauge field theory, catastrophe theory, general relativity, fluid flow.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Groups: Advanced Mathematics Courses

MATH 465 Introduction to Mathematical Logic
Crosslisted with: MATH 865
Description: Semantical and syntactical developments of propositional logic, discussion of several propositional calculi, application of Boolean algebra and related topics, semantics and syntax of first order predicate logic including Godel's completeness theorem, the compactness theorem.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Groups: Advanced Mathematics Courses
MATH 471 Introduction to Topology  
**Prerequisites:** MATH 314 and either MATH 325 or 310  
**Description:** Elementary point-set and geometric topology. Point-set topics include topological spaces, continuous functions, homeomorphisms, connectedness, compactness, quotient spaces. Geometric topology topics include Euler characteristic, classification of surfaces, and other applications.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC  
**Prerequisite for:** MATH 856  
**Crosslisted with:** MATH 487 Probability Theory  
**Prerequisites:** MATH 314 and MATH 325  
**Description:** Probability, conditional probability, Bayes' theorem, independence, discrete and continuous random variables, density and distribution functions, multivariate distributions, probability and moment generating functions, the central limit theorem, convergence of sequences of random variables, random walks, Poisson processes and applications.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC  
**Groups:** Advanced Mathematics Courses  
**MATH 489 Stochastic Processes**  
**Crosslisted with:** MATH 889  
**Prerequisites:** MATH 314 and STAT/MATH 380 (or STAT 880)  
**Description:** Markov chains, continuous-time Markov processes, the Poisson process, Brownian motion, introduction to stochastic calculus.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC  
**Groups:** Advanced Mathematics Courses  
**MATH 495 Seminar**  
**Prerequisites:** MATH 208 or 208H; and permission.  
**Credit Hours:** 1-3  
**Min credits per semester:** 1  
**Max credits per semester:** 3  
**Max credits per degree:** 6  
**Format:** LEC  
**Groups:** Seminars, Ind Study, Topics  
**MATH 496 Seminar in Mathematics**  
**Crosslisted with:** MATH 896  
**Prerequisites:** Permission.  
**Credit Hours:** 1-3  
**Min credits per semester:** 1  
**Max credits per semester:** 3  
**Max credits per degree:** 6  
**Format:** LEC  
**Groups:** Seminars, Ind Study, Topics  
**MATH 497 Reading Course**  
**Prerequisites:** Permission.  
**Credit Hours:** 1-4  
**Min credits per semester:** 1  
**Max credits per semester:** 4  
**Max credits per degree:** 4  
**Format:** IND  
**Groups:** Seminars, Ind Study, Topics  

PLEASE NOTE  
This document represents a sample 4-year plan for degree completion with this major. Actual course selection and sequence may vary and should be discussed individually with your college or department academic advisor. Advisors also can help you plan other experiences to enrich your undergraduate education such as internships, education abroad, undergraduate research, learning communities, and service learning and community-based learning.

**Mathematics (B.A.)**

**Mathematics - sTANDARD (B.S.)**

**Mathematics - eDUCATION (B.S.)**

**Mathematics - Research Experience (B.S.)**

**Mathematics - Statistics (B.S.)**

**Career Information**

The following represents a sample of the internships, jobs and graduate school programs that current students and recent graduates have reported.

**Transferable Skills**

- Apply mathematical and scientific skills to solve real-world problems
- Develop basic techniques of statistical analysis
- Analyze and explain data
- Make predictions using mathematical, statistical, and scientific modeling methods
- Simplify complex information and present it to others
- Examine problems from multiple perspectives
- Use quantitative analysis techniques
- Use qualitative analysis techniques

**Jobs of Recent Graduates**

- Business Analyst, Sandhills Publishing - Lincoln NE
- Quality Assurance Analyst, Nanonation - Lincoln NE
- Implementation Consultant, Fast Enterprises - Centennial CO
- Data Engineer, Hudl - Lincoln NE
- Website Production Support, Cabela’s - Omaha NE
- Programmer/Analyst, Centrix Solutions, Inc. - Lincoln NE
- Math Teacher, Omaha Public Schools - Omaha NE
- Actuary, CNA Insurance - Chicago IL
- Social Insurance Specialist, Social Security - Kansas City MO
- Statistical Analyst, Experian - Lincoln NE
- Mathematics Teacher, Norris School District #16 - Firth NE
- Software Development Engineer, Microsoft - Redmond WA
- 2nd Lieutenant, United States Army - Ft. Benning GA
• Account Executive, 93.7 The Ticket - Lincoln NE
• Data & Research Analyst, Mercer - Urbandale IA

Internships
• Data Science Intern, The Hartford Insurance Company - Hartford CT
• Actuarial Intern, Lincoln Financial Group - Omaha NE
• Intern, American Embassy - Berlin, Germany
• Programming Intern, Firespring - Lincoln NE
• Intern, Nebraska Human Resources Institute - Lincoln NE
• Intern, Bureau of Sociological Research - Lincoln NE
• Software Development Intern, Tigerpaw Software - Bellevue NE
• Intern, Tetrad Property Group - Lincoln NE
• Summer Intern, Southwestern - Nationwide
• Intern - Group Actuarial, Ameritas Life Insurance Corp. - Lincoln NE
• Programming Intern, Firespring - Lincoln NE
• Associate Logistics Professional Intern, ConAgra Foods - Omaha NE

Graduate & Professional Schools
• Ph.D., Mathematics, University of Nebraska-Lincoln - Lincoln NE
• Ph.D., Physics, University of Nebraska-Lincoln - Lincoln NE
• Ph.D., Economics, University of Tennessee - Knoxville TN
• Master's Degree, Computer Science, University of Malaya - Kuala Lumpur, Malaysia
• Ph.D., Neural Computation, Center for Neural Basis of Cognition - Pittsburgh PA
• Doctor of Physical Therapy, Creighton University - Omaha NE
• Ph.D., Statistics, University of Nebraska-Lincoln - Lincoln NE
• Master's Degree, System Engineering, University of Pennsylvania - Philadelphia PA
• Master's Degree, Biostatistics, University of Southern California - Los Angeles CA
• Ph.D., Agricultural & Resource Economics, University of California, Berkeley - Berkeley CA
• Master’s Degree, Math Education, University of Nebraska-Lincoln - Lincoln NE
• Master’s Degree, Actuarial Science, University of Nebraska-Lincoln - Lincoln NE
• Master's Degree, Physics, Ohio State University - Columbus OH
• Master's Degree, Atmospheric Science, University of Utah - Salt Lake City UT