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 UNL General Admission Requirements. Students who are admitted through the Admission by Review process may have certain conditions attached to their enrollment at UNL. 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 languages. Four years of high school language will exempt students from the College of Arts and Sciences’ language requirement. It will also allow students to continue language study at a more advanced level, and give 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 UNL General Admissions 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 submit either the ACT or SAT scores.

Ordinarily, hours earned at an accredited college are accepted by the University. The College, however, will evaluate all hours submitted on an application for transfer and reserves the right to accept or reject any of them. Sixty 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 UNL. All D grades may be transferred from UNO or UNK, but they are not applicable to a major or minor.

Readmitted Students
Students readmitted to the College of Arts and Sciences will follow the requirements stated in the bulletin for the academic year of readmission and reenrollment as a degree-seeking student in Arts and Sciences. In consultation with advisors, a student may choose to follow a bulletin for any academic year in which they are admitted to and enrolled as a degree-seeking student at UNL in the College of Arts and Sciences. Students must complete all degree requirements from a single bulletin year. Beginning in 1990-1991, the bulletin 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 before graduating from the College of Arts and Sciences and should consult a college advisor in the Academic and Career Advising Center in 107 Oldfather Hall for questions about admission deficiencies.

Removing Foreign Language Deficiencies
Students must complete the second semester of the 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 two high school geometry courses by Independent Study or by completing a geometry course from an accredited community college or a four-year institution. Neither of these options count for college credit.

College Degree Requirements

College General Education Requirements
The College of Arts and Sciences distribution requirements are designed to further the purposes of liberal education by encouraging study in several different areas. Courses satisfying these requirements may impart specialized knowledge or broadly connect the subject matter to other areas of knowledge.

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 major to satisfy the Breadth Requirement (F), but may apply an ancillary requirement of the primary major or a course from their second major toward this requirement. Independent study or reading courses and internships cannot be used to satisfy distribution 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).

Bachelor of Arts or Bachelor of Science (16 credits + Language)
A. Written Communication: 3 hours
To be selected from courses approved for ACE outcome 1.

B. **Natural, Physical and Mathematical Sciences: 4 hours**
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. Select courses from geography\(^1\) and anthropology* may also be used to satisfy the lab requirement.

C. **Humanities: 3 hours**
Select from: classics\(^2\), English, history, modern languages and literatures\(^2\), philosophy, and religious studies\(^2\).

D. **Social Sciences: 3 hours**
Select from: anthropology\(^3\), communication studies, geography\(^3\), political science, psychology\(^3\), or sociology.

E. **Languages Classical and Modern: 0-6 hours**
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.

F. **Additional Breadth Requirement (may not be used toward the primary major; may apply toward ancillary requirements and second majors): 3 hours**
Select from: natural, physical and mathematical sciences (Area B), humanities (Area C), or social sciences (Area D).

1. See your 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**
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 BIOC 101 Career Opportunities in Biochemistry), biological sciences (excluding CASC 160 Introduction to Dentistry and Dental Hygiene, BIOS 160 Introduction to Clinical Laboratory Science, BIOS 203 Bioethics), chemistry (excluding CHEM 101 Career Opportunities in Chemistry), computer science (excluding CSCE 10 Introduction to CSE), geography (selected courses), geology, life sciences, mathematics (excluding courses below MATH 104 Applied Calculus), meteorology, 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**
UNL and the College of Arts and Sciences will exempt or waive students from the UNL 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**
1. For the University entrance requirements, students must show an official high school transcript with two or more years of the same foreign language in high school.
2. 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.
3. For the College of Arts and Sciences College Distribution Requirement E-Language, 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**
1. 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, UNL will provide testing only in the languages it teaches. Currently, these languages are:

   - Arabic
   - French
   - German
   - Spanish
   - Russian
   - Czech
   - Japanese
   - Chinese

The Department of Modern Languages will oversee the test and provide written documentation to the Arts and Sciences Advising Center that the student has passed the proficiency test at the 102 level.

2. 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.

**Distance Education**
1. For the University entrance requirement, students without transcript documentation who claim proficiency in a language not taught at UNL, 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 UNL 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.
2. 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 Requirements E-Languages requirement. If this waiver were granted, the student would then be required to complete 101 and 102 in another (3rd language) at UNL.

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 can be applied toward requirements in a major or a minor. No UNL 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.

For students in Arts and Sciences, the University regulations for Pass/No Pass apply as follows:

- 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 (1/2 of the course).
- 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:

- Pass/No Pass hours can count toward fulfillment of University ACE requirements and college distribution requirements up to the 24-hour maximum.
- Many Arts and Sciences departments and programs do not allow courses in the major or minor to be taken Pass/No Pass; students should refer to the department’s or program’s section of the bulletin for clarification. By college rule, departments can allow up to 6 hours of Pass/No Pass in the major or minor.
- 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 UNL and other U.S. schools. **NOTE:** This 24-hour limit is more restrictive than the University regulation.

Students who wish to apply P/N hours to their major and minor(s) must obtain approval on a form that is available in the Arts and Sciences Advising Center, 107 Oldfather Hall.

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 to 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. **NOTE:** ALEC 397E and ALEC 397K do not count toward these 30 hours.

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 UNL. 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 UNL and participate in prior-approved education abroad programs. UNL 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 10 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 that is directly equivalent to a UNL ACE-certified course. Courses from outside institutions 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.

Bulletin Rule

Students must fulfill the requirements stated in the bulletin for the academic year in which they are first admitted to and enrolled as a degree-seeking student at UNL. In consultation with advisors, a student may choose to follow a subsequent bulletin for any academic year in which they are admitted to and enrolled as a degree-seeking student at UNL in the College of Arts and Sciences. Students must complete all degree requirements from a single bulletin year. Beginning in 1990-1991 the bulletin 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: Concentration, Education, Statistics, or Research.

Core Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</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>
</tbody>
</table>

Specific Major Requirements

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

Option C (Concentration)

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

Option C Mathematics Courses

Select one course from:

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

Four additional advanced MATH courses with at least two at the 400 level.

Credit Hours Subtotal: 15

Any Plan A minor or an approved 18 hour concentration

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.

Option E (Education)

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.

Option E Mathematics Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 350</td>
<td>Geometry for High School Teaching</td>
<td>3</td>
</tr>
<tr>
<td>MATH 380 / STAT 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>
</tbody>
</table>

Credit Hours Subtotal: 15

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

Option R (Research Experience)

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

Option R Mathematics Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 221</td>
<td>Differential Equations</td>
<td>3</td>
</tr>
</tbody>
</table>

Four additional advanced mathematics courses with at least three at the 400 level.

Credit Hours Subtotal: 15

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.

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

**Option S Mathematics Courses**
MATH 380 / STAT 380 Statistics and Applications 3
Four additional advanced mathematics courses with at least two at the 400 level. 12
Credit Hours Subtotal: 15

**Statistics Courses**
Select three additional statistics courses at 300 or 400 level. 9
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**
MATH 106 Calculus I 5
MATH 107 Calculus II 4
MATH 208 Calculus III 4
MATH 310 Introduction to Modern Algebra 3
MATH 314 Linear Algebra 3
MATH 325 Elementary Analysis 3
MATH 221 Differential Equations 3
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. 9
Credit Hours Subtotal: 9

**Total Credit Hours**

**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.

MATH 106 Calculus I 5
MATH 107 Calculus II 4
MATH 208 Calculus III 4
Two advanced mathematics courses 6

Total Credit Hours 19

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

MATH 106 Calculus I 5
MATH 107 Calculus II 4
MATH 208 Calculus III 4

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**: One year high school algebra and appropriate score on the Math Placement Exam
**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 earned in MATH 100A will not count toward degree requirements.

**Credit Hours**: 3
**Max credits per semester**: 3
**Max credits per degree**: 3
**Format**: LEC
**Prerequisite for**: MATH 100A; MATH 101; MATH 103, MATH 103H
**Groups**: Introductory Mathematics
MATH 101 College Algebra
Prerequisites: Appropriate placement exam score and either two years of high school algebra or a grade of P, C, or better in MATH 100A
Notes: Credit for both MATH 101 and 103 is not allowed.
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: CRIM 300, CRIM 300H; MATH 101; MATH 102, MATH 102H; MATH 104
Groups: Introductory Mathematics

MATH 102 Trigonometry
Crosslisted with: MATH 102H
Prerequisites: One year high school geometry and either two years high school algebra, one semester high school precalculus, and a qualifying score on the Math Placement Exam; or a grade of C, P, or better in MATH 101
Description: Trigonometric functions, identities, trigonometric equations, solution of triangles, inverse trigonometric functions and graphs. Credit toward the degree may be earned in only one of MATH 102 or 103.
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, NRES 361H, AGRO 361H, GEOL 361H, SOIL 361H, WATS 361H; ASCI 340; MATH 102, MATH 102H; MATH 104; MATH 106, MATH 106H
Groups: Introductory Mathematics

MATH 102H Trigonometry
Crosslisted with: MATH 102
Prerequisites: One year high school geometry and either two years high school algebra, one semester high school precalculus, and a qualifying score on the Math Placement Exam; or a grade of C, P, or better in MATH 101
Description: Trigonometric functions, identities, trigonometric equations, solution of triangles, inverse trigonometric functions and graphs. Credit toward the degree may be earned in only one of MATH 102 or 103.
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, NRES 361H, AGRO 361H, GEOL 361H, SOIL 361H, WATS 361H; ASCI 340; MATH 102, MATH 102H; MATH 104; MATH 106, MATH 106H
Groups: Introductory Mathematics

MATH 103 College Algebra and Trigonometry
Crosslisted with: MATH 103H
Prerequisites: Appropriate placement exam score, one year high school geometry, and two years high school algebra. For students with previous college math courses, permission is also required.
Notes: For students with previous college math courses, permission is also required.
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, NRES 361H, AGRO 361H, GEOL 361H, SOIL 361H, WATS 361H; MATH 103, MATH 103H; MATH 104; MATH 106, MATH 106H; SOFT 160
Groups: Introductory Mathematics

MATH 103H College Algebra and Trigonometry
Crosslisted with: MATH 103
Prerequisites: Appropriate placement exam score, one year high school geometry, and two years high school algebra. For students with previous college math courses, permission is also required.
Notes: For students with previous college math courses, permission is also required.
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, NRES 361H, AGRO 361H, GEOL 361H, SOIL 361H, WATS 361H; MATH 103, MATH 103H; MATH 104; MATH 106, MATH 106H; SOFT 160
Groups: Introductory Mathematics

MATH 104 Applied Calculus
Prerequisites: Appropriate placement exam score or a grade of P (pass), or C or better in MATH 101
Description: Rudiments of differential and integral calculus with applications to problems from business, economics, and social sciences. Credit for both MATH 104 and 106 is not allowed.
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 308H; ACCT 309, ACCT 309H; ACCT 313, ACCT 313H; AGRO 361, GEOL 361, NRES 361, SOIL 361, WATS 361, NRES 361H, AGRO 361H, GEOL 361H, SOIL 361H, WATS 361H; AGRO 472, AGRO 872, NRES 472, NRES 872, SOIL 472, WATS 472; BLAW 371; BLAW 371H; BLAW 372; BLAW 372H; BSEN 355; ECON 215; ECON 215H; ECON 311, ECON 311H; FINA 361; FINA 361H; FORS 411; MATH 104; MNGT 301; MNGT 301H; MRKT 341H, RAJK 341H; SCMA 331; SCMA 335; SCMA 350; SCMA 350H
ACE: ACE 3 Math/Stat/Reasoning
Groups: Introductory Mathematics
MATH 106 Calculus I
Crosslisted with: MATH 106H
Prerequisites: One year high school geometry; two years algebra and one year precalculus-trigonometry in high school or MATH 102 or Math 103 or equivalent
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 for both MATH 104 and Math 106 is not allowed.
Credit Hours: 5
Max credits per semester: 5
Max credits per degree: 5
Format: LEC
Prerequisite for: MATH 107H

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; BLAW 371; CHME 331, CHME 331H, ECON 224, ECON 215; ECON 311, ECON 311H; FINA 361; FINA 361H; MATH 107; MATH 208; MATH 380, MATH 380H, STAT 380, STAT 380H, RAIK 270H; MECH 223; METR 223; MNGT 301; MNGT 301H; MRKT 341H, RAIK 341H; SCMA 331; SCMA 335; SCMA 350; SCMA 350H
ACE: ACE 3 Math/Stat/Reasoning
Groups: Introductory Mathematics

MATH 106H Calculus I
Crosslisted with: MATH 106
Prerequisites: One year high school geometry; two years algebra and one year precalculus-trigonometry in high school or MATH 102 or Math 103 or equivalent.
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 for both MATH 104 and Math 106 is not allowed.
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 308H; ACCT 309, ACCT 309H; ACCT 312, ACCT 313H; AGEN 225, AGEN 225H, BSEN 225, BSEN 225H; AGRO 361, GEOL 361, NRES 361, SOIL 361, WATS 361, NRES 361H, AGRO 361H, GEOL 361H, SOIL 361H, WATS 361H; AGRO 472, AGRO 872, NRES 472, NRES 872, SOIL 472, WATS 472; BLAW 371; BLAW 371H; BLAW 372, BLAW 372H; BSEN 355; CHME 114; CNST 241, CNST 241H; CNST 252; CNST 306; CSCE 235, CSCE 235H; ECON 215; ECON 215H; ECON 311, ECON 311H; FINA 361; FINA 361H; FORS 411; MATH 106, MATH 106H; MATH 107; MATH 107H; MNGT 301; MNGT 301H; MRKT 341H, RAIK 341H; 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; BLAW 371; CHME 202, CHME 202H; CHME 331, CHME 331H, ECON 224, ECON 311, ECON 311H; FINA 361; FINA 361H; MATH 107; MATH 208; MATH 380, MATH 380H, STAT 380, STAT 380H, RAIK 270H; MECH 223; METR 223; MNGT 301; MNGT 301H; MRKT 341H, RAIK 341H; SCMA 331; SCMA 335; SCMA 350; SCMA 350H
ACE: ACE 3 Math/Stat/Reasoning
Groups: Introductory Mathematics

MATH 107R Analytic Geometry and 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: 5
Max credits per semester: 5
Max credits per degree: 5
Format: LEC
Prerequisite for: ABUS 341, MRKT 341; ACCT 200; ASTR 204; BLAW 371; BLAW 371H; BLAW 372, BLAW 372H; CHME 202, CHME 202H; CHME 331, CHME 331H; ECON 224, ECON 311, ECON 311H; FINA 361; FINA 361H; MATH 107; MATH 208; MECH 223; MNGT 301; MNGT 301H; MRKT 341H, RAIK 341H; 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.
Description: Topics vary. University Honors Seminar is required of all students in the University Honors Program.
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 198 Freshman Seminar
Credit Hours: 1-3
Min credits per semester: 1
Max credits per semester: 3
Max credits per degree: 1-3
Format: LEC
Groups: Seminars, Ind Study, Topics

MATH 203 Contemporary Mathematics
Crosslisted with: MATH 203H
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. Not open to students with credit or concurrent enrollment in MATH 106 or MATH 203J.
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
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. Not open to students with credit or concurrent enrollment in MATH 106 or MATH 203.
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, MRKT 341; ACTS 401; BLAW 371; BLAW 371H; BLAW 372, BLAW 372H; ECEN 306; ECEN 328; ECON 311, ECON 311H; FINA 361; FINA 361H; MATH 208; MATH 310; MATH 325, MATH 325H; MATH 435; MECH 321; MECH 325H; MECH 373; MECH 373H; MECH 421, MECH 821, ENGR 421; MNGT 301; MNGT 301H; MRKT 341H, RAiK 341H; SCMA 331; SCMA 335; SCMA 350; SCMA 350H; STAT 462, STAT 462H
ACE: ACE 3 Math/Stat/Reasoning
Groups: Introductory Mathematics

MATH 208H Honors: Calculus III
Prerequisites: Good standing in the University Honors Program or by invitation
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; ACTS 401; BLAW 371; BLAW 371H; BLAW 372, BLAW 372H; ECEN 306; ECEN 328; ECON 311, ECON 311H; FINA 361; FINA 361H; MATH 208; MATH 310; MATH 325, MATH 325H; MATH 435; MECH 321; MECH 325H; MECH 373; MECH 373H; MECH 421, MECH 821, ENGR 421; MNGT 301; MNGT 301H; MRKT 341H, RAiK 341H; SCMA 331; SCMA 335; SCMA 350; SCMA 350H; STAT 462, STAT 462H
ACE: ACE 3 Math/Stat/Reasoning
Groups: Introductory Mathematics
MATH 221 Differential Equations
Crosslisted with: MATH 821
Prerequisites: A grade of P or C; or better in MATH 208/208H
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: AGEN 344, AGEN 344H, BSEN 344, BSEN 344H; AG57, 45, 97, 45, 97, 45, 97; BSEN 311, BSEN 311H; BSEN 317, BSEN 317H; BSEN 326, CIVE 326; CHME 835; CIVE 310; CIVE 310H; ECEN 213; ECEN 304, ECEN 304H; ECEN 306; ECEN 328; MATH 430; MATH 442; MECH 310, MECH 310H; MECH 381; MECH 925; MECH 933; MECH 936; MECH 938; METR 312
ACE: ACE 3 Math/Stat/Reasoning
Groups: Advanced Mathematics Courses

MATH 221H Honors:Differential Equations
Prerequisites: Good standing in the University Honors Program or by invitation
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: AGEN 344, AGEN 344H, BSEN 344, BSEN 344H; AG57, 45, 97, 45, 97, 45, 97; BSEN 311, BSEN 311H; BSEN 317, BSEN 317H; BSEN 326, CIVE 326; CHME 835; CIVE 310; CIVE 310H; ECEN 213; ECEN 304, ECEN 304H; ECEN 306; ECEN 328; MATH 430; MATH 442; MECH 310, MECH 310H; MECH 381; MECH 925; MECH 933; MECH 936; MECH 938; METR 312
ACE: ACE 3 Math/Stat/Reasoning
Groups: Advanced Mathematics Courses

MATH 238 Mathematical Methods for Biology and Medicine
Crosslisted with: MATH 838
Description: Mathematical modeling, discrete and continuous probability, parameter estimation, discrete and continuous dynamical systems, and Markov chains. Application of mathematical models in the life sciences. Methods include regression analysis, cobweb diagrams, the phase line, nullcline analysis, eigenvalue analysis, linearization, and likelihood analysis. Applications include fisheries, stage-structured populations, pharmacokinetics, epidemiology, and medical testing. MATH 838 will not count toward a MA or MS degree in MATH or STAT.
Credit Hours: 5
Max credits per semester: 5
Max credits per degree: 5
Format: LEC
Groups: Advanced Mathematics Courses

MATH 300 Mathematics Matters
Crosslisted with: MATH 300H
Prerequisites: Parallel TEAC 308 or Parallel TEAC 416D; admission to the College of Education and Human Sciences; removal of any mathematics entrance deficiencies.
Notes: Credit toward the degree may be earned in only one of: MATH 300 or MATH 300M. MATH 300 is designed for elementary education majors with mathematics as an area of concentration.
Description: 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: TEAC 308, TEAC 308H
Groups: Introductory Mathematics

MATH 300H Mathematics Matters
Crosslisted with: MATH 300
Prerequisites: Parallel TEAC 308 or Parallel TEAC 416D; admission to the College of Education and Human Sciences; removal of any mathematics entrance deficiencies.
Notes: Credit toward the degree may be earned in only one of: MATH 300 or MATH 300M. MATH 300 is designed for elementary education majors with mathematics as an area of concentration.
Description: 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: TEAC 308, TEAC 308H
Groups: Introductory Mathematics

MATH 303 Mathematics as a Second Language
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". MATH 303M is designed to strengthen the mathematics knowledge of the middle-level mathematics teacher.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Groups: Introductory Mathematics

MATH 304 Geometry Matters
Crosslisted with: MATH 301H
Description: Geometry and measurement. Develop an understanding of geometry as taught in the elementary school. Credit towards the degree may be earned in only one of: MATH 201 or MATH 301. Designed for elementary education majors with mathematics as an area of concentration.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Groups: Introductory Mathematics
MATH 301H Geometry Matters
Crosslisted with: MATH 301
Description: Geometry and measurement. Develop an understanding of geometry as taught in the elementary school. Credit towards the degree may be earned in only one of: MATH 201 or MATH 301. Designed for elementary education majors with mathematics as an area of concentration.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Groups: Introductory Mathematics

MATH 302 Math Modeling
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. Math 300 is a strongly recommended prerequisite. Math 302 is intended for middle grades teaching endorsement majors with a mathematics emphasis and/or to elementary education majors who want a mathematics concentration.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Groups: Introductory Mathematics

MATH 304 Experimentation, Conjecture, and Reasoning
Crosslisted with: MATH 304H
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 304H Experimentation, Conjecture, and Reasoning
Crosslisted with: MATH 304
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
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: MATH 208
Description: Elementary number theory, including induction, the Fundamental Theorem of Arithmetic, and modular arithmetic. Introduction to rings and fields as a 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 417, MATH 417H; MATH 430; MATH 452, MATH 452H; MATH 471; MATH 809, MATH 409
ACE: ACE 3 Math/Stat/Reasoning
Groups: Advanced Mathematics Courses

MATH 310H Honors: Introduction to Modern Algebra
Description: Introduction to groups, rings, and fields as a natural extension of elementary number theory and the theory of equations. Particular emphasis on the study of polynomials with coefficients in the rationals, reals, or complex numbers.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: MATH 350; MATH 417, MATH 417H; MATH 430; MATH 452, MATH 452H; MATH 471; MATH 809, MATH 409
ACE: ACE 3 Math/Stat/Reasoning
Groups: Advanced Mathematics Courses

MATH 314 Linear Algebra
Crosslisted with: MATH 814
Prerequisites: MATH 208
Description: Fundamental concepts of linear algebra, including properties of matrix arithmetic, systems of linearequations, vector spaces, inner products, determinants, eigenvalues and eigenvectors, and diagonalization. Not open to MA or MS students in mathematics or statistics.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: MATH 405, MATH 405H; MATH 442; MATH 450, MATH 450H; MATH 471; MATH 809, MATH 409; MECH 350, MECH 350H
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 or by invitation.
Description: Fundamental concepts of linear algebra from the point of view of matrix manipulation with emphasis on concepts that are most important in applications. Includes solving systems of linear equations, vector spaces, inner products, determinants, eigenvalues, similarity of matrices, and Jordan Canonical Form.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: MATH 405, MATH 405H; MATH 442; MATH 450, MATH 450H; MATH 471; MATH 809, MATH 409; MECH 350, MECH 350H
ACE: ACE 3 Math/Stat/Reasoning
Groups: Advanced Mathematics Courses

MATH 316 Case Studies in Theoretical Ecology
Crosslisted with: BIOS 316, NRES 316
Description: Introduction to biological literature, applied mathematics, computer programming, and/or statistical techniques relevant to particular questions in ecology, evolution, and behavior. Typical mathematical topics include discrete dynamics, systems of differential equations, matrix algebra, or statistical inference and probability. Case studies are structured around preparation for subsequent independent research (BIOS 498 or MATH 496).
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Groups: Advanced Mathematics Courses

MATH 322 Advanced Calculus
Crosslisted with: MATH 322H, 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: METR 965
Groups: Advanced Mathematics Courses

MATH 322H Advanced Calculus
Crosslisted with: MATH 322, 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: METR 965
Groups: Advanced Mathematics Courses

MATH 325 Elementary Analysis
Crosslisted with: MATH 325H
Prerequisites: MATH 208
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 425H; MATH 430; MATH 452, MATH 452H; MATH 471
ACE: ACE 3 Math/Stat/Reasoning
Groups: Advanced Mathematics Courses

MATH 325H Elementary Analysis
Crosslisted with: MATH 325
Prerequisites: MATH 208
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: METR 965
Groups: Advanced Mathematics Courses

MATH 350 Geometry for High School Teaching
Prerequisites: MATH 310
Description: Modern elementary geometry, plane transformations and applications, the axiomatic approach, Euclidean constructions. Additional topics vary. NOT open to MATH majors EXCEPT those under degree option “E” who are seeking a secondary mathematics teaching endorsement.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Groups: Introductory Mathematics
MATH 380 Statistics and Applications
Crosslisted with: MATH 380H, STAT 380, STAT 380H, RAIK 270H
Prerequisites: MATH 107 or 107H
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, BLAW 372H; ECEN 325; ECEN 355; ECEN 850, ECEN 450; ECON 311, ECON 311H; FINA 361; FINA 361H; MATH 809, MATH 409; MECH 343, MECH 343H; MNGT 301; MNGT 301H; MRKT 345; MRKT 350; MRKT 446; SCMA 331; SCMA 335; SCMA 350; SCMA 350H; SCMA 350L
ACE: ACE 3 Math/Stat/Reasoning
Groups: Advanced Mathematics Courses

MATH 380H Statistics and Applications
Crosslisted with: MATH 380, STAT 380, STAT 380H, RAIK 270H
Prerequisites: MATH 107 or 107H
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, BLAW 372H; ECEN 325; ECEN 355; ECEN 850, ECEN 450; ECON 311, ECON 311H; FINA 361; FINA 361H; MATH 809, MATH 409; MECH 343, MECH 343H; MNGT 301; MNGT 301H; MRKT 345; MRKT 350; MRKT 446; SCMA 331; SCMA 335; SCMA 350; SCMA 350H; SCMA 350L
ACE: ACE 3 Math/Stat/Reasoning
Groups: Advanced Mathematics Courses

MATH 394 Topics in Contemporary Mathematics
Description: Topics course for students in academic fields not requiring calculus. Emphasis on understanding and mathematical thinking rather than mechanical skills. Topic varies.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 6
Format: LEC
Groups: Advanced Mathematics Courses

MATH 396 Special Topics in Mathematics
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

MATH 398 Special Topics in Mathematics
Description: Advanced Mathematics Courses
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: IND
Groups: Seminars, Ind Study, Topics

MATH 399 Independent Study in Mathematics
Credit Hours: 1-24
Min credits per semester: 1
Max credits per semester: 24
Max credits per degree: 24
Groups: Seminars, Ind Study, Topics

MATH 399H Honors Course
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

MATH 405 Discrete and Finite Mathematics for High School Teaching
Crosslisted with: MATH 405H
Prerequisites: MATH 314 or 314H recommended
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Groups: Advanced Mathematics Courses

MATH 405H Discrete and Finite Mathematics for High School Teaching
Crosslisted with: MATH 405
Prerequisites: MATH 314 or 314H recommended
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Groups: Advanced Mathematics Courses

MATH 405J Mathematics for High School Teaching I
Crosslisted with: MATH 807
Prerequisites: MATH 208 and 310
Description: Analysis of the connections between college mathematics and high school algebra and precalculus. NOT open to MATH majors EXCEPT those under degree option “E” who are seeking a secondary mathematics teaching endorsement.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Groups: Advanced Mathematics Courses

MATH 406 Mathematics for High School Teaching II
Crosslisted with: MATH 808
Prerequisites: MATH 310 and 350
Description: Analysis of the connections between college mathematics and high school algebra and geometry. NOT open to MATH majors EXCEPT those under degree option “E” who are seeking a secondary mathematics teaching endorsement.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Groups: Advanced Mathematics Courses
MATH 409 Math for High School Teachers II, Using Math to Understand Our World
Crosslisted with: MATH 809
Prerequisites: Math 310, Math 314, Math 380/Stat 380
Description: This course is designed around a series of projects in which students create mathematical models to examine the mathematics underlying several socially-relevant questions. Not open to MA or MS students in Mathematics. This course is for students seeking a mathematics major under the Education Option and for students in CEHS who are seeking their secondary mathematics teaching certificate.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

MATH 415 Theory of Linear Transformations
Crosslisted with: MATH 815
Prerequisites: Math 314/814 and either Math 325 or Math 310
Description: Topics fundamental to the study of linear transformations on finite and infinite dimensional vector spaces over the real and complex number fields including: subspaces, direct sums, quotient spaces, dual spaces, matrix of a transformation, adjoint map, invariant subspaces, triangularization and diagonalization. Additional topics may include: Riesz Representation theorem, projections, normal operators, spectral theorem, polar decomposition, singular value decomposition, determinant as an n-linear functional, Cayley-Hamilton theorem, nilpotent operators, and Jordan canonical form.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

MATH 417 Group Theory
Crosslisted with: MATH 417H
Prerequisites: MATH 310
Description: Elementary group theory, including cyclic, dihedral, and permutation groups; subgroups, cosets, normality, and quotient groups; fundamental isomorphism theorems; the theorems of Cayley, Lagrange, and Cauchy; and if time allows, Sylow's theorems.
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 417H Group Theory
Crosslisted with: MATH 417
Prerequisites: MATH 310
Description: Elementary group theory, including cyclic, dihedral, and permutation groups; subgroups, cosets, normality, and quotient groups; fundamental isomorphism theorems; the theorems of Cayley, Lagrange, and Cauchy; and if time allows, Sylow's theorems.
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 423 Complex Analysis
Crosslisted with: MATH 423H, MATH 823
Prerequisites: MATH 221 or MATH 325
Description: Complex numbers, functions of complex variables, analytic functions, complex integration, Cauchy's integral formulas, Taylor and Laurent series, calculus of residues and contour integration, conformal mappings, harmonic functions. Applications of these concepts in engineering, physical sciences, and mathematics.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Groups: Advanced Mathematics Courses

MATH 423H Complex Analysis
Crosslisted with: MATH 423, MATH 823
Prerequisites: MATH 221 or MATH 325
Description: Complex numbers, functions of complex variables, analytic functions, complex integration, Cauchy's integral formulas, Taylor and Laurent series, calculus of residues and contour integration, conformal mappings, harmonic functions. Applications of these concepts in engineering, physical sciences, and mathematics.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Groups: Advanced Mathematics Courses

MATH 424 Introduction to Partial Differential Equations
Crosslisted with: MATH 424H, MATH 824
Prerequisites: MATH 221
Description: Derivation of the heat, wave, and potential equations; separation of variables method of solution; solutions of boundary value problems by use of Fourier series, Fourier transforms, eigenfunction expansions with emphasis on the Bessel and Legendre functions; interpretations of solutions in various physical settings. Not open to MA or MS students in mathematics or statistics.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Groups: Advanced Mathematics Courses

MATH 424H Introduction to Partial Differential Equations
Crosslisted with: MATH 424, MATH 824
Prerequisites: MATH 221
Description: Derivation of the heat, wave, and potential equations; separation of variables method of solution; solutions of boundary value problems by use of Fourier series, Fourier transforms, eigenfunction expansions with emphasis on the Bessel and Legendre functions; interpretations of solutions in various physical settings. Not open to MA or MS students in mathematics or statistics.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Groups: Advanced Mathematics Courses
MATH 425 Mathematical Analysis
Crosslisted with: MATH 425H
Prerequisites: MATH 325 or permission
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 425H Mathematical Analysis
Crosslisted with: MATH 425
Prerequisites: MATH 325 or permission
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
Description: Matrix operations, transformations, inverses, orthogonal matrices, rotations in space. Eigenvalues and eigenvectors, diagonalization, applications of diagonalization. Curvilinear coordinate systems, differential equations 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 428H, MATH 828
Prerequisites: MATH 314 and either STAT 380 or MECH 321.
Description: Introduction to techniques and applications of operations research. Includes linear programming, queuing theory, decision analysis, network analysis, and simulation.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Crosslisted with: MATH 428H, MATH 828
Groups: Advanced Mathematics Courses

MATH 430 Ordinary Differential Equations
Prerequisites: MATH 221 or 221H, and either MATH 310 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 and either MATH 310 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 433H, MATH 833
Prerequisites: MATH 314/814 and MATH 310 or MATH 325
Description: Mathematical theory of 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 208 and at least two of Math 221, Math 314, 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
Crosslisted with: MATH 435H, MATH 835
Groups: Advanced Mathematics Courses

ACE: ACE 10 Integrated Product
MATH 439 Mathematical Models in Biology  
Crosslisted with: MATH 839  
Prerequisites: MATH 107 or permission  
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. MATH 439/839 has a small laboratory component.  
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 440H, CSCE 840, MATH 440H, MATH 840  
Prerequisites: CSCE 155A, CSCE 155E, CSCE 155H, CSCE 155N, CSCE 155T, or SOFT 160; MATH 107.  
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

MATH 440H Numerical Analysis I  
Crosslisted with: CSCE 440, CSCE 440H, CSCE 840, MATH 440, MATH 840  
Prerequisites: CSCE 155A, CSCE 155E, CSCE 155H, CSCE 155N, CSCE 155T, or SOFT 160; MATH 107.  
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

MATH 441 Approximation of Functions  
Crosslisted with: CSCE 441, CSCE 841, MATH 841  
Prerequisites: MATH 221 and 314  
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  
Groups: Advanced Mathematics Courses

MATH 442 Methods of Applied Mathematics I  
Prerequisites: MATH 221 and MATH 314  
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 445H, 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 445H Number Theory  
Crosslisted with: MATH 445, 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 446 Introduction to the Theory of Numbers II  
Description: Diophantine approximations, irrationality and trancendence, applications of the Euler-Maclaurin sum formula, Selberg's proof of the prime number theorem, order of magnitude of some arithmetic functions, the lattice point problem.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Format: LEC

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  
Groups: Advanced Mathematics Courses
MATH 450 Combinatorics
Crosslisted with: MATH 450H
Prerequisites: MATH 314
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 450H Combinatorics
Crosslisted with: MATH 450
Prerequisites: MATH 314
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
Crosslisted with: MATH 452H
Prerequisites: MATH 310 or MATH 325
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. Selected applications.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Groups: Advanced Mathematics Courses

MATH 452H Graph Theory
Crosslisted with: MATH 452
Prerequisites: MATH 310 or MATH 325
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. Selected applications.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Groups: Advanced Mathematics Courses

MATH 456 Differential Geometry I
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 455 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 465 Introduction to Mathematical Logic II
Description: Semantics and syntax of first order predicate logic including Godel's completeness theorem, decision problems, formalization of deductive theories, the structure of applied predicate calculi, the calculus of classes, introduction to higher order predicate logic.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

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

MATH 487 Probability Theory
Crosslisted with: MATH 887
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

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
ACE: ACE 10 Integrated Product
Groups: Advanced Mathematics Courses
MATH 495 Seminar  
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 496H, MATH 896  
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 496H Seminar in Mathematics  
Crosslisted with: MATH 496, MATH 896  
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  
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.

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  
- Comprehend and critically evaluate complex information  
- Use quantitative analytical computational techniques  
- Make predictions using mathematical, statistical, and scientific modeling methods  
- Understand and use proper laboratory and technical skills and instruments  
- Define problems and identifying causes  
- More...  
  - Support and communicate claims using clear evidence  
  - Simplify complex information and present it to others  
  - Apply mathematical and scientific skills to solve real-world problems  
  - Document and replicate processes and procedures  

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  
- More...  
  - 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  

Internships  
- Data Science Intern, The Hartford Insurance Company - Hartford CT  
- Actuarial Intern, Lincoln Financial Group - Omaha NE  
- Intern, American Embassy - Berlin, Germany ZZ  
- Programming Intern, Firespring - Lincoln NE  
- Intern, Nebraska Human Resources Institute - Lincoln NE  
- More...  
  - Intern, Bureau of Sociological Research - Lincoln NE  
  - Software Development Intern, Tigerpaw Software - Bellevue NE  
  - Intern, Tetrax Property Group - Lincoln NE  
  - Summer Intern, Southwestern -  
  - Intern - Group Actuarial, Ameritas Life Insurance Corp. - Lincoln NE  

Grad Schools  
- Mathematics Ph.D, University of Nebraska-Lincoln - Lincoln NE  
- Physics Ph.D. Program, University of Nebraska-Lincoln - Lincoln NE  
- Economics PhD, University of Tennessee - Knoxville TN  
- Masters of Computer Science, University of Malaya - Kuala Lumpur ZZ  
- Ph.D. Program for Neural Computation, Center for Neural Basis of Cognition - Pittsburgh PA  
- More...  
  - Doctorate of Physical Therapy, Creighton University - Omaha NE  
  - PhD in Statistics, University of Nebraska-Lincoln - Lincoln NE  
  - Masters in System Engineering, University of Pennsylvania - Philadelphia PA  
  - Biostatistics Graduate Program, University of Southern California - Los Angeles CA  
  - Agricultural Resource Economics, Ph.D., University of California, Berkley - Berkeley CA