

<b>Fiscal Unit/Academic Org</b>	Mathematics - D0671
<b>Administering College/Academic Group</b>	Mathematical And Physical Sci
<b>Co-administering College/Academic Group</b>	
<b>Semester Conversion Designation</b>	Converted with minimal changes to program goals and/or curricular requirements (e.g., sub-plan/specialization name changes, changes in electives and/or prerequisites, minimal changes in overall structure of program, minimal or no changes in program goals or content)
<b>Current Program/Plan Name</b>	Mathematics
<b>Proposed Program/Plan Name</b>	Mathematics
<b>Program/Plan Code Abbreviation</b>	MATH-BA
<b>Current Degree Title</b>	Bachelor of Arts

## Credit Hour Explanation

Program credit hour requirements		A) Number of credit hours in current program (Quarter credit hours)	B) Calculated result for 2/3rds of current (Semester credit hours)	C) Number of credit hours required for proposed program (Semester credit hours)	D) Change in credit hours
Total minimum credit hours required for completion of program		53	35.3	38	2.7
Required credit hours offered by the unit	Minimum	40	26.7	31	4.3
	Maximum	48	32.0	34	2.0
Required credit hours offered outside of the unit	Minimum	5	3.3	4	0.7
	Maximum	19	12.7	12	0.7
Required prerequisite credit hours not included above	Minimum	15	10.0	10	0.0
	Maximum	49	32.7	33	0.3

**Explain any change in credit hours if the difference is more than 4 semester credit hours between the values listed in columns B and C for any row in the above table**

Minimum and maximum in row #2 come from different sub-plans. Within each sub-plan the change in semester credit hours is less than 4.

## Program Learning Goals

Note: these are required for all undergraduate degree programs and majors now, and will be required for all graduate and professional degree programs in 2012. Nonetheless, all programs are encouraged to complete these now.

### Program Learning Goals

- Learn conceptual frameworks needed to study higher mathematics, including an introduction to mathematical reasoning, and an understanding of how to read and write proofs.
- Acquire basic mastery of core areas of mathematics, including calculus, analysis and algebra.
- Develop powerful mathematical problem solving skills.
- Learn to communicate mathematical understanding effectively.
- Become proficient in chosen tracks within the major.

## Assessment

Assessment plan includes student learning goals, how those goals are evaluated, and how the information collected is used to improve student learning. An assessment plan is required for undergraduate majors and degrees. Graduate and professional degree programs are encouraged to complete this now, but will not be required to do so until 2012.

**Is this a degree program (undergraduate, graduate, or professional) or major proposal? Yes**

**Does the degree program or major have an assessment plan on file with the university Office of Academic Affairs? Yes**

Summarize how the program's current quarter-based assessment practices will be modified, if necessary, to fit the semester calendar.

Assessment practices will have minimal modifications.

## Program Specializations/Sub-Plans

If you do not specify a program specialization/sub-plan it will be assumed you are submitting this program for all program specializations/sub-plans.

**Program Specialization/Sub-Plan Name** Theoretical (Existing)

**Program Specialization/Sub-Plan Goals**

**Program Specialization/Sub-Plan Name** Education (Existing)

**Program Specialization/Sub-Plan Goals**

**Program Specialization/Sub-Plan Name** Bio-Math (Existing)

**Program Specialization/Sub-Plan Goals**

**Program Specialization/Sub-Plan Name** Applied (Existing)

**Program Specialization/Sub-Plan Goals**

**Program Specialization/Sub-Plan Name** Financial (Existing)

**Program Specialization/Sub-Plan Goals**

## Pre-Major

Does this Program have a Pre-Major? No

## Attachments

- Mathematics BS and BA cover letter.doc: NMS Division of Arts and Sciences cover letter

*(Letter from the College to OAA. Owner: Andereck, Claude David)*

- CCI Subcommittee Chair Letter.doc: CCI Subcommittee Chair Letter

*(Other Supporting Documentation. Owner: Vankeerbergen, Bernadette Chantal)*

- Math\_BA\_5.pdf: combined document

*(Program Rationale Statement. Owner: Shapiro, Daniel B)*

## Comments

- There appears to be a problem with the document labeled Math BA. When I try to combine the files into a single pdf that document comes up blank with the exception of the last page.

DH *(by Hanlin, Deborah Kay on 06/29/2011 02:29 PM)*

- the attachment fulfills several goals. *(by Shapiro, Daniel B on 03/17/2011 08:43 PM)*

## Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Shapiro, Daniel B	03/17/2011 08:43 PM	Submitted for Approval
Approved	Shapiro, Daniel B	03/17/2011 10:22 PM	Unit Approval
Approved	Andereck, Claude David	03/22/2011 03:35 PM	College Approval
Revision Requested	Vankeerbergen, Bernadette Chantal	04/11/2011 08:27 AM	ASCCAO Approval
Submitted	Shapiro, Daniel B	05/12/2011 04:05 PM	Submitted for Approval
Approved	Shapiro, Daniel B	05/12/2011 04:09 PM	Unit Approval
Revision Requested	Andereck, Claude David	05/20/2011 04:02 PM	College Approval
Submitted	Shapiro, Daniel B	06/28/2011 04:57 PM	Submitted for Approval
Approved	Shapiro, Daniel B	06/28/2011 05:00 PM	Unit Approval
Approved	Andereck, Claude David	06/29/2011 01:35 PM	College Approval
Revision Requested	Hanlin, Deborah Kay	06/29/2011 02:29 PM	ASCCAO Approval





**Department of English**

421 Denney Hall  
164 W. 17<sup>th</sup> St.  
Columbus, OH 43210

Phone (614) 292-0695

TO: Larry Krissek, Committee on Curriculum and Instruction (CCI) Chair  
FROM: James Fredal, CCI Social, Behavioral, Biological, Mathematical and Physical Sciences  
Subcommittee Chair  
RE: Semester Conversion Proposal for Actuarial Science BA and BS.

April 6, 2011

Larry:

The Sciences subcommittee of the CCI met on March 28<sup>th</sup> to review semester conversion proposals for the Math BS and BA major programs. The two programs are identical except for the name and the GE Math requirement; therefore the two proposals were considered together and recommended changes will apply to both version except where specified otherwise.

The proposal lists the changes to the programs from quarters to semesters as minimal, but there are a few structural changes:

- The six tracks under quarters have been reduced to five tracks under semesters. The Applied Discrete Mathematics track has been eliminated because of low enrollments.
- With semesters, the Math department will institute a “C-“ rule for all its courses. The rule will state that before students can enroll in a math class, they must achieve a C- or better in prerequisite courses. This rule had applied to transitions within the 151-153 sequence, but will now apply to all math classes within the major.
- In some cases, the department departed from the standard 5/3 rule in converting quarter hours to semester hours, resulting in an increase in credit hours for some classes. A brief rationale is provided for these courses. This increase had the greatest impact on the Financial track, with the result that one required course (Practicum in Actuarial Science) was dropped to lessen the impact on total hours for graduation. Other affected tracks were similarly modified to adjust credit hour requirements; changes for each track are summarized within the proposal. Though several experienced an increase in hours compared to the quarter equivalency measure, the difference within each track was less than 4.

In other ways, the structure of the major and its tracks has remained unchanged, and the transition plan is detailed, quite thorough, and trust inducing. The subcommittee had several recommendations and corrections but found the proposal in general complete and approved it unanimously pending the rectification of the following infelicitous contingencies.

1. The transition courses 114 and 1114 are listed as a pass/non pass course. Will this be a problem for a course that counts as a GE course? If so, it may have to be a graded course. Alternatively, CCI may elect to grant a waiver, especially in light of the fact that this is a bridge course that is going to be offered once or twice, and is therefore only temporary issue.
2. The Credit Hour Explanation chart on the PACER form seems to have some errors. The subcommittee believes the following numbers need to be corrected (there may be other errors and all should be double checked):
  - The maximum required prerequisite quarter credit hours (last line, column a) should be 49 (instead of 30).
  - The minimum required semester credit hours offered outside the unit (4<sup>th</sup> line, column c) should be 4 (instead of 3) for the BA only. The BS version is correct.
  - The maximum required semester credit hours offered outside the unity (5<sup>th</sup> line, column c) should be 12 (instead of 14).
  - The maximum required prerequisite semester credit hours (last line, column c) should be 33 (instead of 23).
3. Also the quarter and semester minimum and maximum credit hours listed in “Changes in credit hours” on page 1 of the Rationale should be double-checked. For example, the Financial track semester hours should be “10 out & 31 in” instead of “10 out & 21 in.” There may be other similar mistakes.
4. CCI usually requests personal info (address) to be removed from Advising Sheets.
5. Finally, there was a question about whether, for the Financial track, BA students could take Econ 2001.01/2002.01 and the BS students could (be encouraged or required to) take Econ 2001.02/2002.02.

Thanks.

Jim Fredal  
Department of English  
fredal.1@osu.edu

cc: Bernadette Vankeerbergen

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230 North Oval Mall  
Columbus, OH 43210

Phone (614) 292-8908  
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March 22, 2011

Larry Krissek  
Chair, Arts and Sciences CCI

Dear Larry:

It is a pleasure to forward to you the proposals for the BS and BA major programs in Mathematics under semesters. The only difference between the two programs lies in the GE component. The programs have been converted with only minor changes from their quarter versions in terms of requirements. In addition, in an attempt to increase success rates in course sequences, they have expanded the requirement that a student receive a grade of C- or better in prerequisite courses in introductory calculus to sequences at higher levels, a common practice at other institutions.

Beyond my own review of the documents, the proposal has been discussed by colleagues from other NMS units at a meeting on January 19, 2011. Feedback from these discussions has been incorporated in the proposal.

If you have any questions, I would be happy to address them.

Sincerely,



David Andereck  
Professor of Physics  
Associate Dean of Natural and Mathematical Sciences, College of Arts and Sciences

# **BA in Mathematics**

Department of Mathematics, OSU

Note: BA and BS documents are identical for this major, except for the change of name. The only differences are in details of General Education requirements.

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- 1.** Rationale for semester plans.

## APPENDICES:

- A.** Major program forms.
- B.** Curriculum maps.
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- E.** Generic course schedule.



To: Office of Academic Affairs  
From: Luis Casian, Chair, Department of Mathematics  
Date: January 2011  
Re: Semester program proposals for degree programs in the Department of Mathematics

The following programs in the Department of Mathematics are being converted from the quarter system to the semester system, with minimal changes:

1. BS in Mathematics
2. BA in Mathematics
3. Minor in Mathematics
4. BS in Actuarial Science
5. BA in Actuarial Science
6. MS in Mathematics
7. MMS in Mathematics
8. PhD in Mathematics

During the past year, the Department's Undergraduate Committee and Graduate Studies Committee have worked on semester conversions of those programs. This process involved frequent consultations with faculty members involved with particular courses or course sequences, and involved repeated editing of the conversion documents.

Many changes will also be made to the structure and flow of freshman-level math courses. Since those courses do not involve students enrolled in those eight programs, their changes are not discussed in these program conversion documents.

These proposed conversion plans and transition policies were approved by the Undergraduate and Graduate Committees, and were discussed during a faculty meeting in December 2, 2010. The semester conversion plans were approved by the Department's tenure-track faculty, by a vote of 49 yes and 0 no.

A handwritten signature in blue ink, appearing to read "Luis Casian".

Luis Casian  
Professor and Chair



## Rationale for semester plans: BS and BA in Math

Note: BA and BS major requirements are identical for this major.  
The only differences are in details of General Education requirements.

### Tracks (sub-plans) within the mathematics major.

The Department of Mathematics currently offers a BS in Mathematics, with six tracks within that major. With the conversion to semesters we will eliminate the *Applied Discrete Math* track, because of low enrollments. The remaining five tracks are

- Theoretical Mathematics
- Education Mathematics
- Bio-Mathematics
- Applied Mathematics
- Financial Mathematics

These will be implemented as sub-plans within the mathematics major.

### Transcript.

The Department requests that the name of the sub-plan appear explicitly on each student's transcript.

### Changes in credit hours.

This chart displays the numbers of credit hours required in the different tracks (sub-plans).

Track	Quarter hrs	(2/3)*Quarter	Semester hrs	$\Delta$
Theoretical	53 – 55 5 out & 48 in 10 out & 45 in	35.3 – 36.7	38 – 39 4 out & 34 in 8 out & 31 in	+ 2.7
Education	53 – 55 5 out & 48 in 10 out & 45 in	35.3 – 36.7	39 – 40 4 out & 34 in 8 out & 31 in	+ 3.3 to + 3.7
Bio-Math	56 – 60 19 out & 37 in 26 out & 34 in	38.0 – 40.0	39 – 41 4 out & 35 in 15 out & 26 in	+ 3 to + 2.0
Applied	58 – 60 14 out & 44 in 19 out & 41 in	38.7 – 40.0	41 – 42 10 out & 31 in 14 out & 28 in	+ 2.3 to + 2.0
Financial	57 – 59 14 out & 43 in 19 out & 40 in	38.0 – 39.3	41 – 42 10 out & 31 in 14 out & 28 in	+ 3 to + 2.7

## **Honors.**

Honors versions of courses are not mentioned explicitly within this documentation of the math major tracks. The understanding is that a student may replace a course requirement by an honors version of that course (if such an honors version is offered).

The Department of Mathematics has an active honors program, allowing strong undergraduate students to take four full years of honors math courses. To be an honors math major (in any track), a student must take:

(1) Four semesters of honors math, earning B- or better in each course. Those four courses must include either {1181H and 2182H} or 4190H.

(2) Two semesters of abstract algebra (either 4580 - 4581, or 5590H - 5591H), earning B- or better in each course.

(3) Analysis (either 4547 - 4548, or 4190H), earning B- or better in each course.

Notes on those rules.

- Overlaps are allowed in those requirements. For instance, 4190H may count in both (1) and (3), and 5590H may count in both (1) and (2).
- Some requirements for the math major may be fulfilled by honors courses. In particular:  
4190H fulfills the analysis requirement (4547 - 4548) in the Theoretical and Education Tracks.  
5520H fulfills requirements for both linear algebra (2568) and differential equations (2255).

## **Grade Prerequisites.**

Academically weak students sometimes encounter serious difficulties in math course sequences, because success in each course requires mastery of the central ideas taught in the preceding course. To improve success rates in those courses, we will implement the “C-minus Rule”:

A student may enter a given math course only with a grade of C- or better in the prerequisite math course.

This rule has been in place for several years for the transitions from 150 to 151, from 151 to 152, and from 152 to 153. We will include this rule in all mainstream undergraduate math courses, once the semester system is underway. Similar rules are standard practice at many colleges and universities in Ohio and in other states.

### Changes in individual math course credits.

The Department of Mathematics embraces the idea that most upper division semester courses should be **3 credits**, running MWF for the whole semester.

Course sequences running for three quarters naturally transform into two-semester sequences. Individual 5-credit quarter courses typically become 3-credit semester courses. But in some cases the semester version of a course involves an increase in credit hours. Math major tracks that require several of those courses end up with fairly large increases in credit hours. Here is a list of the math courses in question, along with credit hours, quarter → semester.

254 → 2153	calculus 3	5 → 4
350 → 3350	intro to math biology	3 → 3
556 → 4556	dynamical systems	3 → 3
530 → 3530	probability	3 → 3
589 → 3589	intro to financial math	3 → 3
512 (557) → 4512	partial differential eqs	3 → 3
513 (551) → 4551	vector analysis	3 → 3
514 (552) → 4552	complex analysis	3 → 3
568 (571 – 572) → 2568	linear algebra	3 → 3
578 → 4578	discrete math models	5 → 4
647 → 5001	set theory	3 → 3

Here are short explanations for those course transitions.

**254:** The sequence 1151 – 1152 – 2153 of standard calculus courses has topics specified by the Ohio Transfer Assurance Guides (TAGs), as posted at

<http://regents.ohio.gov/transfer/otm/otm-learning-outcomes.php>

The semester credits 5, 5, 4 are in line with recommendations from the Board of Regents.

**350 and 556:** These courses are part of the newly developed bio-mathematics curriculum. Course developers are using the semester conversion as an opportunity to expand those courses to include more topics useful for students studying mathematical biology.

**530:** This probability course is sometimes used as an alternative to Stat 420 even though there are some differences in content. The expanded course 3530 will include all the probability needed for math and actuarial science majors, and is aligned closely enough with statistics courses that it can act as a prerequisite for Stat 4202. This increase in content has been recommended by leaders of both the financial math track and the actuarial science major.

**589:** This “Introduction to Financial Mathematics” will expand to include more of the basic mathematical tools needed to model asset pricing and to begin to understand techniques of stochastic calculus.

**512, 513, and 514** are 3-credit courses taken mostly by engineering students. Corresponding 5-credit courses (557, 551, and 552) are taken primarily by math and science majors and some graduate students in engineering. With semester conversion, we will reduce the number of courses by combining each of these pairs into a single 3-credit semester course.

**568** is a 3-credit linear algebra course very crowded with topics. For decades, client engineering departments have insisted on a 3-credit course (in quarters), rather than the more natural 5-credit course needed to explain the ideas appropriately. With semesters, that pressure will decrease because engineering students will have the option of Math 2174: half linear algebra and half differential equations. Both 568 and the two-quarter sequence 571-572 will convert to 2568.

**578:** This 5-credit course currently has a computer science course prerequisite. Students work on mathematical projects using whatever computer languages they already know. People re-designing this course decided to provide a more uniform experience by requiring students to use a standard linear algebra software package. After a couple of weeks in class learning about MATLAB, students with minimal programming experience will be able to use that software in their projects. Inclusion of training in that software helps justify the use of 4 semester credits rather than 3. That increase of credits is balanced by the omission of a CSE course prerequisite. A copy of a concurrence email message from CSE is included at the end of this Rationale.

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## **COMMENTS on changes in the tracks (sub-plans).**

### **Theoretical track.**

Currently the requirement of Math 530 or Stat 420 is hidden, since the required course Stat 421 has one of those two courses as a prerequisite. With semester conversion, we will list an explicit requirement: Math 5530 or Stat 4201. This decision increases the official hours within the major. The increase in core requirements is mitigated by a small decrease in elective hours.

### **Education track.**

This option is a fairly small alteration of the Theoretical track: Differential Equations is not required, but three electives in the Theoretical track are required here. Those three courses (geometry, discrete modeling, and history of mathematics) are important for the Education track because of their direct connections with high school teaching.

### **Applied track.**

Added credits from various individual course conversions are balanced by moving a few courses from required to elective, and adjusting the total number of elective hours.

### **Biology track.**

Courses in the quarter system were converted directly to corresponding courses in the semester system, leading to a slight increase in credit hours.

### **Financial track.**

This track involves the largest total increase in individual course credits: the conversion of each of the required courses Math 512, 530, 568, 589, and Stat 420, 421 increases the count by one credit. The current 57 to 59 quarter credits, correspond to 38 to 39.3 semester credits, but a direct conversion leads to 44 to 45 semester credits. This impact was lessened by removing Math 3588 (Practicum in Actuarial Science) from the required list. Changes in content in this Practicum make it more closely aligned with the Actuarial program, and less suitable for students in the Financial Math track. As enrollments in the Financial track grow, we hope to create one or two new courses designed for that audience. We will be able move forward with that plan after hiring a faculty member who specializes in financial mathematics.

Majors in the Financial Math track are required to take Econ 2001.01 and 2002.01. They may substitute the .02 versions, but Econ 2001.02 and 2002.02 are courses designed for students majoring in Economics.

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## Detailed plans for the conversion.

The four appendices below contain more detailed plans for each of the five tracks in both quarter and semester format.

### **Appendix A:**

*Major Program Forms* for each track, in both the quarter and semester systems.

### **Appendix B:**

A *Curriculum Map* for each track. That map lists the quarter and semester courses in each track of the major, and indicates which Program Learning Goals are emphasized in each semester course.

### **Appendix C:**

Sample *Four-Year Plans* for each track are provided, for both quarters and semesters.

In most cases, students can complete this major by taking at most 18 credit hours per semester. Exceptions naturally arise for honors students, who have very ambitious course schedule, and for students in applied tracks that require significant preparation in other sciences. (The credit hour load is often decreased because students earn college credits while still in high school.)

### **Appendix D:**

*Transition Policies* for math majors. In most cases the transition involves straightforward, one-for-one substitutions of courses and course sequences. Two upper division course sequences (Math 547-548-549 and 580-581-582) require special transition courses in Au12. Plans for transition of the mainstream calculus courses are outlined in Appendix D as well.

Transition plans for all math service courses at OSU appears in a separate document, posted at the semester conversion web page

<http://www.math.ohio-state.edu/semesters>.

### **Appendix E:**

*Generic Course Schedules* for math majors in the traditional track encountering semesters at different points in their careers.

## Math 4578 Concurrence from CSE

From: Neelam Soundarajan [neelam@cse.ohio-state.edu]  
Sent: Thursday, January 27, 2011 10:32 AM  
To: Shapiro, Daniel  
Cc: neelam@cse.ohio-state.edu; supowit@cse.ohio-state.edu  
Subject: RE: Math 578

Dear Dan,

I talked to a couple of people in our dept. and the consensus was that although we do plan to offer a 2-cr MATLAB course that would be appropriate for students interested in developing skills in MATLAB programming, given that you require only minimal familiarity with MATLAB, we concur with your proposed plans for MATH 4578, including two MATLAB training sessions.

Best wishes,

--Neelam.

=====  
Neelam Soundarajan  
Acting Assoc. Chair  
CSE Dept.  
=====

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On Tuesday, January 25, 2011, at 1:47 PM, Shapiro, Daniel writes:

Dear Neelam,

I'm writing again about the semester conversion of Math 578. As mentioned in messages sent in early December, we plan to run Math 4578, "Discrete Mathematical Models", with a format somewhat different from the current Math 578. The semester course will not have any formal prerequisite of a CSE course. Instead, it will include enough MATLAB training so that students can complete simple projects using that software.

To facility the approval process for this course, it would be convenient to include a "concurrence" from CSE. That concurrence can be given in an email message to me.

Sincerely,  
Dan S.

Daniel Shapiro  
Professor and Vice Chair  
Department of Mathematics - OSU

**MAJOR PROGRAM FORM (QUARTERS)**  
College of Arts and Sciences

			<b>Mathematics Major – Theoretical Track</b>
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Name: last first middle Major

OSU email address (name.n):	Student number:
Degree Sought (circle one): <b>BS</b> <b>BA</b>	Expected date of graduation (qtr/yr):

Have you filed a degree application in the college office? (circle one): <b>YES</b> <b>NO</b>
---

NOTE: This form is NOT a degree application.

If completing two majors, list both of them below, and file a separate form for each one:

--	--

**Part A: Required Prerequisites (and / or supplementary requirements)**

Courses	Hours	Grade	Courses	Hours	Grade
Math 151	5		Math 153	5	
Math 152	5				

**Part B: Major Program (Minimum grade of “C-”, and minimum grade average of “C” (2.00) required.)**  
Core Requirements (Substitutions are rarely permitted)

Courses	Hours	Grade	Courses	Hours	Grade
Math 254	5		Math 345	4	
Math 568 or 571	3		Stat 421	5	

**Required Courses for Traditional Track:**

Math 255	5		Math 530 or Stat 420	3 or 5	
Math 547	3		Math 580	3	
Math 548	3		Math 581	3	
Math 549	3		Math 582	3	
Electives (10 credit hours) chosen from a list of math courses. See Curriculum Map for details.					

**53 or 55**

Total of Part B only

Check whether this is:	<b>x</b>	
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See back for information about major programs.      original      revision  
Distribution: One copy each - Faculty adviser, Student, College Office

Signature of faculty adviser
Name of adviser (please print)
Mathematics      292-
Department      Campus phone
Date:



**MAJOR PROGRAM FORM (SEMESTERS)**

College of Arts and Sciences

			<b>Mathematics Major – Theoretical Track</b>
--	--	--	--

Name: last first middle Major

OSU email address (name.n):	Student number:
-----------------------------	-----------------

Degree Sought (circle one): <b>BS</b> <b>BA</b>	Expected date of graduation (sem/yr):
---	---------------------------------------

Have you filed a degree application in the college office? (circle one):      YES      NO
---

NOTE: This form is NOT a degree application.

If completing two majors, list both of them below, and file a separate form for each one:

--	--

**Part A: Required Prerequisites (and / or supplementary requirements)**

Courses	Hours	Grade	Courses	Hours	Grade
<b>Math 1151</b>	<b>5</b>		<b>Math 1152</b>	<b>5</b>	

**Part B: Major Program (Minimum grade of “C-”, and minimum grade average of “C” (2.00) required.)**

Core Requirements (Substitutions are rarely permitted)

Courses	Hours	Grade	Courses	Hours	Grade
<b>Math 2153</b>	<b>4</b>		<b>Math 3345</b>	<b>3</b>	
<b>Math 2568</b>	<b>3</b>		<b>Stat 4202</b>	<b>4</b>	

**Required Courses for Traditional Track:**

<b>Math 2255</b>	<b>3</b>		<b>Math 4530 or Stat 4201</b>	<b>3 or 4</b>	
<b>Math 4547</b>	<b>3</b>		<b>Math 4580</b>	<b>3</b>	
<b>Math 4548</b>	<b>3</b>		<b>Math 4581</b>	<b>3</b>	
<b>Electives (6 credit hours) chosen from a list of math courses. See Curriculum Map for details.</b>					

**38 or 39**

Total of Part B only

Check whether this is:	<b>X</b>	
------------------------	----------	--

See back for information about major programs.      original      revision  
 Distribution: One copy each - Faculty adviser, Student, College Office

Signature of faculty adviser	
Name of adviser (please print)	
<b>Mathematics</b>	<b>292-</b>
Department	Campus phone
	Date:

**MAJOR PROGRAM FORM (QUARTERS)**

College of Arts and Sciences

			<b>Mathematics Major – Education Track</b>
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Name: last first middle Major

OSU email address (name.n):	Student number:
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Degree Sought (circle one): <b>BS</b> <b>BA</b>	Expected date of graduation (qtr/yr):
---	---------------------------------------

Have you filed a degree application in the college office? (circle one): <b>YES</b> <b>NO</b>
---

NOTE: This form is NOT a degree application.

If completing two majors, list both of them below, and file a separate form for each one:

--	--

**Part A: Required Prerequisites (and / or supplementary requirements)**

Courses	Hours	Grade	Courses	Hours	Grade
<b>Math 151</b>	<b>5</b>		<b>Math 153</b>	<b>5</b>	
<b>Math 152</b>	<b>5</b>				

**Part B: Major Program (Minimum grade of "C-", and minimum grade average of "C" (2.00) required.)**

Core Requirements (Substitutions are rarely permitted)

Courses	Hours	Grade	Courses	Hours	Grade
<b>Math 254*</b>	<b>5</b>		<b>Math 345*</b>	<b>4</b>	
<b>Math 568* or 571*</b>	<b>3</b>		<b>Stat 421*</b>	<b>5</b>	

**Required Courses for Educational Track:**

<b>Math 547</b>	<b>3</b>		<b>Math 580*</b>	<b>3</b>	
<b>Math 548</b>	<b>3</b>		<b>Math 581*</b>	<b>3</b>	
<b>Math 549</b>	<b>3</b>		<b>Math 582</b>	<b>3</b>	
<b>Math 530 or Stat 420</b>	<b>3 or 5</b>		<b>Math 507*</b>	<b>5</b>	
<b>Math 504*</b>	<b>5</b>		<b>Math 578*</b>	<b>5</b>	
<b>* needed for OSU MEd program</b>					

**53 or 55**

Total of Part B only

Check whether this is:	<b>x</b>	
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See back for information about major programs.      original      revision

Distribution: One copy each - Faculty adviser, Student, College Office

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Signature of faculty adviser

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Name of adviser (please print)

<b>Mathematics</b>	<b>292-</b>
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Department

Campus phone

	Date:
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**MAJOR PROGRAM FORM (SEMESTERS)**

College of Arts and Sciences

			<b>Mathematics Major – Education Track</b>
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Name: last first middle Major

OSU email address (name.n):	Student number:
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Degree Sought (circle one): <b>BS</b> <b>BA</b>	Expected date of graduation (sem/yr):
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Have you filed a degree application in the college office? (circle one):      YES      NO
---

NOTE: This form is NOT a degree application.

If completing two majors, list both of them below, and file a separate form for each one:

--	--

**Part A: Required Prerequisites (and / or supplementary requirements)**

Courses	Hours	Grade	Courses	Hours	Grade
<b>Math 1151</b>	<b>5</b>		<b>Math 1152</b>	<b>5</b>	

**Part B: Major Program (Minimum grade of "C-", and minimum grade average of "C" (2.00) required.)**

Core Requirements (Substitutions are rarely permitted)

Courses	Hours	Grade	Courses	Hours	Grade
<b>Math 2153*</b>	<b>4</b>		<b>Math 3345*</b>	<b>3</b>	
<b>Math 2568*</b>	<b>3</b>		<b>Math 4530 or Stat 4201*</b>	<b>3 or 4</b>	
			<b>Stat 4202*</b>	<b>4</b>	

**Required Courses for Education Track:**

<b>Math 4547</b>	<b>3</b>		<b>Math 4580*</b>	<b>3</b>	
<b>Math 4548</b>	<b>3</b>		<b>Math 4581*</b>	<b>3</b>	
<b>Math 4504*</b>	<b>3</b>		<b>Math 4507*</b>	<b>3</b>	
			<b>Math 4578*</b>	<b>4</b>	
<b>* needed for OSU MEd program</b>					

**39 or 40**

Total of Part B only

Check whether this is:	<input checked="" type="checkbox"/>	
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See back for information about major programs.      original      revision  
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Signature of faculty adviser

Name of adviser (please print)

<b>Mathematics</b>	<b>292-</b>
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Department	Campus phone

	Date:
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**MAJOR PROGRAM FORM (QUARTERS)**

College of Arts and Sciences

			<b>Mathematics Major – Bio-Math Track</b>
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Name: last first middle Major

OSU email address (name.n):	Student number:
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Degree Sought (circle one): <b>BS</b> <b>BA</b>	Expected date of graduation (qtr/yr):
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Have you filed a degree application in the college office? (circle one):      YES      NO
---

NOTE: This form is NOT a degree application.

If completing two majors, list both of them below, and file a separate form for each one:

--	--

**Part A: Required Prerequisites (and / or supplementary requirements)**

Courses	Hours	Grade	Courses	Hours	Grade
Math 151	5		Chem 121	5	
Math 152	5		Bio 113	5	
Math 153	5		Bio 114	5	

**Part B: Major Program (Minimum grade of "C-", and minimum grade average of "C" (2.00) required.)**

Core Requirements (Substitutions are rarely permitted)

Courses	Hours	Grade	Courses	Hours	Grade
Math 254	5				
Math 345	4		Math 530 or Stat 420	3 or 5	
Math 571	3		Stat 421	5	
Math 572	3				

**Required Courses for Bio-Mathematics Track**

Math 255	5		Math 350	3	
Math 512	3		Bio 401 - 402 or MG 660 - 661	5, 5	
Math 607	5				
Electives (9 credit hours) chosen from a list of math & science courses. See Curriculum Map for details.					

58 - 60

Total of Part B only

Check whether this is:	<input checked="" type="checkbox"/>		
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See back for information about major programs.      original      revision

Distribution: One copy each - Faculty adviser, Student, College Office

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Signature of faculty adviser

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Name of adviser (please print)

<b>Mathematics</b>	<b>292-</b>
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Department

Campus phone

	Date:
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**MAJOR PROGRAM FORM (SEMESTERS)**

College of Arts and Sciences

			<b>Mathematics Major – Bio-Math Track</b>
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Name: last first middle Major

OSU email address (name.n):	Student number:
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Degree Sought (circle one): <b>BS</b> <b>BA</b>	Expected date of graduation (sem/yr):
---	---------------------------------------

Have you filed a degree application in the college office? (circle one): <b>YES</b> <b>NO</b>
---

NOTE: This form is NOT a degree application.

If completing two majors, list both of them below, and file a separate form for each one:

--	--

**Part A: Required Prerequisites (and / or supplementary requirements)**

Courses	Hours	Grade	Courses	Hours	Grade
<b>Math 1151</b>	<b>5</b>		<b>Chem 1210</b>	<b>5</b>	
<b>Math 1152</b>	<b>5</b>		<b>Bio 1113</b>	<b>4</b>	
			<b>Bio 1114</b>	<b>4</b>	

**Part B: Major Program (Minimum grade of "C-", and minimum grade average of "C" (2.00) required.)**

Core Requirements (Substitutions are rarely permitted)

Courses	Hours	Grade	Courses	Hours	Grade
<b>Math 2153</b>	<b>4</b>		<b>Math 3345</b>	<b>3</b>	
<b>Math 2568</b>	<b>3</b>		<b>Math 4530 or Stat 4201</b>	<b>3 or 4</b>	
			<b>Stat 4202</b>	<b>4</b>	

**Required Courses for Bio-Math Track:**

<b>Math 3350</b>	<b>3</b>		<b>Math 2255</b>	<b>3</b>	
			<b>Bio 2401 or MG 5560</b>	<b>4 or 5</b>	
<b>Two of the following three:</b>					
<b>Math 3607, 4557, 4556</b>	<b>3, 3</b>		<b>Electives (6 credits) chosen from a list of math &amp; science courses. See Curriculum Map for details.</b>	<b>6</b>	

<b>39 - 41</b>
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Total of Part B only

Check whether this is:	<b>x</b>	
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See back for information about major programs.      original      revision

Distribution: One copy each - Faculty adviser, Student, College Office

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Signature of faculty adviser

--

Name of adviser (please print)

<b>Mathematics</b>	<b>292-</b>
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Department

Campus phone

	Date:
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**MAJOR PROGRAM FORM (QUARTERS)**

College of Arts and Sciences

			<b>Mathematics Major – Applied Track - Chemistry Option</b>
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Name: last first middle Major

OSU email address (name.n):	Student number:
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Degree Sought (circle one): <b>BS</b> <b>BA</b>	Expected date of graduation (qtr/yr):
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Have you filed a degree application in the college office? (circle one): <b>YES</b> <b>NO</b>
---

**NOTE: This form is NOT a degree application.**

If completing two majors, list both of them below, and file a separate form for each one:

--	--

**Part A: Required Prerequisites (and / or supplementary requirements)**

Courses	Hours	Grade	Courses	Hours	Grade
Math 151	5		Physics 131	5	
Math 152	5		Physics 132	5	
Math 153	5		Physics 133	5	
Chem 121	5		Chem 123	5	
Chem 122	5		CSE 202 or equivalent	4	

**Part B: Major Program (Minimum grade of "C-", and minimum grade average of "C" (2.00) required.)**  
**Core Requirements (Substitutions are rarely permitted)**

Courses	Hours	Grade	Courses	Hours	Grade
Math 254	5		Math 345	4	
Math 571	3		Stat 421	5	

**Required Courses for Applied Math Track:**

**Group I Electives: Math courses 9 hours from:**

Math 255 or 415	5 or 4		Math 547, 548, 549	3, 3, 3	
Math 512	3		Math 601, 602, 603.02	3, 3, 3	
Math 514	3		Math 665, 666	4, 4	
Math 572	3		Math 701	5	
Math 530 or Stat 420	3 or 5		Math 513 or 551	3 or 5	
Math 607	5				
<b>Group II Electives: Chemistry. 9 hrs from:</b>					
Chem 221	5		Chem 530-531-532	3, 3, 3	

56 to 59

Total of Part B only

Check whether this is:	x	
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See back for information about major programs.      original      revision  
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Signature of faculty adviser

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Name of adviser (please print)

<b>Mathematics</b>	292-
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Department      Campus phone

	Date:
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**MAJOR PROGRAM FORM (SEMESTERS)**

College of Arts and Sciences

			<b>Mathematics Major – Applied Track - Chemistry Option</b>
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Name: last first middle Major

OSU email address (name.n):	Student number:
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Degree Sought (circle one): <b>BS</b> <b>BA</b>	Expected date of graduation (sem/yr):
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Have you filed a degree application in the college office? (circle one): <b>YES</b> <b>NO</b>
---

NOTE: This form is NOT a degree application.

If completing two majors, list both of them below, and file a separate form for each one:

--	--

**Part A: Required Prerequisites (and / or supplementary requirements)**

Courses	Hours	Grade	Courses	Hours	Grade
Math 1151	5		Physics 1250	5	
Math 1152	5		Physics 1251	5	
Chem 1210	5		CSE 1222 or equivalent	3	
Chem 1220	5				

Part B: Major Program (Minimum grade of “C-”, and minimum grade average of “C” (2.00) required.)  
Core Requirements (Substitutions are rarely permitted)

Courses	Hours	Grade	Courses	Hours	Grade
Math 2153	4		Math 3345	3	
Math 2568	3		Math 4530 or Stat 4201	3 or 4	
			Stat 4202	4	

**Required Courses for Applied Math Track:**

**Group I Electives: Math. 6 hours from:**

Math 2255	3		Math 4547, 4548	3, 3	
Math 4557	3		Math 5101, 5102	3, 3	
			Math 5756, 5757	3, 3	
<b>Two of the following three:</b> Math 3607, 4552, 4556	3, 3		Math 5451	3	
			Math 4551	3	
<b>Group II Electives: 6 credit hours</b>					
Chosen from a list. See Curriculum Map for further details.					

41 - 42

Total of Part B only

Check whether this is:	x	
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See back for information about major programs. original revision  
Distribution: One copy each - Faculty adviser, Student, College Office

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Signature of faculty adviser

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Name of adviser (please print)

<b>Mathematics</b>	<b>292-</b>
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Department Campus phone

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Date:

**MAJOR PROGRAM FORM (QUARTERS)**

College of Arts and Sciences

			<b>Mathematics Major – Applied Track - Physics Option</b>
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Name: last first middle Major

OSU email address (name.n):	Student number:
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Degree Sought (circle one): <b>BS</b> BA	Expected date of graduation (qtr/yr):
--	---------------------------------------

Have you filed a degree application in the college office? (circle one): YES NO
---

NOTE: This form is NOT a degree application.

If completing two majors, list both of them below, and file a separate form for each one:

--	--

**Part A: Required Prerequisites (and / or supplementary requirements)**

Courses	Hours	Grade	Courses	Hours	Grade
Math 151	5		Physics 131	5	
Math 152	5		Physics 132	5	
Math 153	5		Physics 133	5	
			CSE 202	4	

**Part B: Major Program (Minimum grade of "C-", and minimum grade average of "C" (2.00) required.)**

Core Requirements (Substitutions are rarely permitted)

Courses	Hours	Grade	Courses	Hours	Grade
Math 254	5		Math 345	4	
Math 571	3		Stat 421	5	

**Required Courses for Applied Math Track:**

**Group I Electives: Math courses 9 hours from:**

Math 255 or 415	5 or 4		Math 547, 548, 549	3, 3, 3	
Math 512	3		Math 601, 602, 603.02	3, 3, 3	
Math 514	3		Math 665, 666	4, 4	
Math 572	3		Math 701	5	
Math 530 or Stat 420	3 or 5		Math 513 or 551	3 or 5	
Math 607	5				
<b>Group II Electives: Physics. 12 hrs from:</b>					
Phys 261, 262, 263	4, 4, 4				
various 600-level courses					

59 - 64

Total of Part B only

Check whether this is:	x	
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Signature of faculty adviser	
Name of adviser (please print)	
<b>Mathematics</b>	<b>292-</b>
Department	Campus phone
	Date:



APPENDIX A.  
**MAJOR PROGRAM FORM (SEMESTERS)**  
 College of Arts and Sciences

			<b>Mathematics Major – Applied Track - Physics Option</b>
Name: last	first	middle	Major

OSU email address (name.n):	Student number:
Degree Sought (circle one): <b>BS</b> <b>BA</b>	Expected date of graduation (sem/yr):

Have you filed a degree application in the college office? (circle one): <b>YES</b> <b>NO</b>	NOTE: This form is NOT a degree application.
---	--

If completing two majors, list both of them below, and file a separate form for each one:

--	--

**Part A: Required Prerequisites (and / or supplementary requirements)**

Courses	Hours	Grade	Courses	Hours	Grade
<b>Math 1151</b>	<b>5</b>		<b>Physics 1250</b>	<b>5</b>	
<b>Math 1152</b>	<b>5</b>		<b>Physics 1251</b>	<b>5</b>	
			<b>CSE 1222 or equivalent</b>	<b>3</b>	

**Part B: Major Program (Minimum grade of "C-", and minimum grade average of "C" (2.00) required.)**

Core Requirements (Substitutions are rarely permitted)

Courses	Hours	Grade	Courses	Hours	Grade
<b>Math 2153</b>	<b>4</b>		<b>Math 3345</b>	<b>3</b>	
<b>Math 4530 or Stat 4201</b>	<b>3 or 4</b>		<b>Stat 4202</b>	<b>4</b>	
<b>Math 2568</b>	<b>3</b>				

**Required Courses for Applied Math Track:**

<b>Math 2255</b>	<b>3</b>		<b>Math 4557</b>	<b>3</b>	
<b>Two of the following three: Math 3607, 4552, or 4556</b>	<b>3, 3</b>				

**Group I Electives, Math. 6 hours from:**

<b>Math 4547, 4548</b>	<b>3, 3</b>		<b>Math 5756, 5757</b>	<b>3, 3</b>	
<b>Math 5101, 5102</b>	<b>3, 3</b>		<b>Math 5451</b>	<b>3</b>	
			<b>Math 4551</b>	<b>3</b>	

**Group II Electives, Physics. 8 hrs from:**

<b>Physics 2300, 2301</b>	<b>4, 4</b>				
<b>various 5000-level courses</b>					

**43 - 44**

Total of Part B only

Check whether this is:	<b>x</b>	
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See back for information about major programs.

original      revision

Distribution: One copy each - Faculty adviser, Student, College Office

Signature of faculty adviser	
Name of adviser (please print)	
<b>Mathematics</b>	<b>292-</b>
Department	Campus phone
	Date:

**MAJOR PROGRAM FORM (QUARTERS)**

College of Arts and Sciences

			<b>Mathematics Major – Financial Track</b>
Name: last	first	middle	Major

OSU email address (name.n):	Student number:
Degree Sought (circle one): <b>BS</b> <b>BA</b>	Expected date of graduation (qtr/yr):

Have you filed a degree application in the college office? (circle one): <b>YES</b> <b>NO</b>
---

NOTE: This form is NOT a degree application.

If completing two majors, list both of them below, and file a separate form for each one:

--	--

**Part A: Required Prerequisites (and / or supplementary requirements)**

Courses	Hours	Grade	Courses	Hours	Grade
<b>Math 151</b>	<b>5</b>		<b>Econ 200</b>	<b>5</b>	
<b>Math 152</b>	<b>5</b>		<b>Econ 201</b>	<b>5</b>	
<b>Math 153</b>	<b>5</b>		<b>Acct 310</b>	<b>5</b>	
			<b>CS&amp;E 200</b>	<b>5</b>	

**Part B: Major Program (Minimum grade of "C-", and minimum grade average of "C" (2.00) required.)**

Core Requirements (Substitutions are rarely permitted)

Courses	Hours	Grade	Courses	Hours	Grade
<b>Math 254</b>	<b>5</b>		<b>Math 345</b>	<b>4</b>	
<b>Math 568 or 571</b>	<b>3</b>		<b>Stat 421</b>	<b>5</b>	

**Required Courses for Financial Track**

<b>Math 255</b>	<b>5</b>		<b>Math 618</b>	<b>4</b>	
<b>Math 512</b>	<b>3</b>		<b>Math 632</b>	<b>4</b>	
<b>Math 530 or Stat 420</b>	<b>3, 5</b>		<b>CSE 201 or 202</b>	<b>5</b>	
<b>Math 589</b>	<b>3</b>		<b>Bus Fin 420 or 620</b>	<b>4</b>	
<b>Math 607</b>	<b>5</b>		<b>Math 588</b>	<b>4</b>	

57 - 59

Total of Part B only

Check whether this is:	<b>X</b>	
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See back for information about major programs.      original      revision

Distribution: One copy each - Faculty adviser, Student, College Office

Signature of faculty adviser	
Name of adviser (please print)	
<b>Mathematics</b>	
Department	Campus phone
Date:	

**MAJOR PROGRAM FORM (SEMESTERS)**

College of Arts and Sciences

			<b>Mathematics Major – Financial Track</b>
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Name: last first middle Major

OSU email address (name.n):	Student number:
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Degree Sought (circle one): <b>BS</b> <b>BA</b>	Expected date of graduation (sem/yr):
---	---------------------------------------

Have you filed a degree application in the college office? (circle one): <b>YES</b> <b>NO</b>
---

NOTE: This form is NOT a degree application.

If completing two majors, list both of them below, and file a separate form for each one:

--	--

**Part A: Required Prerequisites (and / or supplementary requirements)**

Courses	Hours	Grade	Courses	Hours	Grade
<b>Math 1151</b>	<b>5</b>		<b>Math 1152</b>	<b>5</b>	
<b>Acct 2000</b>	<b>3</b>		<b>CSE 1113</b>	<b>4</b>	
<b>Econ 2001.01</b>	<b>3</b>		<b>Econ 2002.01</b>	<b>3</b>	

**Part B: Major Program (Minimum grade of “C-”, and minimum grade average of “C” (2.00) required.)**

Core Requirements (Substitutions are rarely permitted)

Courses	Hours	Grade	Courses	Hours	Grade
<b>Math 2153</b>	<b>4</b>		<b>Math 3589</b>	<b>3</b>	
<b>Math 2255</b>	<b>3</b>		<b>Math 3607</b>	<b>3</b>	
<b>Math 2568</b>	<b>3</b>		<b>Math 3618</b>	<b>3</b>	
<b>Math 3345</b>	<b>3</b>		<b>Math 4557</b>	<b>3</b>	
<b>Math 5632</b>	<b>3</b>		<b>Math 4530 or Stat 4201</b>	<b>3 or 4</b>	
<b>Bus Fin 2220 or 3280</b>	<b>3 or 3</b>		<b>Stat 4202</b>	<b>4</b>	
<b>CSE 1222 or 1223</b>	<b>3 or 3</b>				

**41 - 42**

Total of Part B only

Check whether this is:	<b>x</b>	
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See back for information about major programs.      original      revision

Distribution: One copy each - Faculty adviser, Student, College Office

Signature of faculty adviser
Name of adviser (please print)
<b>Mathematics</b>
Department <span style="float: right;">Campus phone</span>
Date:

Math Major, Theoretical Track 53 - 55 quarter hrs become 38 - 39 semester credit hrs.								
Segment of major program	Quarter course #	Quarter course name	Credit hours	Semester course #	Semester course name	Units	Learning outcome	Nature of conversion
<b>Prerequisites (15 quarter credit hours become 10 semester credit hours; some may double-count in GEC)</b>								
	Math 151	Calculus and Analytic Geometry I	5	Math 1151	Calculus 1	5	1, 2, 3	replaces 151-152-153
	Math 152	Calculus and Analytic Geometry II	5	Math 1152	Calculus 2	5	1, 2, 3	
	Math 153	Calculus and Analytic Geometry III	5					
<b>Core major requirements (20 to 22 quarter credit hours become 17 to 18 semester credit hours)</b>								
	Math 254	Calculus and Analytic Geometry IV	5	Math 2153	Calculus 3	4	1*, 2*, 3	expands on 254
	Math 345	Foundations of Higher Mathematics	4	Math 3345	Foundations of Higher Mathematics	3	1**, 2, 3*, 4*	expands on 345
	Math 568	Linear Algebra	3	Math 2568	Linear Algebra	3	1, 2, 3, 5	expands on 568 or 571
	Math 530 or Stat 420	Probability or Intro to Math Stat I	3 or 5	Math 4530 or Stat 4201	Probability or Intro to Math Stat I	3 or 4	1*, 2, 3*, 4*, 5*	Math 4530 expands on 530 Stat 4201 expands on Stat 420
	Stat 421	Intro to Math Stat II	5	Stat 4202	Intro to Math Stat II	4	1, 3, 5	Stat 4202 expands on Stat 421
<b>Required courses in track (23 quarter credit hours become 15 semester credit hours)</b>								
	Math 255	Differential Equations and Their Applications	5	Math 2255	Differential Equations and Their Applications	3	1, 2*, 3*, 4	replaces 255
	Math 547	Introductory Analysis I	3	Math 4547	Introductory Analysis 1	3	1**, 2**, 3*, 4**, 5	Math 4547-4548 replaces 547-548-549
	Math 548	Introductory Analysis II	3	Math 4548	Introductory Analysis 2	3	1**, 2**, 3*, 4**, 5	
	Math 549	Introductory Analysis III	3					
	Math 580	Algebra I	3	Math 4580	Abstract Algebra 1	3	1**, 2**, 3*, 4**, 5	Math 4580-4581 replaces 580-581-582
	Math 581	Algebra II	3	Math 4581	Abstract Algebra 2	3	1**, 2**, 3*, 4**, 5	
	Math 582	Algebra III	3					
<b>Electives (10 quarter credit hours become 6 semester credit hours)</b>								
	Math 504	History of Mathematics	5	Math 4504	History of Mathematics	3	1**, 2*, 3*, 4**, 5**	replaces 504
	Math 507	Advanced Geometry	5	Math 4507	Geometry	3	1**, 2*, 3*, 4**, 5**	replaces 507
	Math 512	Partial Differential Equations and Boundary Value Problems	3	Math 4557	Partial Differential Equations and Boundary Value Problems	3	1*, 3*, 4*, 5*	replaces 557; expands on 512
	Math 513 or Math 551	Vector Analysis	3 or 5	Math 4551	Vector Analysis	3	1*, 2*, 3*, 4*, 5*	replaces 551; expands on 513
	Math 514 or Math 552	Complex Variables	3 or 5	Math 4552	Complex Analysis	3	1*, 2*, 3*, 4*, 5*	replaces 552; expands on 514
	Math 573	Elementary Number Theory	5	Math 4573	Elementary Number Theory	3	1**, 2*, 3*, 4*, 5*	replaces 573
	Math 575	Combinatorial Mathematics and Graph Theory	5	Math 4575	Combinatorial Mathematics and Graph Theory	3	1*, 2*, 3*, 4*, 5*	replaces 575
	Math 578	Discrete Mathematical Models	5	Math 4578	Discrete Mathematical Models	4	1*, 2*, 3*, 4*, 5**	expands on 578
<b>Major program learning outcomes</b>								
	1	Learn conceptual frameworks needed to study higher mathematics, including an introduction to mathematical reasoning, and an understanding of how to read and write proofs.						
	2	Acquire basic mastery of core areas of mathematics, including calculus, analysis and algebra.						
	3	Develop powerful mathematical problem solving skills.						
	4	Learn to communicate mathematical understanding effectively.						
	5	Become proficient in chosen tracks within the major.						
* Learning outcomes are indicated for each semester course listed. Number of asterisks indicates level: beginning, intermediate, or advanced.								

Math Major, Education Track <span style="color: red;">53 - 55 quarter hrs become 39 - 40 semester credit hrs.</span>								
Segment of major program	Quarter course #	Quarter course name	Credit hours	Semester course #	Semester course name	Units	Learning outcome	Nature of conversion
<b>Prerequisites (15 quarter credit hours become 10 semester credit hours; some may double-count in GEC)</b>								
	Math 151	Calculus and Analytic Geometry I	5	Math 1151	Calculus 1	5	1, 2, 3	1151-1152 replaces
	Math 152	Calculus and Analytic Geometry II	5	Math 1152	Calculus 2	5	1, 2, 3	151-152-153
	Math 153	Calculus and Analytic Geometry III	5					
	CSE 201, 202, or 221	Computer Problem Solving for Business.	4	CS&E 1223, 1222, or 2221	Intro Computer Prog in Java	3	3, 4	1223, 1222, 2221 replace 201, 202, 221
		Elem Computer Programming	4		Intro Computer Prog in C++	3		
		Software Dev. Using Cmpnts	4		Software I	4		
<b>Core major requirements (20 to 22 quarter credit hours become 17 to 18 semester credit hours)</b>								
	Math 254*	Calculus and Analytic Geometry IV	5	Math 2153*	Calculus 3	4	1*, 2*, 3	expands on 254
	Math 345*	Foundations of Higher Mathematics	4	Math 3345*	Foundations of Higher Mathematics	3	1**, 2**, 3*, 4*, 5*	expands on 345
	Math 568* or	Linear Algebra or	3	Math 2568*	Linear Algebra	3	1, 2, 3, 5	expands on 568/571
	Math 571*	Linear Algebra for Applications I						
	Math 530 or Stat 420	Probability or Intro to Math Stat I	3 or 5	Math 4530 or Stat 4201	Probability or Intro to Math Stat I	3 or 4	1**, 2, 3*, 4*, 5*	expands on 530; Stat 4201 expands on Stat 420
	Stat 421*	Intro to Math Stat II	5	Stat 4202*	Intro to Math Stat II	4	1, 3, 5*	Stat 4202 expands on Stat 421
<b>Required courses in track (33 quarter credit hours become 22 semester credit hours)</b>								
	Math 547	Introductory Analysis I	3	Math 4547	Introductory Analysis 1	3	1**, 2**, 3*, 4**, 5	4547-4548 replaces 547-548-549
	Math 548	Introductory Analysis II	3	Math 4548	Introductory Analysis 2	3	1**, 2**, 3*, 4**, 5	
	Math 549	Introductory Analysis III	3					
	Math 580*	Algebra I	3	Math 4580*	Abstract Algebra 1	3	1**, 2**, 3*, 4**, 5*	4580-4581 replaces 580-581-582
	Math 581*	Algebra II	3	Math 4581*	Abstract Algebra 2	3	1**, 2**, 3*, 4**, 5*	
	Math 582	Algebra III	3					
	Math 504*	History of Mathematics	5	Math 4504*	History of Mathematics	3	1**, 2**, 3*, 4**, 5	replaces 504
	Math 507*	Advanced Geometry	5	Math 4507*	Geometry	3	1**, 2**, 3*, 4**, 5**	replaces 507
	Math 578*	Discrete Mathematical Models	5	Math 4578*	Discrete Mathematical Models	4	1**, 2, 3**, 4**, 5*	expands on 578
Courses marked with * are needed for the MEd program at OSU.								
<b>Major program learning outcomes</b>								
	<b>1</b>	Learn conceptual frameworks needed to study higher mathematics, including an introduction to mathematical reasoning, and an understanding of how to read and write proofs.						
	<b>2</b>	Acquire basic mastery of core areas of mathematics, including calculus, analysis and algebra.						
	<b>3</b>	Develop powerful mathematical problem solving skills.						
	<b>4</b>	Learn to communicate mathematical understanding effectively.						
	<b>5</b>	Become proficient in chosen tracks within the major.						
* Learning outcomes are indicated for each semester course listed. Number of asterisks indicates level: beginning, intermediate, or advanced.								

## Appendix B

<b>Math Major, Biology Track</b> 56 - 60 quarter hrs become 39 - 41 semester hrs.								
Segment of major program	Quarter course #	Quarter course name	Credit hours	Semester course #	Semester course name	Units	Learning outcome	Nature of conversion
<b>Prerequisites (30 quarter credit hours become 23 semester credit hours; some may double-count in GEC)</b>								
	Math 151	Calculus and Analytic Geometry I	5	Math 1151	Calculus 1	5	1, 2, 3	1151-1152 replaces 151-152-153
	Math 152	Calculus and Analytic Geometry II	5	Math 1152	Calculus 2	5	1, 2, 3	
	Math 153	Calculus and Analytic Geometry III	5					
	Bio 113	BioSci: Energy Transfer and Development	5	Bio 1113	BioSci: Energy Transfer and Development	4	5	Bio 1113-1114 Replaces Bio 113-114
	Bio 114	BioSci: Form, Function, Diversity, and Ecology	5	Bio 1114	BioSci: Form, Function, Diversity, and Ecology	4	5	
	Chem 121	General Chemistry	5	Chem 1210	General Chemistry	5	5	Chem 1210 replaces Chem 121
<b>Core major requirements (23-25 quarter credit hours become 17-18 semester credit hours)</b>								
	Math 254	Calculus and Analytic Geometry IV	5	Math 2153	Calculus 3	4	1*, 2**, 3	expands on 254
	Math 345	Foundations of Higher Math	4	Math 3345	Foundations of Higher Math	3	1**, 2**, 3*, 4*	expands on 345
	Math 571-2	Linear Alg for Appl I, II	3, 3	Math 2568	Linear algebra	3	1*, 2*, 3*, 5	replaces 571-571, expands on 568
	Math 530 or Stat 420	Probability or Intro to Math Stat I	3 or 5	Math 4530 or Stat 4201	Probability or Intro to Math Stat I	3 or 4	1**, 2, 3*, 4*, 5*	4530 expands on 530; Stat 4201 replaces Stat 420
	Stat 421	Intro to Math Stat II	5	Stat 4202	Intro to Math Stat II	4	1, 5	Stat 4202 replaces Stat 421
<b>Required courses in track (35 quarter credit hours become 24 semester credit hours)</b>								
	Math 350	Intro to Mathematical Biology	3	Math 3350	Intro to Mathematical Biology	3	4*, 5	replaces 350
	Math 255	Diff Equations and Appls	5	Math 2255	Differential Equations and Appls	3	1*, 2**, 3*, 4	replaces 255
	Bio 401 - 2 or MG 660 - 1	Integrated Biology I, II, Integrated Mol & Cell Bio I, II	5, 5	Bio 2401 or MG 5560	Integrated Mol & Cell Bio, Integrated Biology	4 or 5	5*	Bio 2401 replaces Bio 401-402
	Math 512	Partial Differential Equations	3					
	Math 607	Essentials of Numerical Analysis	5	<b>Two of the following three:</b>				
				Math 4557	Partial Differential Equations	3	1*, 2, 3**, 5**	4557 expands on 557
				Math 4556	Dynamical Systems	3	1*, 2, 3**, 5**	4556 expands on 556
				Math 3607	Beginning Scientific Computing	3	1*, 2, 3**, 5**	3607 is the undergraduate version of 607
<b>Electives (9 credit hrs) Must include courses within and outside of Math</b>				<b>Electives (6 credit hours)</b>				
				Any of 4557, 4556, 3607 not counted as a required course.			1*, 2, 3**, 5**	
	Math 547	Introductory Analysis I	3	Math 4547	Introductory Analysis 1	3	1**, 2**, 3*, 4**	Math 4547-4548 replaces Math 547-548-549
	Math 580	Algebra I	3	Math 4580	Abstract Algebra 1	3	1**, 2**, 3*, 4**	Math 4580-4581 replaces Math 580-581-582
	Math 514	Complex Variables	3	Math 4552	Complex Analysis	3	1*, 2**, 3**, 4*, 5*	replaces 514 or 552
	Math 540H	Calculus on Manifolds	5	Math 5540H	Honors Differential Geometry	5	1**, 2**, 3**, 4*, 5	replaces 540H-541H
	Math 513 or 551	Vector Analysis	3 or 5	Math 4551	Vector Analysis	3	1*, 3**, 4*, 5*	replaces 513 & 551
	Math 601, 602, or 603.02	Math Principles in Science I, II, III	3, 3, 3	Math 5101-5102	Linear Math in Finite & Infinite Dimensions	3, 3	1*, 2*, 3** 4**, 5*	5101-5102 replace 601-602- 603.02
	Bchem 511	Intro to Biological Chemistry	5	Bchem 4511	Intro to Biological Chemistry	4	5**	Bchem 4511 replaces Bchem 511
	EEOB 400	Evolution	5	EEOB 3310	Evolution	4	5**	EEOB 3310 replaces EEOB 400
	EEOB 410	Animal form and function	4	EEOB 4520	Animal form and function	3	5**	EEOB 4520 replaces EEOB 410
	EEOB 503	Introductory Ecology (Lec + Lab)	6	EEOB 3420	Introductory Ecology	4	5**	EEOB 3420 replaces EEOB 503
	Chem 251	Organic chemistry	4	Chem 2510	Organic chemistry	4	5**	Chem 2510 replaces Chem 251
	MolGen 500	General genetics	5	MolGen 4500	General genetics	3	5**	MolGen 4500 replaces MolGen 509
	MolGen 601	Eukaryotic Mol Gen Lab	5	MolGen 5601	Eukaryotic Mol Gen Lab	4	5**	MolGen 5601 replaces MolGen 601
<b>Major program learning outcomes</b>								
	<b>1</b>	Learn conceptual frameworks needed to study higher mathematics, including an introduction to mathematical reasoning, and an understanding of how to read and write proofs.						
	<b>2</b>	Acquire basic mastery of core areas of mathematics, including calculus, analysis and algebra.						
	<b>3</b>	Develop powerful mathematical problem solving skills.						
	<b>4</b>	Learn to communicate mathematical understanding effectively.						
	<b>5</b>	Become proficient in chosen tracks within the major.						
* Learning outcomes are indicated for each semester course listed. Number of asterisks indicates level: beginning, intermediate, or advanced.								

<b>Math Major, Applied Track (options Physics or Chemistry) 58 - 60 quarter hrs become 41 - 42 semester hrs.</b>										
Segment of major program	Quarter course #	Quarter course name	Credit hours	Semester course #	Semester course name	Units	Learning outcome	Nature of conversion		
<b>Prerequisites (34 quarter credit hours become 23 semester credit hours; some may double-count in GEC)</b>										
	Math 151	Calculus and Analytic Geometry I	5	Math 1151	Calculus 1	5	1, 2, 3			
	Math 152	Calculus and Analytic Geometry II	5	Math 1152	Calculus 2	5	1, 2, 3	1151-1152 replaces 151-152-153		
	Math 153	Calculus and Analytic Geometry III	5							
Prerequisite courses like the following, depend on Applied Area:										
	Phys 131, 132, 133	Calc-based Physics 1, 2, 3	5, 5, 5	Phys 1250, 1251	Calc-based Physics 1, 2	5, 5	3, 5*	Phys 1250-1251 replaces Phys 131-132-133		
	CSE 202	Intro to Programming & Algorithms	4	CSE 1222	Intro to Programming in C++	3	3, 5*	CSE 1222 replaces 202. C++ is the most appropriate option.		
	Bio 113, 114	Biological Sciences	5, 5	Bio 1113, 1114	Biological Sciences	4, 4	3, 5*	replace Bio 113, 114		
	Chem 121, 122, 123	General Chemistry	5, 5, 5	Chem 1210, 1220	General Chemistry	5, 5	3, 5*	replace Chem 121-122-123		
<b>Core major requirements (23-25 quarter credit hours become 17-18 semester credit hours)</b>										
	Math 254	Calculus and Analytic Geometry IV	5	Math 2153	Calculus 3	4	1*, 2*, 3	expands on 254		
	Math 345	Fdns of Higher Mathematics	4	Math 3345	Fdns of Higher Mathematics	3	1**, 2**, 3*, 4*	expands on 345		
	Math 571-2	Linear Algebra I, II	3, 3	Math 2568	Linear Algebra	3	1*, 2**, 3*, 4, 5	replaces 571-572		
	Math 530 or Stat 420	Probability, or Intro to Math Stat I	3 or 5	Math 4530 or Stat 4201	Probability or Intro to Math Stat I	3 or 4	1*, 2, 3**, 4*, 5*	expands on 530; Stat 4201 replaces Stat 420		
	Stat 421	Intro to Math Stat II	5	Stat 4202	Intro to Math Stat II	4	1, 3*, 5	Stat 4202 replaces Stat 421		
<b>Required &amp; Elective courses in track (34 quarter credit hours become 24 semester credit hours)</b>										
<b>Required:</b>										
	Math 512	Partial Diff Equations	3	Math 4557	Partial Diff Eqs	3	1, 2**, 3*, 4, 5	replaces 557, expands on 512		
	Math 255	Diff Equations and Appls	5	Math 2255	Differential Equations and Appls	3	1, 2**, 3**, 4	replaces 255		
	Math 607	Essentials of Numerical Analysis	5	Two of the following three:						
	Math 514	Complex Variables	3	Math 3607	Beginning Scientific Computing	3	3**, 4, 5*	replaces parts of 607		
				Math 4552	Complex Analysis	3	1*, 2**, 3*, 4*, 5*	replaces 552, expands on 514		
				Math 4556	Dynamical Systems	3	1, 3*, 4*, 5*	expands on 556		
<b>Electives (at least 9 quarter hours in math and 9 in the applied area):</b>										
<b>Electives (at least 6 units in math and 6 in the applied area):</b>										
<b>Group I - Math</b>										
	Math 556	Differential Eqs I	3	Any of 4552, 4556, 3607 not counted as a required course.						
	Math 513 or 551	Vector Analysis	3 or 5	Math 4551	Vector Analysis	3	1*, 3*, 4*, 5*	replaces 513 & 551		
	Math 601, 602, or 603.02	Math Principles in Science I, II, III	3, 3, 3	Math 5101, 5102	Linear Math in Finite & Infinite Dimensions	3, 3	1, 2**, 3*, 5*	5101-5102 replace 601-602- 603.02		
	Math 547, 548, 549	Intro Analysis I, II, III	3, 3, 3	Math 4547, 4548	Introductory Analysis 1, 2	3, 3	1**, 2**, 3*, 4*	4547-4548 replace 547-548-549		
	Math 665, 666	Applied Differential Geometry I, II	4, 4	Math 5756, 5757	Methods in Relativity Theory I, II	3, 3	3, 4*, 5*	5756-5757 replace 665-666		
	Math 701	Calculus of Variation & Tensors	5	Math 5451	Calculus of Variation & Tensors	3	1, 2, 3*, 4, 5**	replaces 701		
<b>Group II - Applied Area</b>										
<b>Option 1: Physics</b>										
	Phys 261-262-263	Dyn of Particles & Waves I, II, III	4, 4, 4	Phys 2300-2301	Dyn of Particles & Waves I, II, III	4, 4, 4	5**	Phys 2300-2301 replace Phys 261-262-263		
<b>Option 2: Chemistry</b>										
	Chem 221	Analytical Chemistry	5	Chem 2210	Analytical Chemistry	5	5**	Chem 2210 expands on Chem 221		
	Chem 530-531-531	Physical Chemistry 1, 2, 3	3, 3, 3	Chem 4300-4310	Physical Chemistry 1, 2	3, 3	5**	Chem 4300-4310 replace Chem 530-531-532		
<b>Major program learning outcomes</b>										
	<b>1</b>	Learn conceptual frameworks needed to study higher mathematics, including an introduction to mathematical reasoning, and an understanding of how to read and write proofs.								
	<b>2</b>	Acquire basic mastery of core areas of mathematics, including calculus, analysis and algebra.								
	<b>3</b>	Develop powerful mathematical problem solving skills.								
	<b>4</b>	Learn to communicate mathematical understanding effectively.								
	<b>5</b>	Become proficient in chosen tracks within the major.								
* Learning outcomes are indicated for each semester course listed. Number of asterisks indicates level: beginning, intermediate, or advanced.										

<b>Math Major, Financial Track</b> 57 - 59 quarter hrs become 41 - 42 semester credit hrs.								
Segment of major program	Quarter course #	Quarter course name	Credit hours	Semester course #	Semester course name	Units	Learning outcome	Nature of conversion
<b>Prerequisites (35 quarter credit hours become 23 semester credit hours; some may double-count in GEC)</b>								
	Math 151	Calculus and Analytic Geometry I	5	Math 1151	Calculus 1	5	1, 2, 3	1151-1152 replaces 151-152-153
	Math 152	Calculus and Analytic Geometry II	5	Math 1152	Calculus 2	5	1, 2, 3	
	Math 153	Calculus and Analytic Geometry III	5					
	Acct 310	Foundations of Accounting	5	Acct 2000	Foundations of Accounting	3	3, 5*	Acct 2000 replaces Acct 310
	Econ 200	Principles of Microeconomics	5	Econ 2001.01	Principles of Microeconomics	3	3, 5*	Econ 2001.01 replaces Econ 200
	Econ 201	Principles of Macroeconomics	5	Econ 2002.01	Principles of Macroeconomics	3	3, 5*	Econ 2002.01 replaces Econ 200
	CSE 200	Computer Assisted Problem Solving for Business	5	CSE 1113	Computer Assisted Problem Solving for Business	4	3, 5*	CSE 1113 replaces CSE 200
<b>Core major requirements (20 or 22 quarter credit hours become 17 or 18 semester credit hours)</b>								
	Math 254	Calculus and Analytic Geometry IV	5	Math 2153	Calculus 3	4	1*, 2*, 3**	expands on 254
	Math 345	Foundations of Higher Math	4	Math 3345	Foundations of Higher Math	3	1**, 2**, 3*, 4*	expands on 345
	Math 530 or Stat 420	Probability or Intro to Math Stat I	3 or 5	Math 4530 or Stat 4201	Probability or Intro to Math Stat I	3 or 4	1**, 2, 3**, 4*, 5*	
	Math 568	Linear Algebra	3	Math 2568	Linear Algebra	3	1*, 2**, 3, 5	expands on 568 or 571
	Stat 421	Intro to Math Stat II	5	Stat 4202	Intro to Math Stat II	4	1, 3, 5*	Stat 4202 replaces Stat 421
<b>Required courses in track (36 quarter credit hours become 24 semester credit hours)</b>								
	Math 255	Differential Equations and Their Applications	5	Math 2255	Differential Equations and Their Applications	3	1, 2**, 3**, 4*	replaces Math 255
	Math 512	Partial Differential Equations & Boundary Value Problems	3	Math 4557	Partial Differential Equations	3	1, 2**, 3**, 5**	replaces 512 or 557
	Math 588	Practicum in Actuarial Science	4					no longer offered to Financial Math majors
	Math 589	Introduction to Mathematical Finance	3	Math 3589	Introduction to Financial Mathematics	3	3*, 4*, 5**	replaces 589
	Math 607	Essentials of Numerical Analysis	5	Math 3607	Begin Sci Computing	3	3*, 4*, 5**	replaces parts of 607
	Math 618	Theory of Interest	4	Math 3618	Theory of Interest	3	3*, 4**, 5**	replaces 618
	Math 632	Actuarial Mathematics III	4	Math 5632	Financial Economics	3	3*, 4**, 5**	replaces 632
	Bus 420 or 620	Foundations of Finance, Business Finance	4 or 4	Bus Fin 2220 or 3280	Foundations of Finance, Business Finance	3 or 3	3*, 4*, 5**	replaces BUS 420, 620
	CSE 201 or 202	Elementary Computer Programming, Intro. to Programming & Algorithms	4 or 4	CSE 1223, 1222	Intro to Computer Prog. in Java, Intro to Computer Prog. in C++	3 or 3	3, 5*	replaces CSE 201, 202
<b>Electives</b>	none			none				
<b>Major program learning outcomes</b>								
	<b>1</b>	Learn conceptual frameworks needed to study higher mathematics, including an introduction to mathematical reasoning, and an understanding of how to read and write proofs.						
	<b>2</b>	Acquire basic mastery of core areas of mathematics, including calculus, analysis and algebra.						
	<b>3</b>	Develop powerful mathematical problem solving skills.						
	<b>4</b>	Learn to communicate mathematical understanding effectively.						
	<b>5</b>	Become proficient in chosen tracks within the major.						
* Learning outcomes are indicated for each course listed. Number of asterisks indicates level: beginning, intermediate, or advanced.								



## SAMPLE FOUR-YEAR PLANS

*Italic* indicates prerequisite courses, not counted in the major.

### Math Major: **Theoretical Track** **Quarters**

	Au	Wi	Sp	Hours in major
YR 1.	<i>Math 151</i> (5) GEC	<i>Math 152</i> (5) GEC	<i>Math 153</i> (5) GEC	0
YR 2.	Math 254 (5) GEC	Math 255 (5) GEC	Math 345 (4) Math 568 (3) GEC	17
YR 3.	Math 580 (3) Math 530 (3) or Stat 420 (5) GEC	Math 581 (3) Stat 421 (5) GEC	Math 582 (3) GEC	17 or 19
YR 4.	Math 547 (3) Math Elective* (5) GEC	Math 548 (3) Math Elective* (3) GEC	Math 549 (3) GEC	19

### Math Major: **Theoretical Track** **Semesters**

	Au	Sp	Hours in major
YR 1.	<i>Math 1151</i> (5) GE	<i>Math 1152</i> (5) GE	0
YR 2.	Math 2153 (4) GE	Math 3345 (3) Math 2568 (3) GE	10
YR 3.	Math 4580 (3) Math 4530 (3) or Stat 4201 (4) Math 2255 (3) GE	Math 4581 (3) Stat 4202 (4)  GE	16 or 17
YR 4.	Math 4547 (3) Math Elective* (3) GE	Math 4548 (3) Math Elective* (3) GE	12

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\* Check with your faculty adviser to determine choices for elective courses.

Math Major: **HONORS Theoretical Track** **Quarters**

	Au	Wi	Sp	Hours in major
YR 1.	Math 190H (5) GEC	Math 191H (5) GEC	Math 264H (5) GEC	15
YR 2.	Math 520H (5) GEC	Math 521H (5) GEC	Math 522H (4) GEC	15
YR 3.	Math 594H (5) or Math 531H Math 590H (5) GEC	Math 540H (5) or Math 576H (5) Math 591H (5) GEC	Math 541H (5) or Math 577H (5) Math 592H (5)	30
YR 4.	Math 531H (5) GEC	Stat 421 (5) GEC	GEC GEC	10

Math Major: **HONORS Theoretical Track** **Semesters**

	Au	Sp	Hours in major
YR 1.	Math 4190H (5) GE	Math 4191H (5) GE	10
YR 2.	Math 5520H (5) GE	Math 5522H (5) GE	10
YR 3.	Math 5590H (5) Math 5529H (5) or Math 5576H (5) GE	Math 5591H (5) Math 5530H (5) or Math 5540H (5) GE	20
YR 4.	Math 5576H (5) or Math 5529H (5) Stat 4202 (4) GE	Math 5540H (5) or Math 5530H (5) GE	14

### Math Major: Education Track **Quarters**

	Au	Wi	Sp	Hours in major
YR 1.	<i>Math 151 (5)</i> GEC	<i>Math 152 (5)</i> <i>CSE 201, 202,</i> <i>or 221 (4)</i>	<i>Math 153 (5)</i> GEC	0
YR 2.	Math 254 (5) GEC	Math 568 (3) GEC	Math 345 (4) GEC	12
YR 3.	Math 580 (3) Stat 420 (5) GEC	Math 581 (3) Stat 421 (5) GEC	Math 582 (3) Math 578 (5) GEC	24
YR 4.	Math 547 (3) Math 507 (5) GEC	Math 548 (3) GEC	Math 549 (3) Math 504 (5) GEC	19

### Math Major: Education Track **Semesters**

	Au	Sp	Hours in major
YR 1.	<i>Math 1151 (5)</i> GE	<i>Math 1152 (5)</i> <i>CSE 1223 (3),</i> <i>1222(3), or 2221 (4)</i>	0
YR 2.	Math 2153 (4) GE GE	Math 3345 (3) Math 2568 (3) GE	10
YR 3.	Math 4580 (3) Stat 4201 (4) GE	Math 4581 (3) Stat 4202 (4) GE	14
YR 4.	Math 4547 (3) Math 4504 (3) Math 4507 (3) GE	Math 4548 (3) Math 4578 (4) GE	16

Math Major: **Bio-Math Track Quarters**

	Au	Wi	Sp	Hours in major
YR 1.	<i>Math 151 (5)</i> <i>Chem 121 (5)</i> GEC	<i>Math 152 (5)</i> <i>Bio 113 (5)</i> GEC	<i>Math 153 (5)</i> <i>Bio 114 (5)</i> GEC	0
YR 2.	Math 254 (5) GEC	Math 255 (5) Stat 420 (5) GEC	Math 345 (4) Math 512 (3) Stat 421 (5)	27
YR 3.	Math 571 (3) MolGen 660 (5) GEC	Math 572 (3) MolGen 661 (5) GEC	Math 350 (3) GEC	19
YR 4.	Math or Bio* (3) GEC	Math 607 (5) Math or Bio* (3) GEC	Math or Bio* (3) GEC	14

Math Major: **Bio-Math Track Semesters**

	Au	Sp	Hours in major
YR 1.	<i>Math 1151 (5)</i> <i>Chem 1210 (5)</i> GE	<i>Math 1152 (5)</i> <i>Bio 1113 (4)</i> GE	0
YR 2.	Math 2153 (4) <i>Bio 1114 (4)</i> GE	Math 2255 (3) Math 2568 (3) Stat 4201 (4)	15
YR 3.	Stat 4202 (4) Math 3345 (3) GE	Math 4556** (3) Math 3350 (3) GE	12
YR 4.	Bio 2401 (4) or MolGen 5560 (5) Math 3607** (3) GE	Math or Bio Elective* (3) Math or Bio Elective* (3) GE	13 or 14

\* Check with your faculty adviser to determine choices for elective courses.

\*\* Majors in this track need credit for two of the following three courses: 4556, 4557, 3607.

## Math Major: Applied Track **Quarters**

	Au	Wi	Sp	Hours in major
YR 1.	<i>Math 151 (5)</i> GEC	<i>Math 152 (5)</i> <i>Physics 131 (5)</i> GEC	<i>Math 153 (5)</i> <i>Physics 132 (5)</i> GEC	0
YR 2.	Math 254 (5) <i>Physics 133 (5)</i> GEC	Math 255 (5) GEC	Math 345 (4) Math 512 (3) GEC	17
YR 3.	Math 571 (3) Stat 420 (5) GEC	Math 572 (3) Math 607 (5) GEC	Math 514 (3) Stat 421 (5) GEC	24
YR 4.	Math Elective* (3) Applied Elective* (3) GEC	Math Elective* (3) Applied Elective* (3) GEC	Math Elective* (3) Applied Elective* (3) GEC	18

## Math Major: Applied Track **Semesters**

	Au	Sp	Hours in major
YR 1.	<i>Math 1151 (5)</i> <i>CSE 1222 (3)</i> GE	<i>Math 1152 (5)</i> <i>Physics 1250 (5)</i> GE	0
YR 2.	Math 2153 (4) <i>Physics 1251 (5)</i> GE	Math 3345 (3) Math 2255 (3) Math 2568 (3)	13
YR 3.	Stat 4201 (4) Math 3607** (3) Math 4557 (3)	Stat 4202 (4) Math 4552** (3) GE	17
YR 4.	Math Elective* (3) Applied Elective* (3) GE	Math Elective* (3) Applied Elective* (3) GE	12

\* Check with your faculty adviser to determine choices for elective courses.

\*\* Majors in this track need credit for two of the following three courses: 4552, 4556, 3607.

**Math Major: Financial Track Quarters**

	Au	Wi	Sp	Hours in major
YR 1.	<i>Math 151 (5)</i> <i>CSE 200 (5)</i> GEC	<i>Math 152 (5)</i> <i>Econ 200 (5)</i> GEC	<i>Math 153 (5)</i> <i>Econ 201 (5)</i> GEC	0
YR 2.	Math 254 (5) <i>Acct 310 (5)</i> GEC	Math 255 (5) CSE 201 (4) GEC	Math 345 (4) Math 568 (3) GEC	21
YR 3.	Stat 420 (5) GEC	Stat 421 (5) Math 512 (3) GEC	Bus Fin 620 (4) GEC	17
YR 4.	Math 618 (4) GEC	Math 589 (3) Math 607 (5) GEC	Math 588 (4) Math 632 (4) GEC	20

**Math Major: Financial Track Semesters**

	Au	Sp	Hours in major
YR 1.	<i>Math 1151 (5)</i> <i>CSE 1113 (4)</i> GE	<i>Math 1152 (5)</i> <i>Econ 2001.01 (3)</i> GE	0
YR 2.	Math 2153 (4) <i>Econ 2002.01 (3)</i> <i>Acct 2000 (3)</i>	Math 3345 (3) Math 2568 (3) GE	10
YR 3.	Stat 4201 (4) Math 2255 (3) GE	Stat 4202 (4) Math 4557 (3) Math 3589 (3)	17
YR 4.	Math 3618 (3) Math 3607 (3) CSE 1222 (3) GE	Math 5632 (3) Bus Fin 3280 (3)  GE	15

## Transition Policies and Plans for students getting a BS or BA in Math.

Requirements for a B.S. in Mathematics will undergo minimal changes in the conversion to semesters. Every math course or course sequence (prerequisite, required, or elective) under quarters will have a corresponding course or course sequence under semesters. In some cases this transition involves an increase in credit hours, typically motivated by the expectation that upper division semester math courses will be 3 credits. In most cases, these increases are balanced by small rearrangements of required and elective courses.

Transition policies for freshman-level courses are more difficult to work out because those courses are usually in a long sequence that can be entered at different points. The only one of those transitions that is relevant for math majors is the mainstream calculus sequence, Math 151-152-153-254. Those plans are outlined on a separate page below.

Two difficult transition arise in upper division courses taken by math majors:

Students might be part way through a 500-level math course sequence at the end of Spring 2012.

This can happen for Math **547-548-549** and **580-581-582**, corresponding to Math **4547-4548** and Math **4580-4581**. Those course sequences in quarters begin in both Autumn and Winter. Each of the four corresponding semester courses will be offered in both Autumn and Spring Semesters.

Since Math 547 and 580 are not offered in Spring, few students will have credit for just one course in the sequence when semesters arrive. Advisors will guide those students on a case-by-case basis.

Students who complete Math 547-548 in Winter and Spring of 2012 will enter the 3-credit transition course Math **4544** offered only in Au12. Math 4544 will be Math 549 done in a semester. This will include all topics not in 549, done in greater detail, and proceeding through the mathematical ideas at slower pace. This arrangement will not cause delays in graduation.

Students who complete Math 580-581 in Winter and Spring of 2012 will enter the 3-credit transition course Math **4584** offered only in Au12. Math 4584 will be Math 582 done in a semester. This will include all topics not in 582, done in greater detail, and proceeding through the mathematical ideas at slower pace. This arrangement will not cause delays in graduation.

### ADVISING.

Three full-time counselors are currently available in the *Math Advising Office* for walk-in appointments to help students determine their best paths through the many options for math at OSU. General information about that office is posted at <http://www.math.ohio-state.edu/counseling>. Those counselors devote most of their effort assisting students from other departments. They evaluate math transfer credit, deal with issues involved with the Math Placement Exam, advise students who are having difficulties with math classes, work with many activities to recruit new freshmen, etc. In addition, the math counselors work closely with Math and Actuarial Science majors, helping them complete major and minor program forms and facilitating the process of connecting majors with faculty advisors.

From Winter 2011 through Spring 2012 the math advisors will send messages to all undergraduate majors in the Math Department, highlighting the various math course options available with semesters. They will direct the efforts to complete a TAP form for every math and actuarial science major who will be at OSU after Sp12. The Department's staff members, faculty advisors, and departmental administrators will be able to deal with the expected numbers of majors who encounter difficulties in the process of conversion to semesters.

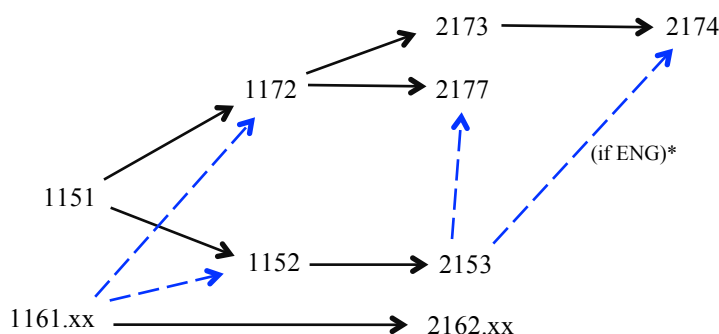
However, throughout 2012 we expect floods of students from outside the Math Department to visit the Math Advising Office with questions about transition processes, especially concerning semester transitions of the many lower-division math courses. We hope that the Department will be able to find funds to hire enough extra help during the transition year to make it possible to handle that advising burden.

## Calculus transition plans.

With semesters, calculus will split into different strands.

Note: 1151, 1152, 2153, 2568, and 2255 satisfy the *Transfer Assurance Guides* provided by Ohio's Board of Regents.

Course sequences starting with calculus	majors that use them
• Standard Calculus: 1151 – 1152 – 2153 – 2568 – 2255	math, act sci, some sciences
• Eng. Calculus: 1151 – 1172 – 2173 – 2174	AE, ISE, ME, CBE, Eng Phys
• Eng. Calculus Topics: 1151 – 1172 – 2177	BME, CEEGS, FABE, MSE, WE
• Calc – LinAlg – DiffEq: 1151 – 1172 – 2568 – 2415	ECE
• Calculus + Discrete: 1151 – 1172 – 2568 – 2566	CSE, CIS
• Accelerated Calculus: 1161 – 2162 (+ 2568 + 2415)	FEH
• Honors Calculus: 1181H – 2182H	honors math
• Honors Analysis: 4190H – 4191H	honors math



Arrows indicate ways students may move among these courses:

Dotted line: allowed but not recommended (e.g. because of overlapping material).

No arrow from X to Y: students with credit for Course X may not enroll in Course Y.

### Honors courses

Students with C- or better in 1181H or 4190H may enter 1172 or 2153.

### Linear Algebra

2568 prereq: C- or better in 1172, 2153, 2162.xx, 1181H, or 4191H.

### Diff Eqs:

2255 prereq: C- or better in 2153, or 2162.xx, or 2173.

Note: 2255 and 2415 exclude each other.

2415 prereq: C- or better in 2153, or 2162.xx, or 2173, or {1172 and 2568}.

4556 prereq: C- or better in 2153, or 2162, or 2173.

4557 prereq: C- or better in 2255 or 2415.

4512 prereq: C- or better in 2174, 2255, 2415 or equivalent.

Note: 4512 is intended for engineers.

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\* Math and Act Sci majors with credit for Math 2174 must also take 2255 and 2568, even though that involves overlaps in content.



Here are short descriptions of these courses. Credit hours are indicated in parentheses.

- 1151 Calculus 1** (5) limits, derivatives, max-min, definite integrals, Fundamental Theorem.
- 1152 Calculus 2** (5) integration techniques, sequences and series, convergence tests, Taylor series, parametric and polar curves, (optional: vectors).
- 1161 Accelerated Calculus 1** (5) limits, derivatives, max-min, integrals, techniques of integration, applications.
- 1172 Engineering Math A** (5) integration, sequences & series, Taylor series, vectors and parametric curves, several variables, partial derivatives, max-min.
- 2153 Calculus 3** (4) vectors, several variables, partial derivatives, max-min, multiple integrals, line integrals and vector fields, divergence, curl, integration theorems.
- 2162 Accelerated Calculus 2** (5) sequences & series, Taylor series, vectors, parametric curves, partial derivatives, optimization, multiple integrals, line integrals, divergence, curl, integration theorems.
- 2173 Engineering Math B** (3) multiple integrals, line integrals, vector fields, second order constant coefficient ODEs.
- 2174 Linear Algebra and Differential Equations** (3) vectors, matrices, diagonalization, systems of linear ODEs, Fourier series, PDEs.
- 2177 Mathematical Topics for Engineers** (4) multiple integrals, line integrals, matrices and linear systems, constant coefficient ODEs, Fourier series, PDEs.
- 2255 ODEs** (3) first order methods, existence and uniqueness, second order linear equations, Wronskian, undetermined coefficients, variation of parameter, series solutions, Laplace transform.
- 2415 ODEs and PDEs** (3) first and second order ODEs, Fourier series, constant coefficient PDEs, boundary and initial value problems, systems of ODEs.
- 2568 Linear Algebra** (3) systems of equations, matrices, vector spaces, dimension, linear transformations, determinants, eigenvalues, diagonalization, orthogonality.
- 4512 Applied PDEs** (3) first and second order equations, boundary value problems, separation of variables, Fourier series, Green's functions, wave and diffusion equation, Schrodinger's equation, Bessel functions.
- 4556 Dynamical Systems** (3) systems of linear, first-order ODEs, existence and uniqueness, phase plane analysis, bifurcation theory, stability, oscillations, applications and modeling.
- 4557 PDEs** (3) first and second order PDEs, initial value and boundary value problems, Fourier series, Green's functions, nonlinear theory: wave, heat, and Laplace equation. Applications.

Abbreviations: ODE = ordinary differential equation, PDE = partial differential equation.

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## TRANSITION PLANS for Freshman Calculus.

Here are different scenarios for students at the end of Spring 2012. More detailed information about Math course transition options appears in separate documents, posted at [www.math.ohio-state.edu/semesters](http://www.math.ohio-state.edu/semesters).

- *Completed 151-152-153:* may take 2153, (not 2173 or 2177).
- *Engineers on track to complete 151-152-153:* In Sp12, take the 5-credit transition course **Math 154** instead of 153. With credit for 154, they may enter Math 2173 or 2177, (not 2153).

- *Completed 151-152:* may enter 1152 or 1172, but that direct transition repeats about 6 weeks of material.

There are two ways to avoid that overlap.

**1** Students with C- or better in Math 151 may enroll in **Math 114**, a 3-credit transition course in Sp12, or in **Math 1114** a 2-credit transition course in Su12 or Au12.

Math 151 plus {114 or 1114} is equivalent to Math 1151.

Math 114 and 1114 will use video lectures that each student will view independently, on a personal computer. Recitation classes following those lectures come in two formats, to accommodate different needs of students. Each recitation class will have a maximal enrollment of 30 students. Both of the formats will have video lectures, on-line homework assignments, and a **proctored, paper-and-pencil, final exam**.

Formats for the recitation sections are:

- 1. Hybrid:** Students meet in traditional, live, recitation sections meeting in an OSU classroom twice a week.
  - The best option. In Columbus, this class will probably be offered Sp12, Su12, and the first term of Au12.
- 2. Online:** At the scheduled class time, each student logs in to the class using a personal computer, communicating with the instructor through microphone and chat box. Students will hear their recitation instructor and see the problems being written out.
  - Available for students unable to attend a traditional class in Columbus.

C- or better in 114 or 1114: may enter 1152 or 1172.

D+ or lower in 114 or 1114: re-enroll in 1114 in Au12, or enter 1151 (repeating the 151 topics).

**2** Students with C- or better Math 152 in Sp12 may enter the 3-credit transition courses **Math 1534** or **1544**. These courses correspond directly to the quarter courses:

1534 = Math 153 presented in a semester. Students with C- or better in 1534 may enter Math 2153.

1544 = Math 154 presented in a semester. Students with C- or better in 1544 may enter Math 2173 or 2177.

- *Completed 151:*

Advising at the end of Sp12: Math 1114. We recommend the live recitation option if possible.

**AP-Calculus credit:**

Students who took AP-calculus exams in high school will get credit for certain OSU calculus courses.

Score	Credit for:	Recommended Courses
AB-1, AB-2, BC-1, BC-2	no credit	Use OSU Math Placement Exam
AB-3	1151	1151
AB-4	1151	1152 or 1172
AB-5	1151	1161.xx, 1152, 1172; or 1181H or 4190H with advisor approval
BC-3	1151	1161.xx, 1152, 1172; or 1181H or 4190H with advisor approval
BC-4, 5	1151, 1152	2153; or 1181H, 4190H with advisor approval, or: 1162.02 or 2162.02: with FEH-advisor approval

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## Generic transition schedules.

Here are generic course schedules for math majors (theoretical track) who will experience the transition to semesters at different points in their undergraduate careers. Credit hours are indicated to the right of each course in the major program. Similar schedules can be generated for the other tracks.

Nearly all math majors will move smoothly to the new system. A few difficulties will arise, for unanticipated reasons, leading to some individual studies courses run by appropriate faculty members.

Graduating $\leq$ Sp12	Graduating Sp13	Graduating Sp14	Graduating Sp15	Graduating $\geq$ Sp16
(Au08)	(Au09)	(Au10)	(Au11)	(Au12)
Math 151 (Calc I) 5	Math 151 (Calc I) 5	Math 151 (Calc I) 5	Math 151 (Calc I) 5	Math 1151 (Calc 1) 5
Math 152 (Calc II) 5	Math 152 (Calc II) 5	Math 152 (Calc II) 5	Math 152 (Calc II) 5	Math 1152 (Calc 2) 5
Math 153 (Calc III) 5	Math 153 (Calc III) 5	Math 153 (Calc III) 5	Math 153 (Calc III) 5	GECs
GECs	GECs	GECs	GECs	
Math 254 (Calc IV) 5	Math 254 (Calc IV) 5	Math 254 (Calc IV) 5	Math 2153 (Calc 3) 4	Math 2153 (Calc 3) 4
Math 255 (ODE) 5	Math 255 (ODE) 5	Math 255 (ODE) 4	Math 2255 (ODE) 3	Math 2255 (ODE) 3
Math 345 (Hi Math) 4	Math 345 (Hi Math) 4	Math 345 (Hi Math) 4	Math 3345 (Hi Math) 3	Math 3345 (Hi Math) 3
Math 568 (Lin Alg) 3	Math 568 (Lin Alg) 3	Math 568 (Lin Alg) 3	Math 2568 (Lin Alg) 3	Math 2568 (Lin Alg) 3
GECs	GECs	GECs	GECs	GECs
Math 580 (Ab Alg I) 3	Math 580 (Ab Alg I) 3	Math 4580 (Ab Alg 1) 3	Math 4580 (Ab Alg 1) 3	Math 4580 (Ab Alg 1) 3
Math 581 (Ab Alg I) 3	Math 581 (Ab Alg I) 3	Math 4581 (Ab Alg 2) 3	Math 4581 (Ab Alg 2) 3	Math 4581 (Ab Alg 2) 3
Math 582 (Ab Alg I) 3	Math 582 (Ab Alg I) 3	Math 4530 (Prob) 3	Math 4530 (Prob) 3	Math 4530 (Prob) 3
Math 530 (Prob) 3	Math 530 (Prob) 3	Stat 4202 (Stat) 4	Stat 4202 (Stat) 4	Stat 4202 (Stat) 4
Stat 421 (Stat) 5	Stat 421 (Stat) 5	GECs	GECs	GECs
GECs	GECs			
Math 547 (An I) 3	Math 4547 (An 1) 3	Math 4547 (An 1) 3	Math 4547 (An 1) 3	Math 4547 (An 1) 3
Math 548 (An II) 3	Math 4548 (An 2) 3	Math 4548 (An 2) 3	Math 4548 (An 2) 3	Math 4548 (An 2) 3
Math 549 (An III) 3	Math 4507 (Geom) 3	Math 4507 (Geom) 3	Math 4507 (Geom) 3	Math 4507 (Geom) 3
Math 507 (Geom) 5	Math 4552 (Cx An) 3	Math 4552 (Cx An) 3	Math 4552 (Cx An) 3	Math 4552 (Cx An) 3
Math 552 (Cx Vbl) 5	GECs	GECs	GECs	GECs
GECs				