SELF-ADVISING HANDBOOK
FOR UNDERGRADUATE
MATH MAJORS AND MINOR

Department of Mathematics
Brooklyn College
City University of New York

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Table of Contents

1. Undergraduate Programs 4
1.1 B.A. in Mathematics 5
Prerequisite Flowchart for the B.A. in Mathematics 6
Possible Schedules for the B.A. in Mathematics 7
1.2 B.S. in Mathematics 8
Prerequisite Flowchart for the B.S. in Mathematics (Concentration in General Mathematics) 10
Possible Schedules for the B.S. in Mathematics (Concentration in General Mathematics) 11
Prerequisite Flowchart for the B.S. in Mathematics (Concentration in Theoretical Mathematics) 12
Possible Schedules for the B.S. in Mathematics (Concentration in Theoretical Mathematics) 13
Prerequisite Flowchart for the B.S. in Mathematics (Concentration in Applied Mathematics) 14
Possible Schedules for the B.S. in Mathematics (Concentration in Applied Mathematics) 15
1.3 B.S. in Actuarial Mathematics 16
Prerequisite Flowchart for the B.S. in Actuarial Mathematics 18
Possible Schedules for the B.S. in Actuarial Mathematics 19
Additional Advice on the Actuarial Professional Examinations 20
1.4 B.S. in Financial Mathematics 22
Prerequisite Flowchart for the B.S. in Financial Mathematics 24
Possible Schedules for the B.S. in Financial Mathematics 25
1.5 B.S. in Computational Mathematics 26
Prerequisite Flowchart for the B.S. in Computational Mathematics (Option I: Computational) 28
Possible Schedules for the B.S. in Computational Mathematics (Option I: Computational) 29
Prerequisite Flowchart for the B.S. in Computational Mathematics (Option II: Theoretical) 30
Possible Schedules for the B.S. in Computational Mathematics (Option II: Theoretical) 31
1.6 B.A. in Adolescence Education: Mathematics Teacher 32
Prerequisite Flowchart for the B.A. in Adolescence Education: Mathematics Teacher 33
Possible Schedules for the B.A. in Adolescence Education: Mathematics Teacher 34
1.7 Minor in Mathematics 35
1.8 Minor in Actuarial and Financial Mathematics 36
1.9 Minor in Statistics 37
1.10 Minor in Data Science 38
1.11 Early Childhood and Childhood Education Teacher with concentration in Mathematics 39
2. Requirements for Graduation with Departmental Honors 40
3. Multiple-year Schedule of Advanced Electives 41
4. Courses Offered by the Department of Mathematics 43
5. Faculty 54

This “Self-Advising Handbook” aims to provide an overview of the undergraduate programs in Mathematics at Brooklyn College. The latest Brooklyn College Bulletin (available on the College website at http://www.brooklyn.cuny.edu/web/about/administration/enrollment/registrar/bulletins.php) is the official document of the rules and regulations and should be consulted for final resolutions of any question.

For any question regarding the correspondence between new course numbers and old course numbers, go to http://www.brooklyn.cuny.edu/courses/new_crs_num.jsp

To access the most recent version of the Self-Advising Handbook for majors and minors sponsored or partially sponsored by the Mathematics Department use the link
http://www.brooklyn.cuny.edu/web/aca_naturalsciences_math/self_advising_handbook_11_2021.pdf

1. Undergraduate Programs

The Mathematics Department offers distinctive undergraduate educational programs in pure and applied mathematics as well as in mathematics education. Its faculty pursues high quality research and participates in the doctoral programs in mathematics, physics and urban education at The Graduate Center of The City University of New York.

The department offers the following undergraduate programs:

- B.A. in Mathematics
- B.S. in Mathematics with three different concentrations (general, theoretical and applied mathematics)
- B.S. in Actuarial Mathematics
- B.S. in Financial Mathematics
- B.S. in Computational Mathematics (joint program with the Department of Computer and Information Science)
- B.A. in Adolescence Education for Mathematics Teachers (grades 7-12)
- Early Childhood Education Teacher (birth-grade 2) and Childhood Education Teacher (grades 1-6) concentration in Mathematics (joint program with the School of Education)
- Minor in Mathematics
- Minor in Actuarial and Financial Mathematics
- Minor in Statistics
- Minor in Data Science (joint program with the Department of Computer and Information Science)

Students who major, minor, or take courses in mathematics increase their computational facility, develop their appreciation for abstract structures and reasoning at the heart of mathematics, and enhance their ability to apply mathematics to real-world problems.

Mathematics students gain experience with current mathematical software and technology, and may pursue a B.S. in Computational Mathematics in conjunction with the Computer and Information Science Department.

Students may elect to develop expertise in financial and actuarial mathematics to obtain marketable credentials for work in financial and insurance industries.

Students may also elect to develop expertise in teaching Mathematics and pursue a B.A. in Adolescent Education for Mathematics Teachers.

Students who desire to study more advanced mathematical topics and their applications may apply to master's and doctoral degree programs after graduation.

Back to Table of Contents

1.1 B.A. in Mathematics

To enroll in any advanced mathematics course, students must maintain an average grade of C or higher in all courses previously taken in the department, unless this requirement is waived by the chairperson. A student exempt, without credit, from a course cannot take the course later for credit except with permission of the chairperson.

All mathematics courses offered to satisfy the requirements for a major in mathematics must be completed with a grade of C- or higher. Unless otherwise specified in the Brooklyn College Undergraduate Bulletin, any mathematics courses used to satisfy a prerequisite for an advanced elective must be completed with a grade of C- or higher.

Department requirements (45-50 credits):

All of the following:

MATH 1006 (waived by passing a placement exam)

MATH 1011 or MATH 1012 (waived by passing a placement exam)

MATH 1201, 1206, 2001, 2101, 2201, 3101, 4201

CISC 1115 or 1215

Two of the following:

MATH 4101, 4106, 4206, 4211 (and prerequisite 2206), 4216, 4302, 4306, 4501 (and prerequisite 3501), 4506, 4511 (and prerequisite 3501), 4701 (and prerequisite 2206), 5001, 5002, 5003, 5004

Any additional courses in the Mathematics department to bring the total number of credits in advanced courses[1] *to 18*.

Department recommendations:

- Majors should consult with a Mathematics department counselor concerning substitutions for core science courses.
- Prospective doctoral students should develop reading competence in at least one of the following languages: French, German and Russian.

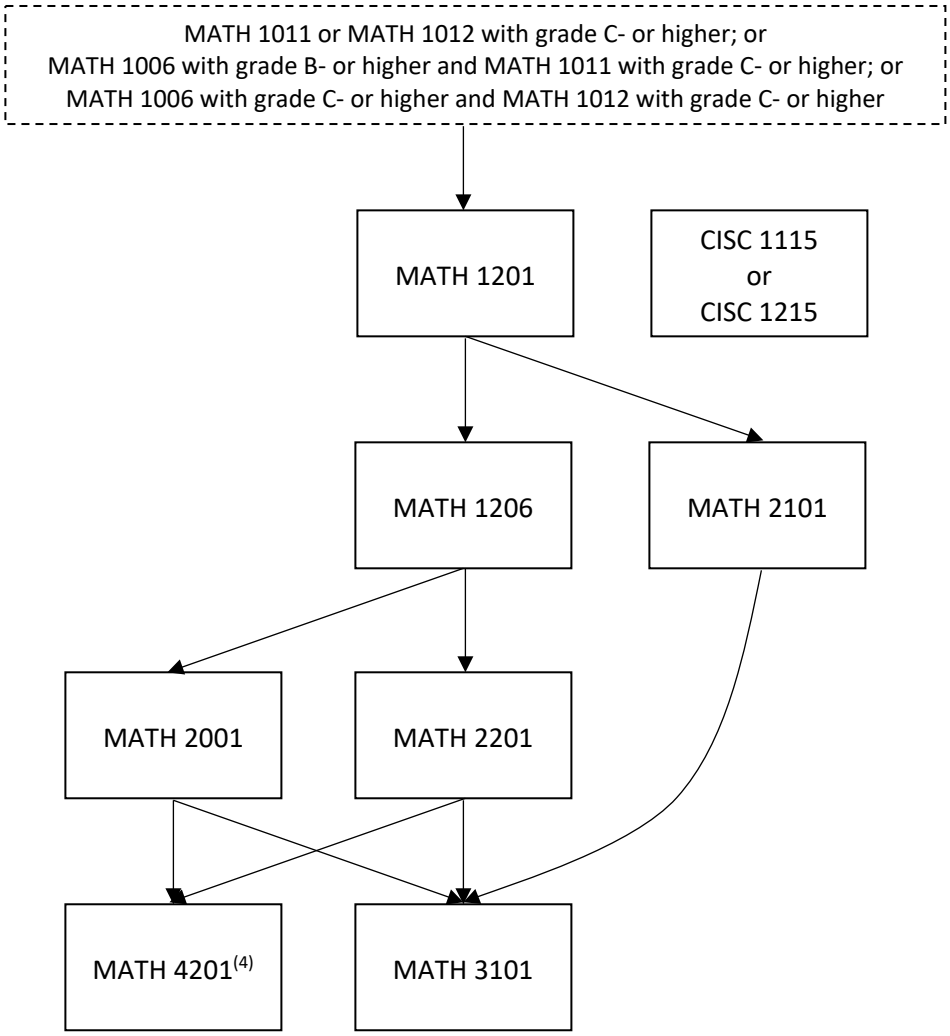
Additional Recommendation:

- Students are advised to take advanced electives from the following list: MATH 4101, 4106, 4206, 4211, 4216, 4302, 4306, 4501, 4506, 4511, 4701.
- MATH 2011W can be used to satisfy the college requirement of a writing intensive “W” course.

Back to Table of Contents

[1] Any mathematics course numbered 2000 or higher except for the following: 2001, 2101, 2201, 2208, 2501, 2701.

Prerequisite Flowchart for the B.A. in Mathematics



Two more from the following list:
MATH 4101, 4106, 4206, 4211 (and prerequisite 2206), 4216, 4302, 4306, 4501 (and prerequisite 3501), 4506, 4511 (and prerequisite 3501), 4701 (and prerequisite 2206), 5001, 5002, 5003, 5004

Notes:
(1) Solid boxes indicate a required course
(2) Dashed boxes indicate courses that may be waived conditional on the outcome of appropriate placement exams
(3) Courses associated with boxes with multiple incoming arrows, have multiple prerequisites
(4) Additional requirement for MATH 4201: at least 6 credits in advanced Mathematics Department courses or permission of the chairperson

Back to Table of Contents

Possible Schedules for the B.A. in Mathematics

Students wishing to major in Mathematics are encouraged to see a department counselor as early as possible. The suggestions below are offered to help students arrange the required courses into a feasible schedule. Other arrangements are possible, and each student should consider the prerequisites for the individual courses before planning his or her schedule. Students should also take core courses as appropriate and, eventually, other advanced electives that may not be required for the major.

Sample course schedules for students at different levels:

Four Year Schedule (appropriate for students who completed College Algebra and Precalculus)

1st Semester:	MATH 1201; CISC 1115; ENGL 1010 + 2 core courses
2nd Semester:	MATH 1206; MATH 2101; ENGL 1012 + 2 core courses
3rd Semester:	MATH 2001; MATH 2201 + 2 core courses + 1 elective course
4th Semester:	MATH 3101 + 2 core courses + 2 elective courses
5th Semester:	MATH 4201 + 4 elective courses
6th Semester:	5 elective courses
7th Semester:	5 elective courses
8th Semester:	5 elective courses

Three Year Schedule (appropriate for transfer students holding an Associate Degree with a complete three-course Calculus sequence)

1st Semester:	MATH 2101; CISC 1115 + 3 elective courses
2nd Semester:	MATH 2001 + 4 elective courses
3rd Semester:	MATH 3101 + 4 elective courses
4th Semester:	MATH 4201 + 4 elective courses
5th Semester:	5 elective courses
6th Semester:	5 elective courses

Two Year Schedule (appropriate for transfer students holding an Associate Degree in Mathematics with a complete three-course Calculus sequence, as well as Linear Algebra, Differential Equations, and Introduction to Programming courses)

1st Semester:	MATH 2001 + 4 elective courses
2nd Semester:	MATH 3101 + 4 elective courses
3rd Semester:	MATH 4201 + 4 elective courses
4th Semester:	5 elective courses

Back to Table of Contents

1.2 B.S. in Mathematics

To enroll in any advanced mathematics course, students must maintain an average grade of C or higher in all courses previously taken in the department, unless this requirement is waived by the chairperson. A student exempt, without credit, from a course cannot take the course later for credit except with permission of the chairperson.

All mathematics courses offered to satisfy the requirements for a major in mathematics must be completed with a grade of C- or higher. Unless otherwise specified in in the Brooklyn College Undergraduate Bulletin, any mathematics courses used to satisfy a prerequisite for an advanced elective must be completed with a grade of C- or higher.

Department requirements (52-55 credits):

All of the following:

MATH 1006 (waived by passing a placement exam)

MATH 1011 or MATH 1012 (waived by passing a placement exam)

MATH 1201, 1206, 2001, 2101, 2201, 4201

CISC 1115 or 1215

Candidates for a B.S. degree in mathematics must choose one of the following concentrations, plus additional courses in the Mathematics Department to bring the total number of credits in advanced courses[2] to 24:

a) Concentration in general mathematics (52 credits)

All of the following:

MATH 3101

Two of the following:

MATH 4101, 4106, 4206, 4211 (and prerequisite 2206), 4216, 4302, 4306, 4501 (and prerequisite 3501), 4506, 4511 (and prerequisite 3501), 4701 (and prerequisite 2206), 5001, 5002, 5003, 5004

b) Concentration in theoretical mathematics (52 credits)

All of the following:

MATH 2206 and 3101

Three of the following:

MATH 3106, 4101, 4106, 4206, 4216, 4302, 4306, 500x (the 500x must be in theoretical mathematics)

[2] Any mathematics course numbered 2000 or higher except for the following: 2001, 2101, 2201, 2208, 2501, 2701.

c) Concentration in applied mathematics (53-55 credits)

All of the following:

MATH 2206, 3202, 3501, 4701

Two of the following:

MATH 2706, 3107, 4211, 4216, 4501, 500x (the 500x must be in applied mathematics)

Additional requirements for a B.S. degree:

- Candidates for a B.S. degree in Mathematics must complete at least 60 credits in science and mathematics; 24 of these 60 credits must be completed in advanced courses[3] in the Mathematics Department. These 24 credits must be completed at Brooklyn College with a grade of C- or higher.

Department recommendations:

- Majors should consult with a Mathematics department counselor concerning substitutions for core science courses.
- Prospective doctoral students should develop reading competence in at least one of the following languages: French, German and Russian.

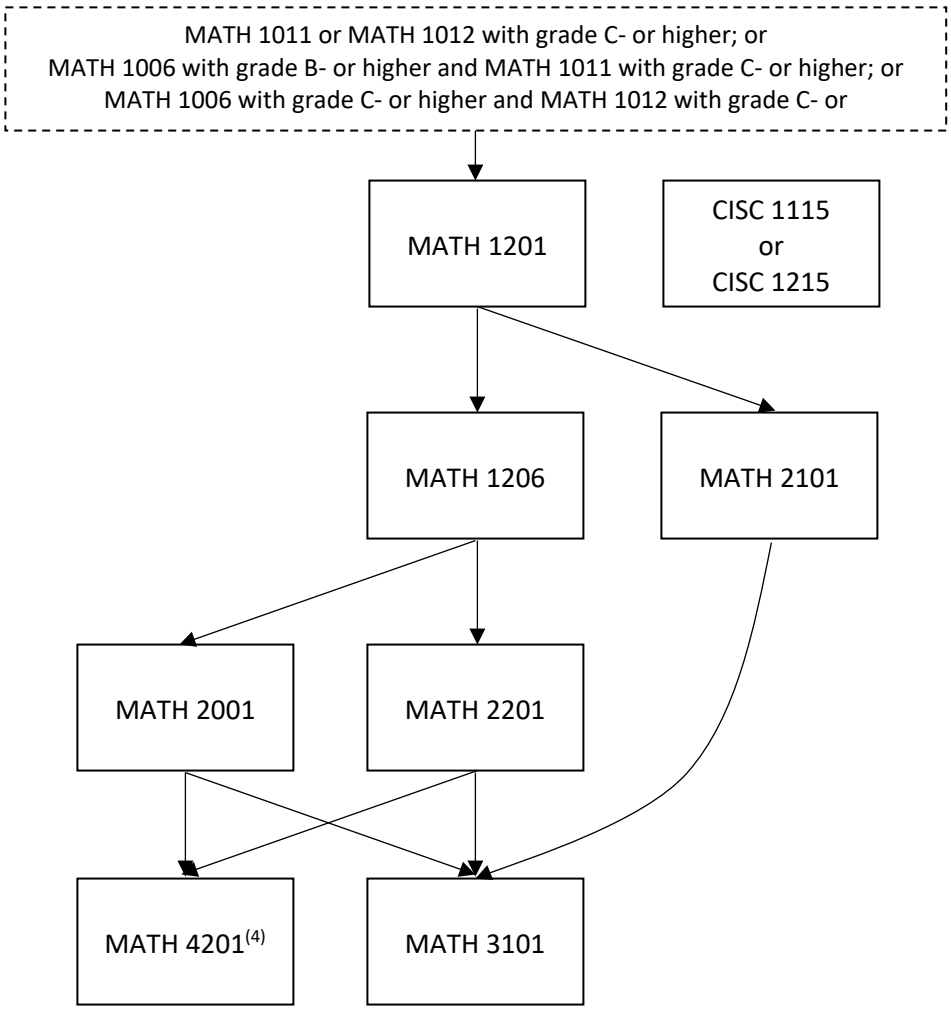
Additional Recommendation:

- Students are advised to take advanced electives from the following list: MATH 2706, 3106, 3107, 3111, 4101, 4106, 4206, 4211, 4216, 4302, 4306, 4501, 4506, 4511, 4531, 4701.
- MATH 2011W can be used to satisfy the college requirement of a writing intensive “W” course.

Back to Table of Contents

[3] Any mathematics course numbered 2000 or higher except for the following: 2001, 2101, 2201, 2208, 2501, 2701.

Prerequisite Flowchart for the B.S. in Mathematics (Concentration in General Mathematics)



Two more from the following list:
MATH 4101, 4106, 4206, 4211 (and prerequisite 2206), 4216, 4302, 4306, 4501 (and prerequisite 3501), 4506, 4511 (and prerequisite 3501), 4701 (and prerequisite 2206), 5001, 5002, 5003, 5004

Notes:
(1) Solid boxes indicate a required course
(2) Dashed boxes indicate courses that may be waived conditional on the outcome of appropriate placement exams
(3) Courses associated with boxes with multiple incoming arrows, have multiple prerequisites
(4) Additional requirement for MATH 4201: at least 6 credits in advanced Mathematics Department courses or permission of the chairperson

Back to Table of Contents

Possible Schedules for the B.S. in Mathematics (Concentration in General Mathematics)

Students wishing to major in Mathematics are encouraged to see a department counselor as early as possible. The suggestions below are offered to help students arrange the required courses into a feasible schedule. Other arrangements are possible, and each student should consider the prerequisites for the individual courses before planning his or her schedule. Students should also take core courses as appropriate and, eventually, other advanced electives that may not be required for the major.

Sample course schedules for students at different levels:

Four Year Schedule (appropriate for students who completed College Algebra and Precalculus)

1st Semester:	MATH 1201; CISC 1115; ENGL 1010 + 2 core courses
2nd Semester:	MATH 1206; MATH 2101; ENGL 1012 + 2 core courses
3rd Semester:	MATH 2001; MATH 2201 + 2 core courses + 1 elective course
4th Semester:	MATH 3101 + 2 core courses + 2 elective courses
5th Semester:	MATH 4201 + 4 elective courses
6th Semester:	5 elective courses
7th Semester:	5 elective courses
8th Semester:	5 elective courses

Three Year Schedule (appropriate for transfer students holding an Associate Degree with a complete three-course Calculus sequence)

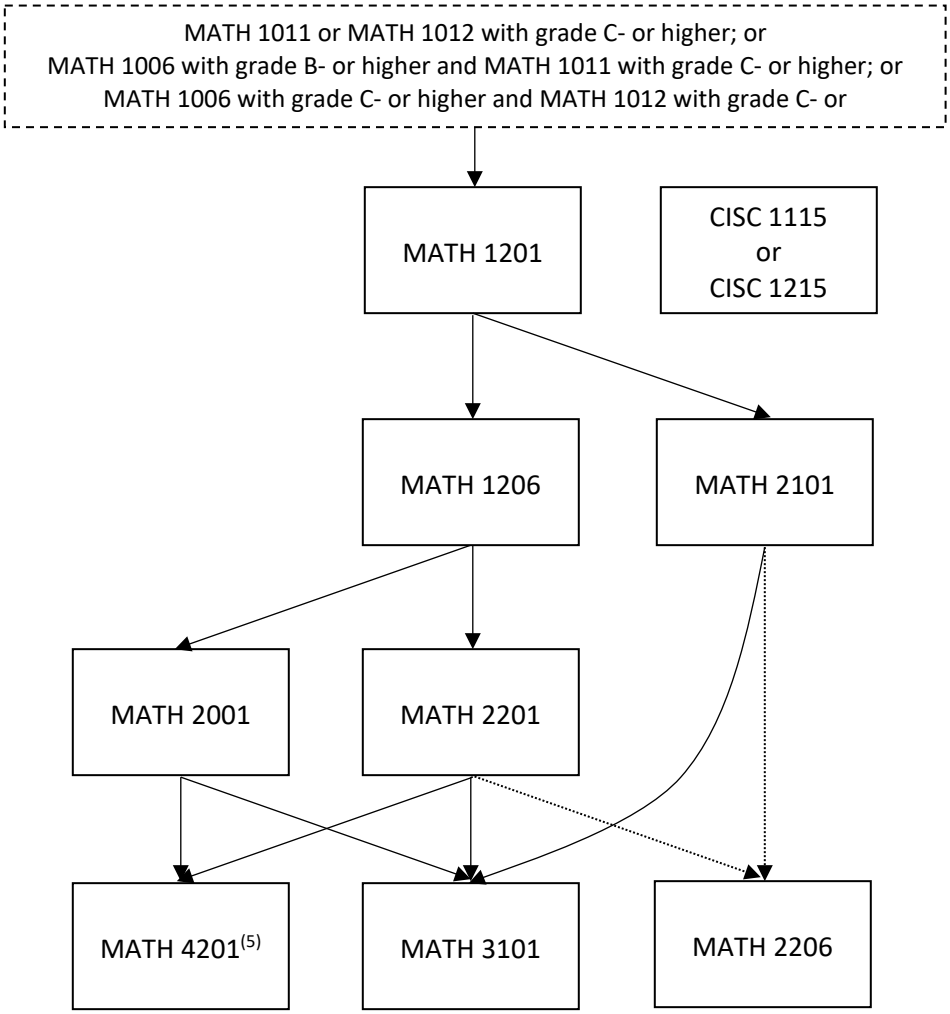
1st Semester:	MATH 2101; CISC 1115 + 3 elective courses
2nd Semester:	MATH 2001 + 4 elective courses
3rd Semester:	MATH 3101 + 4 elective courses
4th Semester:	MATH 4201 + 4 elective courses
5th Semester:	5 elective courses
6th Semester:	5 elective courses

Two Year Schedule (appropriate for transfer students holding an Associate Degree in Mathematics with a complete three-course Calculus sequence, as well as Linear Algebra, Differential Equations, and Introduction to Programming courses)

1st Semester:	MATH 2001 + 4 elective courses
2nd Semester:	MATH 3101 + 4 elective courses
3rd Semester:	MATH 4201 + 4 elective courses
4th Semester:	5 elective courses

Back to Table of Contents

Prerequisite Flowchart for the B.S. in Mathematics (Concentration in Theoretical Mathematics)



Three more from the following list:
MATH 3106, 4101, 4106, 4206, 4216, 4302, 4306, 500x (the 500x must be in theoretical mathematics)

Notes:
(1) Solid boxes indicate a required course
(2) Dashed boxes indicate courses that may be waived conditional on the outcome of appropriate placement exams
(3) Courses associated with boxes with multiple incoming arrows, have multiple prerequisites
(4) Dotted arrows indicate corequisites
(5) Additional requirement for MATH 4201: at least 6 credits in advanced Mathematics Department courses or permission of the chairperson.

Back to Table of Contents

Possible Schedules for the B.S. in Mathematics (Concentration in Theoretical Mathematics)

Students wishing to major in Mathematics are encouraged to see a department counselor as early as possible. The suggestions below are offered to help students arrange the required courses into a feasible schedule. Other arrangements are possible, and each student should consider the prerequisites for the individual courses before planning his or her schedule. Students should also take core courses as appropriate and, eventually, other advanced electives that may not be required for the major.

Sample course schedules for students at different levels:

Four Year Schedule (appropriate for students who completed College Algebra and Precalculus)

1st Semester:	MATH 1201; CISC 1115; ENGL 1010 + 2 core courses
2nd Semester:	MATH 1206; MATH 2101; ENGL 1012 + 2 core courses
3rd Semester:	MATH 2001; MATH 2201 + 2 core courses + 1 elective course
4th Semester:	MATH 2206; MATH 3101 + 2 core courses + 1 elective course
5th Semester:	MATH 4201 + 4 elective courses
6th Semester:	5 elective courses
7th Semester:	5 elective courses
8th Semester:	5 elective courses

Three Year Schedule (appropriate for transfer students holding an Associate Degree with a complete three-course Calculus sequence)

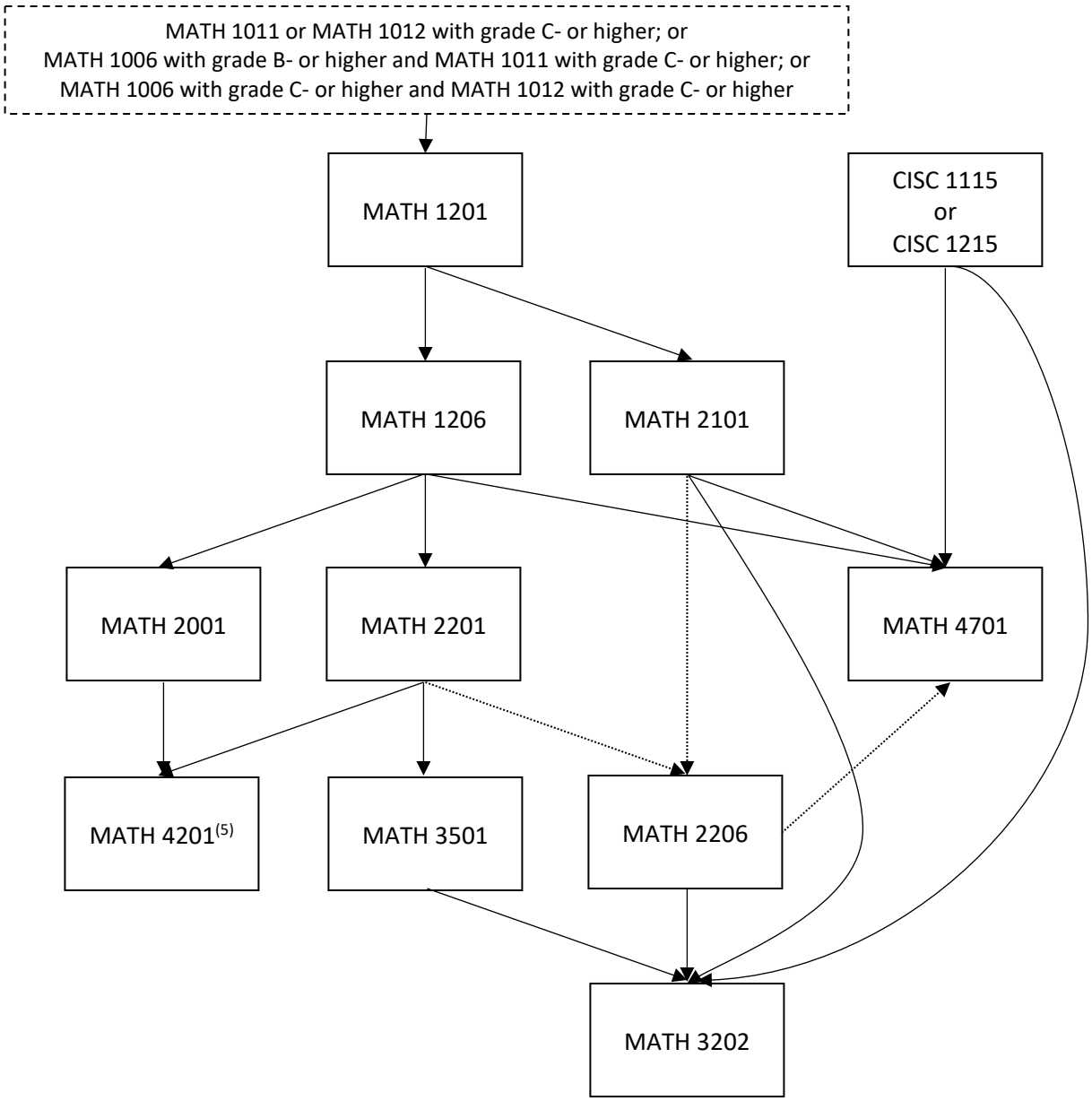
1st Semester:	MATH 2101; CISC 1115 + 3 elective courses
2nd Semester:	MATH 2001 + 4 elective courses
3rd Semester:	MATH 2206 + 4 elective courses
4th Semester:	MATH 3101 + 4 elective courses
5th Semester:	MATH 4201 + 4 elective courses
6th Semester:	5 elective courses

Two Year Schedule (appropriate for transfer students holding an Associate Degree in Mathematics with a complete three-course Calculus sequence, as well as Linear Algebra, Differential Equations, and Introduction to Programming courses)

1st Semester:	MATH 2001 + 4 elective courses
2nd Semester:	MATH 3101 + 4 elective courses
3rd Semester:	MATH 4201 + 4 elective courses
4th Semester:	5 elective courses

Back to Table of Contents

Prerequisite Flowchart for the B.S. in Mathematics (Concentration in Applied Mathematics)



Two more from the following list:
MATH 2706, 3107, 4211, 4216, 4501, 500x (the 500x must be in applied mathematics)

Notes:
(1) Solid boxes indicate a required course
(2) Dashed boxes indicate courses that may be waived conditional on the outcome of appropriate placement exams
(3) Courses associated with boxes with multiple incoming arrows, have multiple prerequisites
(4) Dotted arrows indicate corequisites
(5) Additional requirement for MATH 4201: at least 6 credits in advanced Mathematics Department courses or permission of the chairperson.

Back to Table of Contents

Possible Schedules for the B.S. in Mathematics (Concentration in Applied Mathematics)

Students wishing to major in Mathematics are encouraged to see a department counselor as early as possible. The suggestions below are offered to help students arrange the required courses into a feasible schedule. Other arrangements are possible, and each student should consider the prerequisites for the individual courses before planning his or her schedule. Students should also take core courses as appropriate and, eventually, other advanced electives that may not be required for the major.

Sample course schedules for students at different levels:

Four Year Schedule (appropriate for students who completed College Algebra and Precalculus)

1st Semester:	MATH 1201; CISC 1115; ENGL 1010 + 2 core courses
2nd Semester:	MATH 1206; MATH 2101; ENGL 1012 + 2 core courses
3rd Semester:	MATH 2001; MATH 2201 + 2 core courses + 1 elective course
4th Semester:	MATH 2206; MATH 3501 + 2 core courses + 1 elective course
5th Semester:	MATH 3202; MATH 4201 + 3 elective courses
6th Semester:	MATH 4701 + 4 elective courses
7th Semester:	5 elective courses
8th Semester:	5 elective courses

Three Year Schedule (appropriate for transfer students holding an Associate Degree with a complete three-course Calculus sequence)

1st Semester:	MATH 2101; CISC 1115 + 3 elective courses
2nd Semester:	MATH 2001; MATH 2206 + 3 elective courses
3rd Semester:	MATH 3501 + 4 elective courses
4th Semester:	MATH 3202 + 4 elective courses
5th Semester:	MATH 4201 + 4 elective courses
6th Semester:	MATH 4701 + 4 elective courses

Two Year Schedule (appropriate for transfer students holding an Associate Degree in Mathematics with a complete three-course Calculus sequence, as well as Linear Algebra, Differential Equations, and Introduction to Programming courses)

1st Semester:	MATH 2001; MATH 3501 + 3 elective courses
2nd Semester:	MATH 3202 + 4 elective courses
3rd Semester:	MATH 4201 + 4 elective courses
4th Semester:	MATH 4701 + 4 elective courses

Back to Table of Contents

1.3 B.S. in Actuarial Mathematics

To enroll in any advanced mathematics course, students must maintain an average grade of C or higher in all courses previously taken in the department, unless this requirement is waived by the chairperson. A student exempt, without credit, from a course cannot take the course later for credit except with permission of the chairperson.

All mathematics courses offered to satisfy the requirements for a major in actuarial mathematics must be completed with a grade of C- or higher. Unless otherwise specified in in the Brooklyn College Undergraduate Bulletin, any mathematics courses used to satisfy a prerequisite for an advanced elective must be completed with a grade of C- or higher.

Department requirements (73 credits):

All of the following:

MATH 1006 (waived by passing a placement exam)

MATH 1011 or MATH 1012 (waived by passing a placement exam)

MATH 1201, 1206, 2001, 2101, 2201, 2206, 2601, 3501, 4201, 4501, 4601

CISC 1115 or 1215

ACCT 2001

BUSN/ECON 2100, 2200

FINC 3310

Two of the following:

MATH 3801, 3802 or 4506

Additional requirements for a B.S. degree:

- Candidates for a B.S. degree in Actuarial Mathematics must complete at least 60 credits in science and mathematics; 24 of these 60 credits must be completed in advanced courses[4] in the Mathematics Department. These 24 credits must be completed at Brooklyn College with a grade of C- or higher.

Additional advice for Actuarial Mathematics majors:

- Due to the number of credits required by courses taught at range of distinct departments, actuarial mathematics majors should ideally be declared at the beginning of the 2nd year and no later than the end of the 2nd year of their program of study.

- Internships are highly advisable for actuarial mathematics majors, especially in insurance companies that hire and train actuaries, so that they can be used in a student portfolio when applying for permanent positions. To this effect, students should ideally begin regular visits to the Magner Center at the beginning of their 2nd year. They should at that time actively seek advice by resume and interview specialist at the Magner Center and participate at alumni nights which are organized by the

[4] Any mathematics course numbered 2000 or higher except for the following: 2001, 2101, 2201, 2208, 2501, 2701.

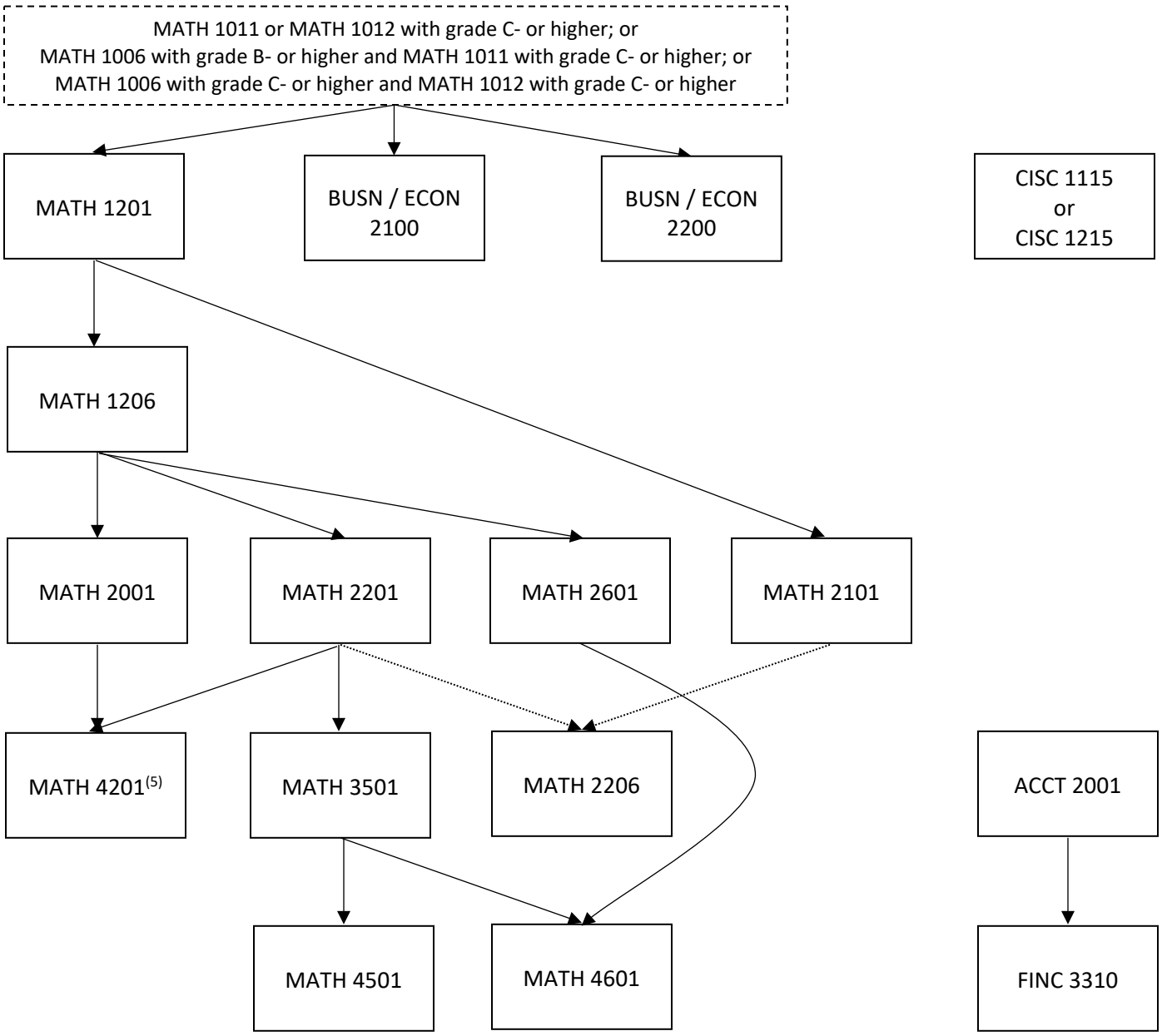
Magner Center on a regular basis. Students should enroll on an active database that advertises internships at the beginning of their 2nd year. Moreover, students should participate in the actuarial day that takes place around November every year on campus. Students should also actively participate in the events of the actuarial club.

- Students are advised to take MATH 3202, 3801, 3802 and 4506 as advanced electives.

- Both MATH 2011W and BUSN/ECON 4400W can be used to satisfy the college requirement of a writing intensive “W” course.

Back to Table of Contents

Prerequisite Flowchart for the B.S. in Actuarial Mathematics



Two more from the following list: MATH 3801, 3802 or 4506

Notes:
(1) Solid boxes indicate a required course
(2) Dashed boxes indicate courses that may be waived conditional on the outcome of appropriate placement exams
(3) Courses associated with boxes with multiple incoming arrows, have multiple prerequisites
(4) Dotted arrows indicate corequisites
(5) Additional requirement for MATH 4201: at least 6 credits in advanced Mathematics Department courses or permission of the chairperson.

Back to Table of Contents

Possible Schedules for the B.S. in Actuarial Mathematics

Students wishing to major in Actuarial Mathematics are encouraged to see a department counselor as early as possible. The suggestions below are offered to help students arrange the required courses into a feasible schedule. Other arrangements are possible, and each student should consider the prerequisites for the individual courses before planning his or her schedule. Students should also take core courses as appropriate and, eventually, other advanced electives that may not be required for the major.

Suggested course schedules for students at different levels:

Four Year Schedule (appropriate for students who completed College Algebra and Precalculus)

1st Semester:	MATH 1201; CISC 1115; ENGL 1010 + 2 core courses
2nd Semester:	MATH 1206; MATH 2101; ENGL 1012 + 2 core courses
3rd Semester:	MATH 2001; MATH 2201; ECON 2100 + 2 core courses
4th Semester:	MATH 2206; MATH 3501; ACCT 2001 + 2 core courses
5th Semester:	MATH 2601; MATH 4201; ECON 2200 + 2 elective courses
6th Semester:	MATH 4601; MATH 4501; FINC 3310 + 2 elective courses
7th Semester:	4 elective courses
8th Semester:	4 elective courses

Three Year Schedule (appropriate for transfer students holding an Associate Degree with a complete three-course Calculus sequence)

1st Semester:	MATH 2001; MATH 2101; CISC 1115 + 2 elective course
2nd Semester:	MATH 2206; MATH 3501; ECON 2100 + 2 elective course
3rd Semester:	MATH 2601; ECON 2200; ACCT 2001 + 2 elective courses
4th Semester:	MATH 4601; MATH 4201 + 3 elective courses
5th Semester:	MATH 4501; FINC 3310 + 2 elective courses
6th Semester:	4 elective courses

Two Year Schedule (appropriate for transfer students holding an Associate Degree in Mathematics with a complete three-course Calculus sequence, as well as Linear Algebra, Differential Equations, and Introduction to Programming courses)

1st Semester:	MATH 2001; MATH 3501; ECON 2100; ACCT 2001 + 1 elective course
2nd Semester:	MATH 2601; ECON 2200; FINC 3310 + 2 elective courses
3rd Semester:	MATH 4601; MATH 4201; MATH 4501 + 2 elective courses
4th Semester:	4 elective courses

Back to Table of Contents

Additional Advice on the Actuarial Professional Examinations

The Society of Actuaries (SOA) and the Casualty Actuarial Society (CAS) offer a range of professional examinations. Further detailed information can be found on www.beanactuary.org. The first level of certification offered by the SOA, leading to the title of Associate of the Society of Actuaries (ASA), includes seven preliminary exams and a Validation by Educational Experience (VEE) requirement. The corresponding certification level offered by the Casualty Actuarial Society is called Associate of the Casualty Actuarial Society (ACAS).

The seven preliminary exams are the following (with related Brooklyn College course sequences):

1. Exam P - Probability of SOA (identical to Exam 1 of CAS) develops the candidate's knowledge of probability tools for quantitatively assessing risk.

   MATH 1201 → MATH 1206 → MATH 2201 → MATH 3501 → MATH 4501

2. Exam FM - Financial Mathematics of SOA (identical to Exam 2 of CAS) develops the candidate's understanding of valuing contingent cash flows, reserving, valuation, pricing, asset/liability management, investment, and capital budgeting.

   MATH 1201 → MATH 1206 → MATH 2601

   ACCT 2001 → FINC 3310

3. Exam IFM - Investment and Financial Markets of SOA develops the candidate's knowledge of the theoretical basis of financial models and applications to modeling actuarial and financial risks.

   MATH 1201 → MATH 1206 → MATH 2201 → MATH 2601 and MATH 3501 → MATH 4601

   ACCT 2001 → FINC 3310

4. Exam LTAM - Long-Term Actuarial Mathematics of SOA develops the candidate's knowledge of contingent payment models and its application to modeling actuarial and financial risk.

   MATH 1201 → MATH 1206 → MATH 2201 → MATH 3501 → MATH 3801

5. Exam STAM: Short-Term Actuarial Mathematics of SOA provides an introduction to actuarial modeling, frequency and severity models, credibility theory and evaluation of actuarial models.

   MATH 1201 → MATH 1206 → MATH 2201 → MATH 3501 → MATH 3802

6. Exam SRM: Statistics for Risk Modeling of SOA develops the candidate's knowledge of regression models (including the generalized linear model), time series models, principal components analysis, decision trees, and cluster analysis.

   MATH 1201 → MATH 1206 → MATH 2201 → MATH 3501 → MATH 4501 → MATH 4506

7. Exam PA: Predictive Analytics of SOA develops the candidate's ability to employ selected analytic techniques to solve business problems and effectively communicate the solution. The PA Exam is administered as a five-hour project requiring analysis of a data set in the context of a business problem and submission of a report.

   MATH 1201 → MATH 1206 → MATH 2201 → MATH 3501 → BUSN 4400W

Another aspect of the professional actuarial education is the Validation by Educational Experience (VEE) requirements.

Specifically, the VEE requirements include the topical areas of economics (both micro-economic and macro-economic), corporate finance, and statistics. The following courses at Brooklyn College have been pre-approved as fulfilling these requirements. They should be completed with a grade of at least B-minus.

1. VEE – Mathematical Statistics.

   i) MATH 4501 Probability and Statistics II

   Course sequence to fulfill this requirement:

   MATH 1201 → MATH 1206 → MATH 2201 → MATH 3501 → MATH 4501

2. VEE – Accounting and Finance.

   i) ACCT 2001 Introductory Accounting

   ii) FINC 3310 Corporation Financial Management

   Course sequence to fulfill this requirement:

   ACCT 2001 → FINC 3310

3. VEE – Economics.

   i) ECON 2100 Elementary Macroeconomics;

   ii) ECON 2200 Elementary Microeconomics.

Students not completing the above VEE-related courses, or completing them with grade lower than B-minus, will be required to take alternative exams offered by the Actuarial Societies.

The SOA announced changes to the ASA curriculum, to become effective between Fall 2022 and Spring 2023:

- Exam IFM will be eliminated (offered for the last time November 2022)

- Exams LTAM and STAM will be replaced with the following new exams:

  a) Fundamentals of Actuarial Mathematics (FAM), planned to be offered for the first time in Fall 2022

  b) Choice of either Advanced Long-Term Actuarial Mathematics (ALTAM) or Advanced Short-Term Actuarial Mathematics (ASTAM), planned to be offered for the first time in Spring 2023

- A new course will be introduced: Introduction of Advanced Topics in Predictive Analytics (ATPA)

Back to Table of Contents

1.4 B.S. in Financial Mathematics

To enroll in any advanced mathematics course, students must maintain an average grade of C or higher in all courses previously taken in the department, unless this requirement is waived by the chairperson. A student exempt, without credit, from a course cannot take the course later for credit except with permission of the chairperson.

All mathematics courses offered to satisfy the requirements for a major in financial mathematics must be completed with a grade of C- or higher. Unless otherwise specified in in the Brooklyn College Undergraduate Bulletin, any mathematics courses used to satisfy a prerequisite for an advanced elective must be completed with a grade of C- or higher.

Department requirements (69-72 credits):

All of the following:

MATH 1006 (waived by passing a placement exam)

MATH 1011 or MATH 1012 (waived by passing a placement exam)

MATH 1201, 1206, 2001, 2101, 2201, 2206, 2601, 3501, 4201, 4501, 4506, 4601

CISC 1115 or 1215

MATH 3202 or both of CISC 3110 and 3820

BUSN/ECON 2100, 2200 and 4400W

Additional requirements for a B.S. degree:

- Candidates for a B.S. degree in Financial Mathematics must complete at least 60 credits in science and mathematics; 24 of these 60 credits must be completed in advanced courses[5] in the Mathematics Department. These 24 credits must be completed at Brooklyn College with a grade of C- or higher.

Additional advice for Financial Mathematics majors:

- Due to the number of credits required by courses taught at three departments, financial mathematics majors should ideally be declared at the beginning of the 2nd year and no later than the end of the 2nd year of their program of study.

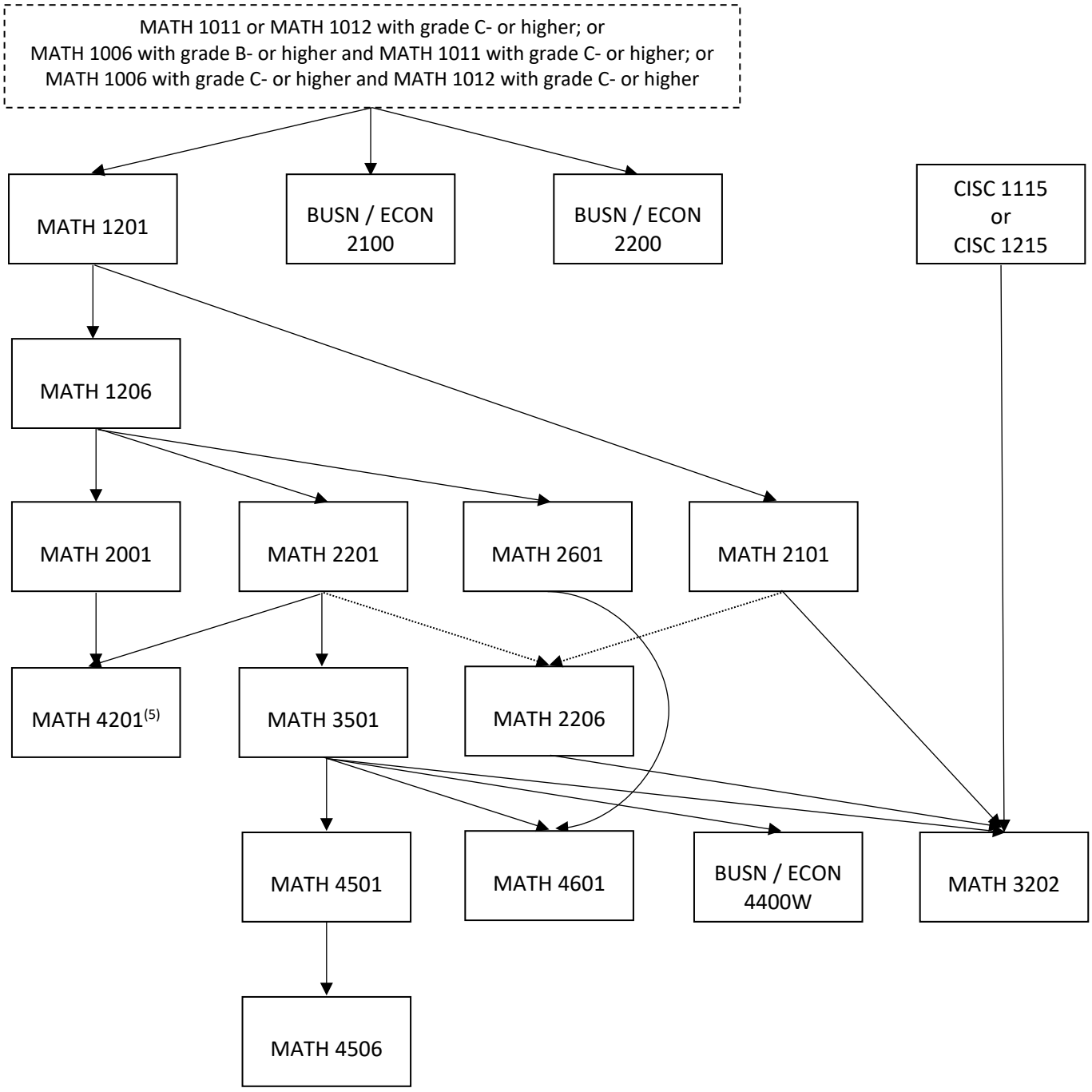
- It is strongly advised that financial mathematics majors complete their first internship at the end of the 2nd year. In case they do not declare their major by the end of the 2nd year, they should definitely do an internship at the end of the 3rd year of their program. In that way, they would have at least one internship completed by the beginning of their 4th year of study, before they would eventually apply to MFE programs, master programs in Operations Research, or for permanent positions. This is because the completion of such an internship is seen very positively, not only by potential future employers, but also by admission committees in applications to professional MFE programs. To this effect, students should ideally begin regular visits to the Magner Center at the beginning of their 2nd year. They should at that time actively seek advice by resume and interview specialist at the Magner Center and participate at alumni nights which are organized by the Magner Center on a regular basis. Students

[5] Any mathematics course numbered 2000 or higher except for the following: 2001, 2101, 2201, 2208, 2501, 2701.

should enroll on an active database that advertises internships at the beginning of their 2nd year. Moreover, students should actively participate in the events of the trading club and other relevant events of the actuarial and math clubs depending on their specific interests.

Back to Table of Contents

Prerequisite Flowchart for the B.S. in Financial Mathematics



Notes:
(1) Solid boxes indicate a required course
(2) Dashed boxes indicate courses that may be waived conditional on the outcome of appropriate placement exams
(3) Courses associated with boxes with multiple incoming arrows, have multiple prerequisites
(4) Dotted arrows indicate corequisites
(5) Additional requirement for MATH 4201: at least 6 credits in advanced Mathematics Department courses or permission of the chairperson.

Back to Table of Contents

Possible Schedules for the B.S. in Financial Mathematics

Students wishing to major in Financial Mathematics are encouraged to see a department counselor as early as possible. The suggestions below are offered to help students arrange the required courses into a feasible schedule. Other arrangements are possible, and each student should consider the prerequisites for the individual courses before planning his or her schedule. Students should also take core courses as appropriate and, eventually, other advanced electives that may not be required for the major.

Suggested course schedules for students at different levels:

Four Year Schedule (appropriate for students who completed College Algebra and Precalculus)

1st Semester:	MATH 1201; CISC 1115; ENGL 1010 + 2 core courses
2nd Semester:	MATH 1206; MATH 2101; ENGL 1012 + 2 core courses
3rd Semester:	MATH 2001; MATH 2201; ECON 2100 + 2 core courses
4th Semester:	MATH 2206; MATH 3501; ECON 2200 + 2 core courses
5th Semester:	MATH 2601; MATH 3202; MATH 4201 + 2 elective courses
6th Semester:	MATH 4601; MATH 4501 + 2 elective courses
7th Semester:	MATH 4506; ECON 4400W + 2 elective courses
8th Semester:	4 elective courses

Three Year Schedule (appropriate for transfer students holding an Associate Degree with a complete three-course Calculus sequence)

1st Semester:	MATH 2001; MATH 2101; CISC 1115 + 2 elective course
2nd Semester:	MATH 2206; MATH 3501; ECON 2100 + 2 elective course
3rd Semester:	MATH 2601; MATH 3202; ECON 2200 + 2 elective courses
4th Semester:	MATH 4201; MATH 4501 + 2 elective courses
5th Semester:	MATH 4601; ECON 4400W + 2 elective courses
6th Semester:	MATH 4506 + 3 elective courses

Two Year Schedule (appropriate for transfer students holding an Associate Degree in Mathematics with a complete three-course Calculus sequence, as well as Linear Algebra, Differential Equations, and Introduction to Programming courses)

1st Semester:	MATH 2001; MATH 3501; CISC 3110; ECON 2100 + 1 elective course
2nd Semester:	MATH 2601; MATH 3202; ECON 2200 + 2 elective courses
3rd Semester:	MATH 4201; MATH 4501; MATH 4601 + 2 elective courses
4th Semester:	MATH 4506; ECON 4400W + 3 elective courses

Back to Table of Contents

1.5 B.S. in Computational Mathematics

The Department of Computer and Information Science and the Department of Mathematics jointly offer a program aimed at providing students a strong background in both applied mathematics and computer science.

To enroll in any advanced mathematics course, students must maintain an average grade of C or higher in all courses previously taken in the department, unless this requirement is waived by the chairperson. A student exempt, without credit, from a course cannot take the course later for credit except with permission of the chairperson.

Program requirements (61-69 credits):

All of the following:

MATH 1006 (waived by passing a placement exam)

MATH 1011 or MATH 1012 (waived by passing a placement exam)

MATH 1201, 1206, 2001, 2101, 2201, 4201

CISC 1115 or 1170, 3115, 3130, 3220

a) Option I: Computational

All of the following:

MATH 2206, 3501, 4701

Three of the following:

CISC 3240 or MATH 3107; CISC 3142, 3160, 3230, 3310, 3330, 3350, 3820, 4335

b) Option II: Theoretical

All of the following:

MATH 3101, 4101

CISC 3230

CISC 4900 or 5001

Three of the following:

CISC 3240 or MATH 3107, CISC 3142, CISC 3160, 3330, 3350, 3820, 4335

Additional requirements for a B.S. degree:

- Candidates for a B.S. degree in Computational Mathematics must complete at least 60 credits in science and mathematics; 24 of these 60 credits must be completed in advanced courses[6] numbered

[6] Any mathematics course numbered 2000 or higher except for the following: 2001, 2101, 2201, 2208, 2501, 2701.

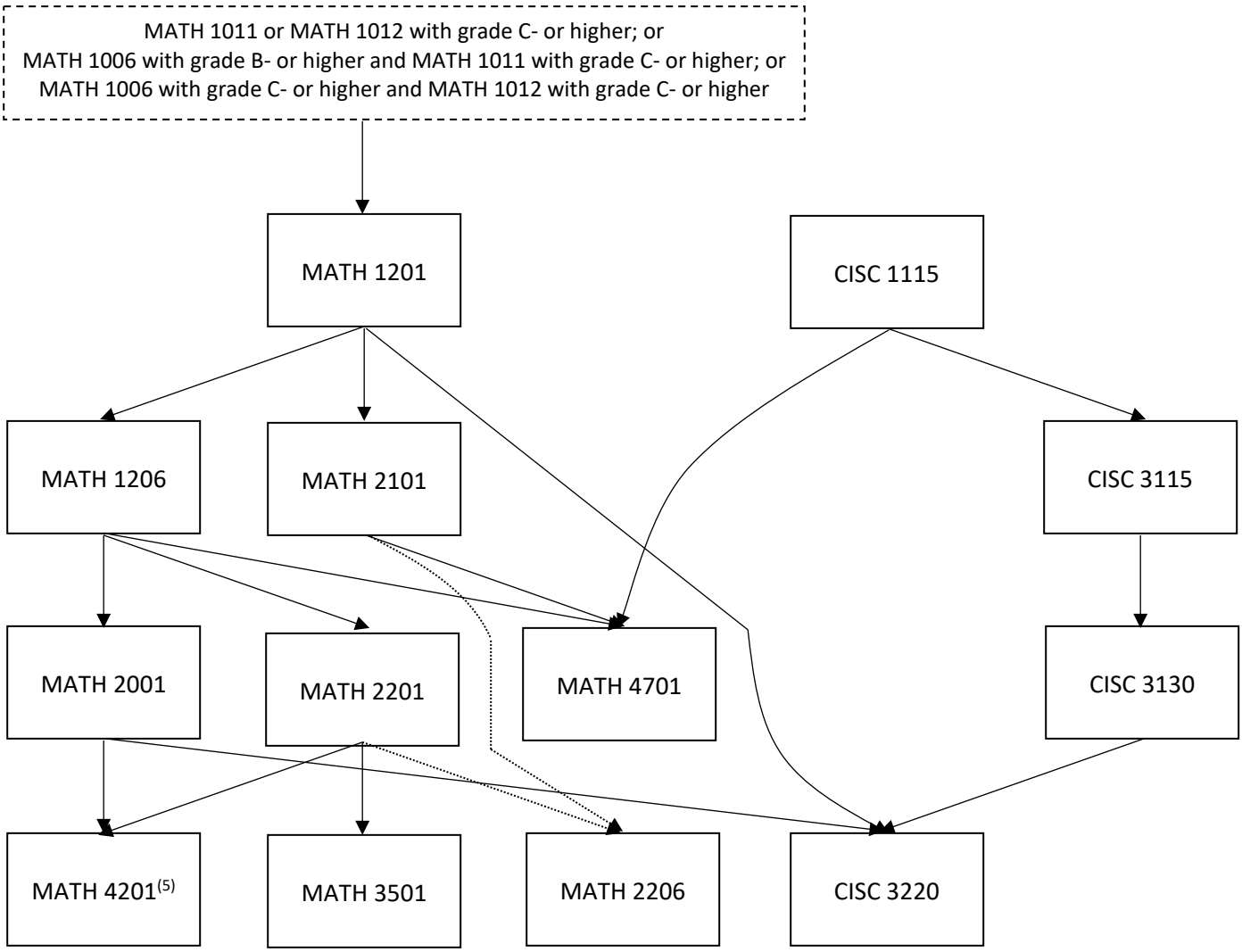
2000 and above in the Department of Mathematics and/or Department of Computer and Information Science. These 24 credits must be completed at Brooklyn College with a grade of C or higher.

Additional Recommendation:

- Students are advised to take MATH 4501 as an advanced elective.
- MATH 2011W can be used to satisfy the college requirement of a writing intensive “W” course.

Back to Table of Contents

Prerequisite Flowchart for the B.S. in Computational Mathematics (Option I: Computational)



Three more from the following list: CISC 3240 or MATH 3107, CISC 3142, 3160, 3230, 3310, 3330, 3350, 3820, 4335.

Notes:
(1) Solid boxes indicate a required course
(2) Dashed boxes indicate courses that may be waived conditional on the outcome of appropriate placement exams
(3) Courses associated with boxes with multiple incoming arrows, have multiple prerequisites
(4) Dotted arrows indicate corequisites
(5) Additional requirement for MATH 4201: at least 6 credits in advanced Mathematics Department courses or permission of the chairperson.

Back to Table of Contents

Possible Schedules for the B.S. in Computational Mathematics (Option I: Computational)

Students wishing to complete a B.S. in Computational Mathematics are encouraged to see a department counselor as early as possible. The suggestions below are offered to help students arrange the required courses into a feasible schedule. Other arrangements are possible, and each student should consider the prerequisites for the individual courses before planning his or her schedule. Students should also take core courses as appropriate and, eventually, other advanced electives that may not be required for the major.

Suggested course schedules for students at different levels:

Four Year Schedule (appropriate for students who completed College Algebra and Precalculus)

1st Semester:	MATH 1201; CISC 1115; ENGL 1010 + 2 core courses
2nd Semester:	MATH 1206; MATH 2101; ENGL 1012; + 2 core courses
3rd Semester:	MATH 2001; MATH 2201; CISC 3115 + 2 core courses
4th Semester:	MATH 2206; CISC 3130 + 2 core courses + 1 elective
5th Semester:	MATH 3501; CISC 3220 + 3 elective courses
6th Semester:	MATH 4201 + 3 elective courses
7th Semester:	MATH 4701 + 3 elective courses
8th Semester:	4 elective courses

Three Year Schedule (appropriate for transfer students holding an Associate Degree with a complete three-course Calculus sequence)

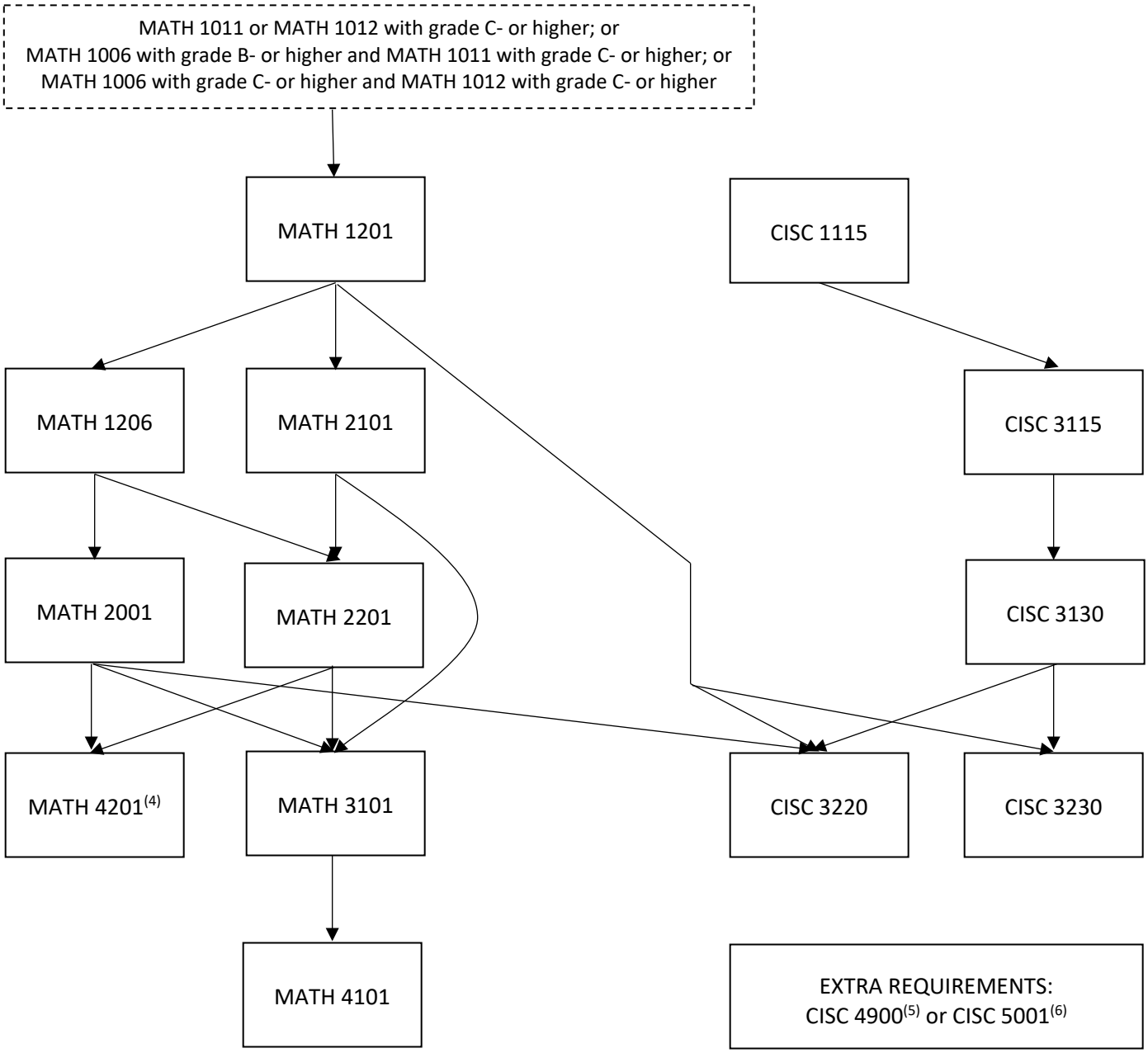
1st Semester:	MATH 2001; MATH 2101; CISC 1115 + 2 elective courses
2nd Semester:	MATH 2206; CISC 3110 + 3 elective courses
3rd Semester:	MATH 3501; CISC 3130 + 3 elective courses
4th Semester:	MATH 4201; CISC 3220 + 2 elective courses
5th Semester:	MATH 4701 + 3 elective courses
6th Semester:	4 elective courses

Two Year Schedule (appropriate for transfer students holding an Associate Degree in Mathematics with a complete three-course Calculus sequence, as well as Linear Algebra, Differential Equations, and Introduction to Programming courses)

1st Semester:	MATH 2001; CISC 3110 + 2 elective courses
2nd Semester:	MATH 3501; CISC 3130 + 3 elective courses
3rd Semester:	MATH 4201; CISC 3220 + 3 elective courses
4th Semester:	MATH 4701 + 3 elective courses

Back to Table of Contents

Prerequisite Flowchart for the B.S. in Computational Mathematics (Option II: Theoretical)



Three more from the following list: CISC 3240 or MATH 3107, CISC 3142, 3160, 3330, 3350, 3820, 4335.

Notes:
(1) Solid boxes indicate a required course
(2) Dashed boxes indicate courses that may be waived conditional on the outcome of appropriate placement exams e
(3) Courses associated with boxes with multiple incoming arrows, have multiple prerequisites
(4) Additional requirement for MATH 4201: at least 6 credits in advanced Mathematics Department courses or permission of the chairperson.
(5) Requirement for CISC 4900: CISC 3110 and permission of the chairperson.
(6) Requirement for CISC 5001: CISC 3130, an advanced elective in CISC numbered 3140 or above, a minimum GPA of 3.0 overall in CISC advanced electives, a declared major in the CISC department and permission of the chairperson.

Back to Table of Contents

Possible Schedules for the B.S. in Computational Mathematics (Option II: Theoretical)

Students wishing to complete a B.S. in Computational Mathematics are encouraged to see a department counselor as early as possible. The suggestions below are offered to help students arrange the required courses into a feasible schedule. Other arrangements are possible, and each student should consider the prerequisites for the individual courses before planning his or her schedule. Students should also take core courses as appropriate and, eventually, other advanced electives that may not be required for the major.

Suggested course schedules for students at different levels:

Four Year Schedule (appropriate for students who completed College Algebra and Precalculus)

1st Semester:	MATH 1201; CISC 1115; ENGL 1010 + 2 core courses
2nd Semester:	MATH 1206; MATH 2101; ENGL 1012 + 2 core courses
3rd Semester:	MATH 2001; MATH 2201; CISC 3115 + 2 core courses
4th Semester:	MATH 3101; CISC 3130 + 2 core courses + 1 elective course
5th Semester:	MATH 4201; CISC 3220 + 2 elective courses
6th Semester:	MATH 4101; CISC 3230 + 2 elective courses
7th Semester:	4 elective courses
8th Semester:	CISC 4900 or CISC 5001 + 3 elective courses

Three Year Schedule (appropriate for transfer students holding an Associate Degree with a complete three-course Calculus sequence)

1st Semester:	MATH 2001; MATH 2101; CISC 1115 + 2 elective courses
2nd Semester:	MATH 3101; CISC 3115 + 3 elective courses
3rd Semester:	MATH 4201; CISC 3130 + 2 elective courses
4th Semester:	MATH 4101; CISC 3220 + 2 elective courses
5th Semester:	CISC 3230 + 4 elective courses
6th Semester:	CISC 4900 or CISC 5001 + 3 elective courses

Two Year Schedule (appropriate for transfer students holding an Associate Degree in Mathematics with a complete three-course Calculus sequence, as well as Linear Algebra, Differential Equations, and Introduction to Programming courses)

1st Semester:	MATH 2001; CISC 3115 + 2 elective courses
2nd Semester:	MATH 3101; CISC 3130 + 2 elective courses
3rd Semester:	MATH 4201; CISC 3220; CISC 3230 + 2 elective courses
4th Semester:	MATH 4101; CISC 4900 or CISC 5001 + 2 elective courses

Back to Table of Contents

1.6 B.A. in Adolescence Education: Mathematics Teacher

The Department of Secondary Education and the Department of Mathematics jointly offer a program for students who plan to teach mathematics in grades 7 through 12. This program reflects changes in teacher certification requirements recently implemented by the New York State Education Department. Moreover, completion of the adolescence education program as part of a major in mathematics, qualifies students for New York State initial certification in Secondary Education for grades 7 through 12.

To enroll in any advanced mathematics course, students must maintain an average grade of C or higher in all courses previously taken in the department, unless this requirement is waived by the chairperson. A student exempt, without credit, from a course cannot take the course later for credit except with permission of the chairperson.

Program requirements (73-74 credits):

All of the following:

MATH 1006 (waived by passing a placement exam)

MATH 1011 or MATH 1012 (waived by passing a placement exam)

MATH 1201, 1206, 2001, 2011W, 2101, 2201, 3101, 3501, 4201, 4302, 4401, 4406

CISC 1115

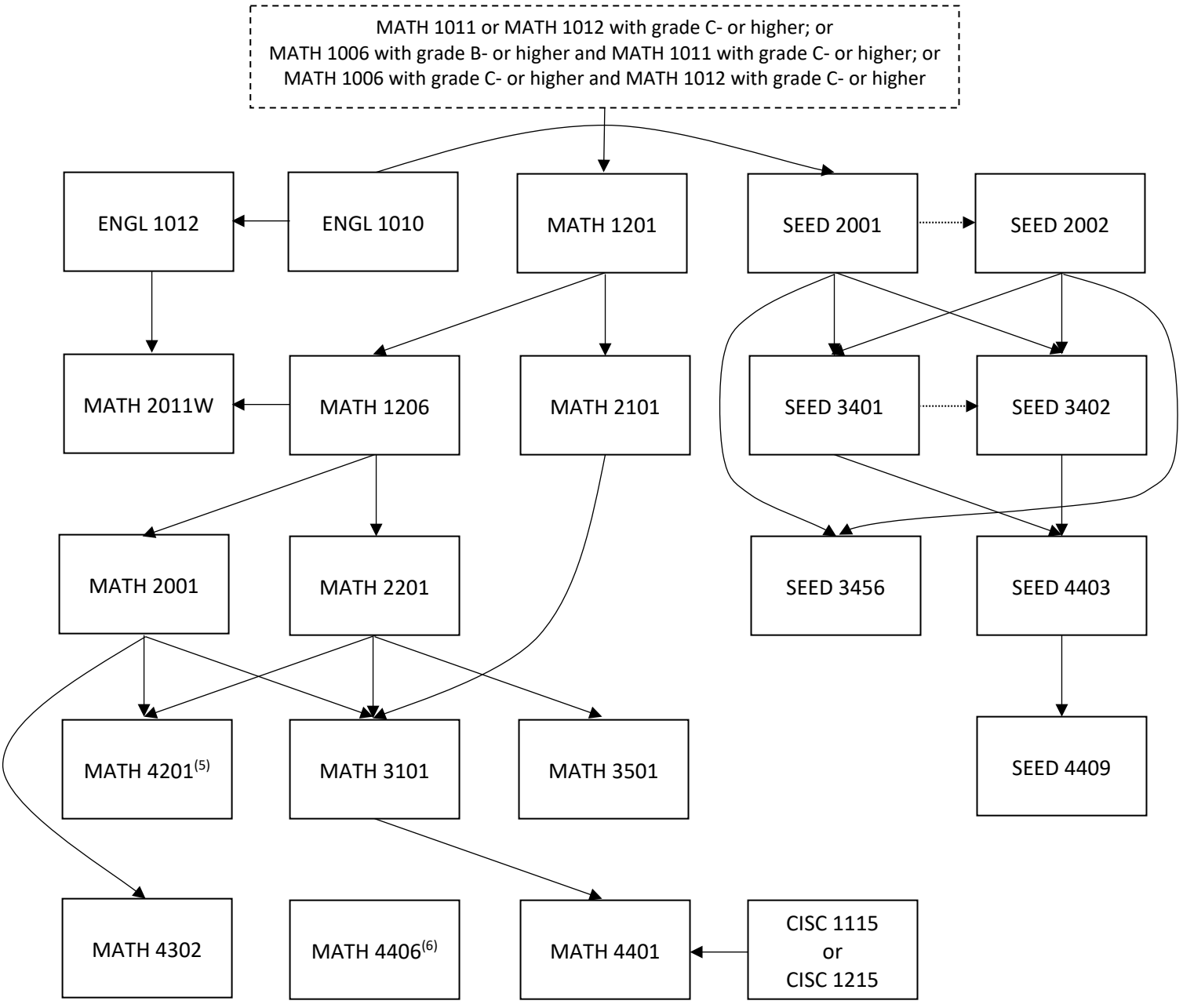
SEED 2001, 2002, 3401, 3402, 3456, 4403, 4409

Additional information:

- Students qualifying for the initial certification in adolescence education may obtain an extension to teach mathematics in grades 5 and 6 by taking SEED 3454.

Back to Table of Contents

Prerequisite Flowchart for the B.A. in Adolescence Education: Mathematics Teacher



Notes:
(1) Solid boxes indicate a required course
(2) Dashed boxes indicate courses that may be waived conditional on the outcome of appropriate placement exams
(3) Courses associated with boxes with multiple incoming arrows, have multiple prerequisites
(4) Dotted arrows indicate corequisites
(5) Additional requirement for MATH4201: at least 6 credits in advanced Mathematics Department courses or permission of the chairperson.
(6) Requirement for MATH4406: at least eight credits in advanced Mathematics Department courses; and senior standing or permission of the chairperson.

Back to Table of Contents

Possible Schedules for the B.A. in Adolescence Education: Mathematics Teacher

Students wishing to complete a B.A. in Adolescent Education: Mathematics Teacher are encouraged to see a department counselor as early as possible. The suggestions below are offered to help students arrange the required courses into a feasible schedule. Other arrangements are possible, and each student should consider the prerequisites for the individual courses before planning his or her schedule. Students should also take core courses as appropriate and, eventually, other advanced electives that may not be required for the major.

Suggested course schedules for students at different levels:

Four Year Schedule (appropriate for students who completed College Algebra and Precalculus)

1st Semester:	MATH 1201; CISC 1115; ENGL 1010 + 2 core courses
2nd Semester:	MATH 1206; ENGL 1012; SEED 2001 + 2 core courses
3rd Semester:	MATH 2011W; MATH 2101; SEED 2002 + 2 core courses
4th Semester:	MATH 2001; MATH 2201; SEED 3401 + 2 core courses
5th Semester:	MATH 3101; MATH 3501; SEED 3402 + 2 elective courses
6th Semester:	MATH 4201; MATH 4302; SEED 4403 + 2 elective courses
7th Semester:	MATH 4401; SEED 4409 + 3 elective courses
8th Semester:	MATH 4406 + 4 elective courses

Three Year Schedule (appropriate for transfer students holding an Associate Degree with a complete three-course Calculus sequence)

1st Semester:	MATH 2001; CISC 1115; SEED 2001 + 2 elective courses
2nd Semester:	MATH 2011W; MATH 2101; SEED 2002 + 2 elective courses
3rd Semester:	MATH 3101; MATH 3501; SEED 3401 + 2 elective courses
4th Semester:	MATH 4201; MATH 4302; SEED 3402 + 2 elective courses
5th Semester:	MATH 4401; SEED 4403 + 3 elective courses
6th Semester:	MATH 4406; SEED 4409 + 3 elective courses

Two Year Schedule (appropriate for transfer students holding an Associate Degree in Mathematics with a complete three-course Calculus sequence, as well as Linear Algebra, Differential Equations, and Introduction to Programming courses)

1st Semester:	MATH 2001; MATH 2011W; SEED 2001; SEED 2002 + 1 elective course
2nd Semester:	MATH 3101; MATH 3501; SEED 3401; SEED 3402 + 1 elective course
3rd Semester:	MATH 4201; MATH 4302; SEED 4403 + 2 elective courses
4th Semester:	MATH 4401; MATH 4406; SEED 4409 + 2 elective courses

Back to Table of Contents

1.7 Minor in Mathematics

To obtain a Minor in Mathematics students should complete at least 12 credits in advanced electives in mathematics with a grade of C- or higher. With the permission of the chairperson, at most 6 credits of advanced courses[7] from another institution may be accepted towards this requirement. Mathematics minors should consult with the department counselor for further recommendations.

Back to Table of Contents

[7] Any mathematics course numbered 2000 or higher except for the following: 2001, 2101, 2201, 2208, 2501, 2701.

1.8 Minor in Actuarial and Financial Mathematics

All courses offered to satisfy the requirements for a minor in actuarial and financial mathematics must be completed at Brooklyn College with a grade of C-or higher.

Department requirements (12 credits):

At least 12 credits from the following list of advanced electives in Mathematics:

MATH 2601, 3202, 3801, 3802, 4601

Department recommendations:

- Actuarial and financial mathematics minors should check the bulletin to see which of these courses are sequenced together, and consult with department counselors for recommendations.

Back to Table of Contents

1.9 Minor in Statistics

All courses offered to satisfy the requirements for a minor in statistics must be completed at Brooklyn College with a grade of C- or higher.

Department requirements (12 credits):

At least 12 credits from the following list of advanced electives in Mathematics:

MATH 3202, 4501, 4506, 4511, 4701

Prerequisite for entry to the minor:

MATH 2101 and 2201 with a grade of C- or higher

Department recommendations:

- Statistics minors should check the bulletin to see which of these courses are sequenced together, and consult with department counselors for recommendations.

Back to Table of Contents

1.10 Minor in Data Science

The Department of Computer and Information Science and the Department of Mathematics jointly offer a program aimed at providing students with a background in Data Science.

Program requirements (18-19 credits):

All of the following:

CISC 3225, 3440

MATH 4531

MATH 2001 and 3501, or CISC 2210 and MATH 2501

One additional course, chosen from among the following:

BUSN 2200, 4400W

CISC 1410, 3130

FINC 3377

ECON 2200, 3370, 4422, 4400W

MATH 3601, 4101, 4501

PHIL 3203, 3204, 3423

POLS 3014W, 3421, 3423

PSYC 3510, 3520, 3530, 3580, 4400

SOCY 3506, 3604.

Prerequisite requirements for the minor:

MATH 1201, 1206, 2101

CISC 1215

Additional Information:

- Courses presented for the major in Computer and Information Science may also be used to satisfy the minor in Data Science.

Back to Table of Contents

1.11 Early Childhood and Childhood Education Teacher with concentration in Mathematics

The requirements for early childhood education teacher (birth-grade 2) are described in the Brooklyn College Undergraduate Bulletin under the Department of Early Childhood and Art Education. The requirements for childhood education teacher (grades 1-6) programs are described in the Brooklyn College Undergraduate Bulletin under the Department of Childhood, Bilingual and Special Education.

Students who major in either of these programs and who elect a concentration in mathematics must complete all concentration requirements with a grade of C- or higher in each course and an overall average of C or higher in all mathematics courses taken for the concentration.

Concentration requirements:

All of the following:

MATH 1006 (waived by passing a placement exam)

MATH 1011 or MATH 1012 (waived by passing a placement exam)

MATH 1406

MATH 1201, 1206, 2011W, 2101, 2501

CISC 1001

CISC 1035 or 1600

Additional information:

- Students exempted from CISC 1001 must take a computer and information science courses numbered 1110 or higher other than the course used to satisfy the other computer and information science requirement listed above.
- Students permitted to enroll in Mathematics 1011 or Mathematics 1012 without taking college algebra must take an additional 3 credits of mathematics besides the courses listed below.
- Students permitted to enroll in Mathematics 1201 without taking either college algebra or precalculus must take an additional 6 credits of mathematics besides the courses listed below.

Back to Table of Contents

2. Requirements for Graduation with Departmental Honors

Honors for excellence in a Mathematics department major are recommended by vote of the department faculty members. A student can be considered for graduation with honors in the Mathematics Department if the following minimal requirements are both satisfied:

1. A GPA of at least 3.50 in advanced electives taken in the Mathematics Department.

2. The satisfactory completion of at least three credits in honors work at an advanced-course level, or the completion of an independent study with a grade of A- or better.

Back to Table of Contents

3. Multiple-year Schedule of Math Courses Numbered Above 2000

Daytime Classes										
2022	**2022 – 2023**		**2023 – 2024**		**2024 – 2025**		**2025 – 2026**		**2026 – 2027**	
S	**F**	**S**	**F**	**S**	**F**	**S**	**F**	**S**	**F**	**S**
	2001		2001		2001		2001		2001	
	2011W		2011W		2011W		2011W		2011W	
2101	2101	2101	2101	2101	2101	2101	2101	2101	2101	2101
2201	2201	2201	2201	2201	2201	2201	2201	2201	2201	2201
2206		2206		2206		2206		2206		2206
2501	2501	2501	2501	2501	2501	2501	2501	2501	2501	2501
	2601		2601		2601		2601		2601	
		2706			2706			2706		
	3101		3101		3101		3101		3101	
3106			3106			3106			3106	
	3107			3107			3107			3107
		3111			3111			3111		
3202		3202		3202		3202		3202		3202
	3501		3501		3501		3501		3501	
		3801				3801				3801
3802				3802				3802		
4101			4101			4101			4101	
		4106			4106			4106		
4201		4201		4201		4201		4201		4201
	4206			4206			4206			4206
	4211			4211			4211			4211
		4216			4216			4216		
	4302		4302		4302		4302		4302	
4306			4306			4306			4306	
		4401				4401				4401
4406		4406		4406		4406		4406		4406
4501		4501		4501		4501		4501		4501
	4506		4506		4506		4506		4506	
	4531		4531		4531		4531		4531	
4601		4601		4601		4601		4601		4601
	4701				4701				4701	

Evening Classes										
2022	**2022 – 2023**		**2023 – 2024**		**2024 – 2025**		**2025 – 2026**		**2026 – 2027**	
S	**F**	**S**	**F**	**S**	**F**	**S**	**F**	**S**	**F**	**S**
2001		2001		2001		2001		2001		2001
2011W		2011W		2011W		2011W		2011W		2011W
	2101		2101		2101		2101		2101	
2201	2201	2201	2201	2201	2201	2201	2201	2201	2201	2201
	2206		2206		2206		2206		2206	
	2501		2501		2501		2501		2501	
3101		3101		3101		3101		3101		3101
3501		3501		3501		3501		3501		3501
	4201		4201		4201		4201		4201	
4302		4302		4302		4302		4302		4302
4401				4401				4401		
	4501		4501		4501		4501		4501	
			4701				4701			

Notes:
(1) All required courses not listed on this schedule are normally offered every semester
(2) Both daytime and evening classes are open to all students

Back to Table of Contents

4. Courses Offered by the Department of Mathematics

Course Abbreviation	Course Title	Credits	Hours	Prerequisites	Comments
MATH 1006	College Algebra for Precalculus	3	4	Placement by the Department of Mathematics	- Semesters offered: Fall, Spring and Summer - Course may be waived conditional on the outcome of appropriate placement exams - Prerequisite for MATH 1011. Must earn a grade of B- or higher - Prerequisite for MATH 1012. Must earn a grade of C- or higher
MATH 1010	Problem Solving for College Mathematics	1	1	Co-requisite: MATH 1021 or equivalent	
MATH 1011	Pre-Calculus	3	4	Grade B- or higher in MATH 1006; or Scores on the COMPASS test of $s_1 \geq 70$, $s_2 \geq 70$ and $s_3 \geq 45$; or minimum score of 70 on the ACCUPLACER College-Level Math test; or departmental permission	- Semesters offered: Fall, Spring and Summer - Course may be waived conditional on the outcome of appropriate placement exams - Prerequisite for MATH 1201. Must earn a grade of C- or higher

Course Abbreviation	Course Title	Credits	Hours	Prerequisites	Comments
MATH 1012	Pre-Calculus with Recitation	3	5	Grade C- or higher in MATH 1006; or Scores on the COMPASS test of s_1 ≥ 70, s_2 ≥ 70 and s_3 ≥ 45; or minimum score of 60 on the ACCUPLACER College-Level Math test; or departmental permission	- Semesters offered: Fall, Spring and Summer - Course may be waived conditional on the outcome of appropriate placement exams - Prerequisite for MATH 1201. Must earn a grade of C- or higher
MATH 1021	Pre-Calculus A	2	4	To meet CUNY's college readiness requirements in mathematics.	- Prerequisite for MATH 1026. Must earn a grade of C- or higher
MATH 1026	Pre-Calculus B	2	4	Grade C- or higher in MATH 1021; or Scores on the COMPASS test of s_1 ≥ 70, s_2 ≥ 70 and s_3 ≥ 70; or minimum score of 90 on the ACCUPLACER College-Level Math test; or departmental permission	- Prerequisite for MATH 1201. Must earn a grade of C- or higher
MATH 1031	Introduction to Mathematics for the Social Sciences and Business	2	3	Two years of sequential Mathematics or Mathematics A in high school	- Not open to students who are enrolled in or have completed MATH 1011 or higher or to entering freshmen

Course Abbreviation	Course Title	Credits	Hours	Prerequisites	Comments
MATH 1101	Introduction to Mathematical Thinking	3	3	Course 2 of the NY Sequential Mathematics, or two-and-one-half years of high school mathematics including one year of geometry and a course in intermediate algebra, or Math 0.04, or a grade of C- or higher in Math 0.35 or 0.36 or 0.44, or the equivalent	- Not open to students who are enrolled in or have completed Mathematics course numbered 2000 or higher or Computer and Information Science 2210 except with the chairperson permission
MATH 1102	Elementary Number Theory	3	3	Course 2 of the NY Sequential Mathematics, or two-and-one-half years of high school mathematics including one year of geometry and a course in intermediate algebra, or Math 0.04, or a grade of C- or higher in Math 0.35 or 0.36 or 0.44, or the equivalent	- Not open to students who are enrolled in or have completed Mathematics course numbered 2000 or higher except with the chairperson permission
MATH 1201	Calculus I	4	4	Grade C- or higher in MATH 1011, 1012 or 1026; or scores on the COMPASS test of s_1 ≥ 70, s_2 ≥ 70, s_3 ≥70 and s_5 ≥70; or minimum score of 105 on the ACCUPLACER College-Level Math test; or departmental permission	- Semesters offered: Fall, Spring and Summer - Prerequisite for MATH 1206, 1711, 2101

Course Abbreviation	Course Title	Credits	Hours	Prerequisites	Comments
MATH 1206	Calculus II	4	4	Grade C- or higher in MATH 1201	- Semesters offered: Fall, Spring and Summer - Prerequisite for MATH 1701, 2001, 2006, 2011, 2201, 2501, 2601, 2706
MATH 1211	Infinite Series	1	1	MATH 4.20 or higher; or departmental permission.	- Intended for students who completed a second course in Calculus without infinite series
MATH 1231	Applied Calculus for Economics, Business and Finance	4	4	Grade C- or higher in MATH 1006; or placement by the Department of Mathematics	- Semesters offered: Fall, Spring and Summer
MATH 1301	Basic Concepts of Geometry	3	3	Course 2 of the NY Sequential Mathematics, or two-and-one-half years of high school mathematics including one year of geometry and a course in intermediate algebra, or Math 0.04, or a grade of C- or higher in Math 0.35 or 0.36 or 0.44, or the equivalent	
MATH 1311	Thinking Mathematically	3	3		- Semesters offered: Fall, Spring and Summer - Prerequisite for MATH 1401 - Not open to students who are enrolled in or have completed MATH 1006, 1011, 1012, 1026, 1201, 1206, 1501, or any other Mathematics course numbered 2001 or higher

Course Abbreviation	Course Title	Credits	Hours	Prerequisites	Comments
MATH 1401	Elementary Mathematics from an Advanced Standpoint	4	4	MATH 1006, or MATH 1311, or MATH 1021 and MATH 1010, or a course which is acceptable for at least three credits in mathematics at Brooklyn College.	- Semesters offered: Fall, Spring and Summer - Prerequisite for MATH 1406
MATH 1406	Mathematics in Education	2	2	MATH 1401 or a higher level mathematics course and a passing score on a placement test Corequisite: SEED 3206	- Semesters offered: Fall and Spring
MATH 1501	Elements of Statistics with Applications	3	3		- Semesters offered: Fall and Spring - Satisfies Pathways Required Core Mathematics and Quantitative Reasoning requirement
MATH 1601	Modern Mathematics for the Social Sciences	3	3	Course 2 of the NY Sequential Mathematics, or two-and-one-half years of high school mathematics including one year of geometry and a course in intermediate algebra, or Math 0.04, or a grade of C- or higher in Math 0.35 or 0.36 or 0.44, or the equivalent	
MATH 1701	Symbolic Manipulation in Calculus II	1	1	Prerequisite or corequisite: MATH 1206 or 1211	

Course Abbreviation	Course Title	Credits	Hours	Prerequisites	Comments
MATH 1711	Mathematical Fundamentals of Computer Graphics I	4	4	MATH 1201 and CISC 3110	- Prerequisite for MATH 1716 - Students who have completed both Math 1711 and Math 2101 will receive only 3 credits for Math 1711 and only 2 credits for Math 2101
MATH 1716	Mathematical Fundamentals of Computer Graphics II	4	4	MATH 1711	
MATH 1801	Mathematics of Non-Western Civilizations	3	3	Junior standing	- Satisfies Pathways College Option requirement
MATH 2001	Transition to Advanced Mathematics	3	3	MATH 1206	- Semesters offered: Fall, Spring and Summer - Prerequisite for MATH 3101, 4201, 4302
MATH 2006	Special Topics in Mathematics	3	3	MATH 1206 or higher; permission of the Chairperson	- Students may take this course for credit three times, but may not repeat topics
MATH 2011W	History of Mathematics	3	3	MATH 1206 or 1211 and ENGL 1012	- Semesters offered: Fall and Spring - Writing-intensive course - Term paper required

Course Abbreviation	Course Title	Credits	Hours	Prerequisites	Comments
MATH 2101	Linear Algebra I	3	4	MATH 1201	- Semesters offered: Fall, Spring and Summer - Prerequisite for MATH 2206, 2208, 3101, 3107, 3111, 3202, 4101, 4201, 4206, 4531, 4701 - Corequisite for MATH 2206 - Students who have completed both Math 1711 and Math 2101 will receive only 3 credits for Math 1711 and only 2 credits for Math 2101
MATH 2201	Multivariable Calculus	4	4	MATH 1206 or MATH 1211 (the latter can be taken as corequisite)	- Semesters offered: Fall, Spring and Summer - Prerequisite for MATH 2206, 2208, 2701, 3101, 3501, 3601, 4201 - Corequisite for MATH 2206, 2701
MATH 2206	Introduction to Differential Equations	4	4	MATH 2101 and 2201 (both can be taken as corequisites)	- Semesters offered: Fall, Spring and Summer - Prerequisite for MATH 3202, 4211
MATH 2208	Actuarial Mathematics I	1	1	MATH 2201 and 2101	
MATH 2501	Elementary Probability and Statistics	3	3	MATH 1206 or 1211	- Semesters offered: Fall, Spring and Summer - Prerequisite for MATH 3601, 4531
MATH 2601	Introduction to Financial Mathematics	3	3	MATH 1206 or 1211	- Semesters offered: Fall - Prerequisite for MATH 4601

Course Abbreviation	Course Title	Credits	Hours	Prerequisites	Comments
MATH 2701	Symbolic Manipulation in Multivariate Calculus	1	1	MATH 2201 (can be taken as corequisite)	
MATH 2706	Chaos and Structural Stability in One-Dimensional Dynamics	4	3 hours lecture, 2 hours laboratory	MATH 1206	- Semesters offered: once every three semesters
MATH 3101	Abstract Algebra I	3	3	MATH 2001, 2101 and 2201	- Semesters offered: Fall and Spring - Prerequisite for MATH 3106, 4101, 4106, 4401
MATH 3106	Theory of Numbers	3	3	MATH 3101	- Semesters offered: once every three semesters
MATH 3107	Cryptography and Cryptanalysis	4	4	MATH 2101	- Semesters offered: once every three semesters - This course is the same as CIS 3240
MATH 3111	Graph Theory and Applications	4	4	MATH 2101	- Semesters offered: once every three semesters
MATH 3202	Mathematical Modeling and Simulation	4	4	MATH 2101, 2206 and one of 2501 or 3501 CISC 1110 or 1115 or 1180	- Semesters offered: Spring
MATH 3501	Probability and Statistics I	3	4	MATH 2201	- Semesters offered: Fall and Spring - Prerequisite for MATH 3202, 3601, 3606, 3801, 3802, 4501, 4511, 4531, 4601

Course Abbreviation	Course Title	Credits	Hours	Prerequisites	Comments
MATH 3601	Investment Science	4	4	MATH 2201 and MATH 2501 or MATH 3501 or BUSN / ECON 3400	- Prerequisite for MATH 4601
MATH 3606	Mathematics of Operations Research	3	3	MATH 3501	
MATH 3801	Introduction to Life Contingencies	4	4	MATH 3501	- Semesters offered: odd year Spring
MATH 3802	Introduction to Risk Theory	4	4	MATH 3501	- Semesters offered: odd year Fall
MATH 4101	Linear Algebra II	4	4	MATH 2101 and 3101	- Semesters offered: once every three semesters
MATH 4106	Abstract Algebra II	4	4	MATH 3101	- Semesters offered: once every three semesters
MATH 4201	Advanced Calculus I	3	3	MATH 2001, 2101, 2201 and 3 credits in advanced Mathematics courses or departmental permission	- Semesters offered: Fall and Spring
MATH 4206	Advanced Calculus II	4	4	MATH 2101 and 4201 and one other advanced Mathematics course	- Semesters offered: once every three semesters
MATH 4211	Partial Differential Equations	4	4	MATH 2206	- Semesters offered: once every three semesters

Course Abbreviation	Course Title	Credits	Hours	Prerequisites	Comments
MATH 4216	Introduction to Functions of a Complex Variable	4	4	MATH 4201 and departmental permission	- Semesters offered: once every three semesters
MATH 4302	Foundations of Geometry	4	4	MATH 2001 and 6 credits in advanced Mathematics courses	- Semesters offered: Spring
MATH 4306	Introduction to Topology	4	4	MATH 4201 and departmental permission	- Semesters offered: once every three semesters
MATH 4401	Secondary School Mathematics from an Advanced Viewpoint	4	4	MATH 3101 and CISC 1110 or CISC 1115	- Semesters offered: Spring
MATH 4406	Seminar in Problem Solving and Selected Topics	1	1	Eight credits in advanced Mathematics courses and senior standing or permission of the chairperson	- Semesters offered: Spring
MATH 4501	Probability and Statistics II	4	4	MATH 3501	- Semesters offered: Fall and Spring - Prerequisite for MATH 4506
MATH 4506	Time Series	4	4	MATH 4501	- Semesters offered: Fall
MATH 4511	Probability	4	4	MATH 3501	

Course Abbreviation	Course Title	Credits	Hours	Prerequisites	Comments
MATH 4531	Applied Intermediate Statistics	3	3	MATH 2101 and MATH 2501 or 3501	- Semesters offered: Fall
MATH 4601	Financial Instruments and Their Pricing	4	4	MATH 2601 and 3501, or MATH 3601, or FINC 3370	- Semesters offered: Spring - This course is the same as BUSN/ECON 3375
MATH 4701	Numerical Analysis	4	4	MATH 1206 or 1211 and MATH 2101 and CISC 1110; the ability to use a scientific programming language	- Semesters offered: Fall
MATH 500x	Independent Study			12 credits in advanced Mathematics courses and departmental permission	

Back to Table of Contents

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Back to Table of Contents