

Rochester INSTITUTE OF TECHNOLOGY

Minor Program proposal form

college OF SCIENCE

**School of Mathematical Sciences**

**Name of Minor:** Mathematics

**Brief description of the minor to be used in university publications**

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| The Minor in Mathematics is intended to provide students with an opportunity to broaden their technical background and gain deeper appreciation for the mathematical sciences. |

**1.0 Minor Program Approvals**

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| --- | --- | --- |
|  | Approval request date: | Approval granted date: |
| Academic Unit Curriculum Committee | 2-17-12 | 2-17-12 |
| College Curriculum Committee | 2-21-12 | 2-21-12 |
| Inter-College Curriculum Committee | 4-9-12 | 4-16-12 |

**2.0 Rationale:**

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| All courses in this minor are mathematics courses. |

**3.0 Multidisciplinary involvement:**

If this is a multidisciplinary minor spanning two or more academic units, list the units and their role in offering and managing this minor.

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| None |

**4.0 Students ineligible to pursue this minor:**

The purpose of the minor is both to broaden a student's college education and deepen it in an area outside the student’s major program. A minor may be related to and complement a student’s major, or it may be in a completely different academic/professional area.   It is the responsibility of the academic unit proposing a minor and the unit’s curriculum committee to indicate any home programs for which the minor is not a broadening experience.

Please list below any home programs whose students will not be allowed to pursue this minor, provide the reasoning, and indicate if this exclusion has been discussed with the affected programs:

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| Students majoring in Applied Mathematics are not eligible for this minor. |

**5.0 Minor Program Structure, Sequence and Course Offering Schedule:**

Describe the structure of the proposed minor and list all courses, their anticipated offering schedule, and any prerequisites.

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| To be eligible for a Minor in Mathematics, students must complete Calculus I (COS-Math-181) (or equivalent), and one of the following three courses (or equivalent):  • COS-MATH-182 Calculus II  • COS-MATH-173 Calculus C  • COS-MATH-190 Discrete Mathematics for Computing  • COS-MATH-192 Discrete Mathematics and Introduction to Proof  To earn a Minor in Mathematics, students must complete an additional five courses with a minimum GPA of 2.0. The collection of courses that students may take is partitioned into two groups. At least one of the five courses in a student’s minor must be from Group II, at least two of the five courses must be at the 300-level or above, and at least three of the five courses must not be required by the student’s home program. |
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**Group I:**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Course Number & Title | SCH | Required | Optional | Fall | Spring | Annual/ Biennial | Prerequisites |
| COS-MATH-219  Multivariable Calculus | 3 |  | X | X | X | Annual | MATH-173 or 182 |
| COS-MATH-221 Multivariable and Vector Calculus | 4 |  | X | X | X | Annual | MATH-173 or 182 |
| COS-MATH-231  Differential Equations | 3 |  | X | X | X | Annual | MATH-173 or 182 |
| COS-MATH-233  Linear Systems and Differential Equations | 4 |  | X |  | X | Annual | MATH-172 or 182 |
| COS-MATH-241  Linear Algebra | 3 |  | X | X | X | Annual | MATH-190 or 192 or 219 or 221 |
| COS-MATH-251  Probability and Statistics I | 3 |  | X | X | X | Annual | MATH-182 |
| COS-MATH-311  Linear Optimization | 3 |  | X |  | X | Annual | MATH-241 |
| COS-MATH-312  Nonlinear Optimization | 3 |  | X |  | X | Annual | MATH-311 |
| COS-MATH-321  Game Theory | 3 |  | X |  | X | Annual | MATH-241 |
| COS-MATH-326  Boundary Value Problems | 3 |  | X | X | X | Annual | MATH-221, 231 |
| COS-MATH-331  Dynamical Systems | 3 |  | X |  | X | Annual | MATH-221, 231 |
| COS-MATH-361 Combinatorics | 3 |  | X |  | X | Annual | MATH-190 or 192 |
| COS-MATH-367  Codes and Ciphers | 3 |  | X |  | X | Annual | MATH-190 or 192 |
| COS-MATH-381  Complex Variables | 3 |  | X | X | X | Annual | MATH-221 |

**Group II:**

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| Course Number & Title | SCH | Required | Optional | Fall | Spring | Annual/ Biennial | Prerequisites |
| COS-MATH-341 Advanced Linear Algebra | 3 |  | X | X | X | Annual | MATH-241 |
| COS-MATH-351  Graph Theory | 3 |  | X | X |  | Annual | MATH-190 or 192 |
| COS-MATH-371  Number Theory | 3 |  | X |  | X | Annual | MATH-190 or 192 |
| COS-MATH-401  Stochastic Processes | 3 |  | X | X |  | Annual | MATH-241, 251 |
| COS-MATH-411 Numerical Analysis | 3 |  | X | X |  | Annual | MATH-231, 241 |
| COS-MATH-412 Numerical Linear Algebra | 3 |  | X |  | X | Annual | MATH-221, 231, 241 |
| COS-MATH-431  Real Variables I | 3 |  | X | X | X | Annual | MATH-192, 221 |
| COS-MATH-432  Real Variables II | 3 |  | X | X | X | Annual | MATH-431 |
| COS-MATH-441  Abstract Algebra I | 3 |  | X | X | X | Annual | MATH-192, 241 |
| COS-MATH-442  Abstract Algebra II | 3 |  | X | X | X | Annual | MATH-441 |
| COS-MATH-461  Topology | 3 |  | X |  | X | Annual | MATH-432 |

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| Total credit hours: | 15 |

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| Course | Name | Semester credits | Quarter course | Name | Quarter credits |
| MATH-182 | Calculus II | 4 | 282&283 | Project-Based Calculus II &III | 6 |
| MATH-190 | Discrete Mathematics for Computing | 3 | 265 | Discrete Mathematics I | 4 |
| MATH-192 | Discrete Mathematics and Introduction to Proof | 3 | 265 | Discrete Mathematics I |  |
| MATH-219 | Multivariable Calculus | 3 | 305 | Multivariable Calculus | 4 |
| MATH-221 | Multivariable and Vector Calculus | 4 | 305 or 328 | Multivariable Calculus or Engineering Mathematics | 4 |
| MATH-231 | Differential Equations | 3 | 306 | Differential Equations I | 4 |
| MATH-233 | Linear Systems and Differential Equations | 3 | 331 & 306 | Linear Algebra I & Differential Equations I | 8 |
| MATH 241 | Linear Algebra | 3 | 331 | Linear Algebra I | 4 |
| MATH 251 | Probability and Statistics | 3 | 351 | Probability and Statistics | 4 |
| MATH 311 | Linear Optimization | 3 | 465 | Linear Optimization | 4 |
| MATH 312 | Nonlinear Optimization | 3 | 466 | Nonlinear Optimization | 4 |
| MATH-321 | Game Theory | 3 | 565 | Game Theory | 4 |
| MATH-326 | Boundary Value Problems | 3 | 318 | Boundary Value Problems | 4 |
| MATH-331 | Dynamical Systems | 3 | 407 | Dynamical Systems | 4 |
| MATH-361 | Combinatorics | 3 | 365 | Combinatorics | 4 |
| MATH-367 | Codes and Ciphers | 3 | 361 | Codes and Ciphers | 4 |
| MATH-381 | Complex Variables | 3 | 420 | Complex Variables | 4 |
| MATH-341 | Advanced Linear Algebra | 3 | 432 | Linear Algebra II | 4 |
| MATH-351 | Graph Theory | 3 | 467 | Graph Theory | 4 |
| MATH-371 | Number Theory | 3 | 485 | Number Theory | 4 |
| MATH-401 | Stochastic Processes | 3 | 525 | Stochastic Processes | 4 |
| MATH-411 | Numerical Analysis | 3 | 511 | Numerical Analysis | 4 |
| MATH-412 | Numerical Linear Algebra | 3 | 512 | Numerical Linear Algebra | 4 |
| MATH-431 | Real Variables I | 3 | 411 | Real Variables I | 4 |
| MATH-432 | Real Variables II | 3 | 412 | Real Variables II | 4 |
| MATH-441 | Abstract Algebra I | 3 | 531 | Abstract Algebra I | 4 |
| MATH-442 | Abstract Algebra II | 3 | 532 | Abstract Algebra II | 4 |
| MATH-461 | Topology | 3 | 571 | Topology | 4 |