

## **Conversion to Semesters GRD Working Group**

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### **Program Requirements:**

30 semester hours (Currently: 45 quarter hours)

### **700 Level Courses**

#### Current Quarter Courses

MTH 730, 731, 732  
MTH 751, 752, 753  
MTH 716, 717, 718

#### Proposed Semester Courses

MTH 731, 732  
MTH 751, 752  
MTH 716, 717

Currently the 700 level MTH courses are 4 credit hour courses meeting two 75 minute periods per week. Students in the Mathematics Graduate Program are required to take 24 hours of graduate courses at the 700 level.

Each 12 hour three course sequence could be converted to an 8 hour two course sequence or a 6 hour two course sequence.

If 700 level courses become 4 credit hour courses students in the Mathematics Graduate Program would be required to take 16 hours of course work at the 700 level. Students in the Applied Mathematics Program would be required to take MTH 716 plus two additional 700 level courses from a specified list of MTH/STT/CS courses. Graduate Teaching Assistants could complete either program in two years by taking two courses each quarter and one course during the intervening summer, as they do now.

If 700 level courses become 3 credit hour courses, students in the Mathematics program would be required to take 12 hours of courses at the 700 level. Since both programs would require 10 courses (30 hours), GTAS would need to take three courses over two semesters (or 3 courses over one semester plus a summer course) and two courses over the remaining two semesters, to complete either program in two years.

It was recommended that the Applied Analysis sequence MTH 777, 778 remain in the course inventory. A future possibility would be to design a course to follow MTH 731, consisting of topics from MTH 777/778, for the applied mathematics students. Attached is a proposed outline for the semester version of MTH 731.

## Full-time Status

According to J. Thomas, GRAS and Graduate Council Scholars will probably be required to take 9 hours per semester for fulltime status and GTAS will probably be required to take 6 hours. No firm decisions have been made.

## Comprehensive Exams (Mathematics and Applied Mathematics)

Comprehensive exams currently cover 6 courses over three areas. There are three 90 minute exams, with each exam covering two courses. For the Mathematics Program the committee agreed on three exams covering three areas. Two of the exams would be 90 minute exams covering a semester course. The third exam would cover a 700 level sequence (most probably analysis or algebra). Students could take two of the exams after the Fall semester of their second year. If there is a spring break it was suggested that the third exam be given during this break, covering one and a half semesters of the 700 level sequence (which would roughly correspond to two quarters). Consistent with current practice, a thesis defense would replace one comprehensive. Six credit hours of reading courses related to the writing of the thesis could be counted toward the degree program.

The committee recommended that the Applied Mathematics Program follow a similar plan for comprehensive exams. Recently, the Applied Mathematics Committee offered the following plan. All students would take a comprehensive exam over a two course sequence (either MTH 681, 682 or MTH 716, 717). The remaining two comprehensive exams would each cover a one semester course. Students who choose the MTH 681, 682 sequence option must take one comprehensive over MTH 716.

## 600 Level Courses

Not every 3 credit 600 level course should be converted to a 3 hour semester course. Three course sequences convert naturally to two course semester sequences. The committee agreed on the following recommendations. Each proposed course would be 3 credit hours.

Current Quarter Courses	Proposed Semester Courses
MTH 631, 632, 633	MTH 631, 632
MTH 680, 681, 682	MTH 681, 682
MTH 581, 651, 652	MTH 651, 652
MTH 657, 658	MTH 657 (Applied Combinatorics and Graph Theory)
MTH 619	MTH 619
MTH 656	MTH 656
MTH 671	MTH 671 (Outline attached)
MTH 606	MTH 606 (Core course)
MTH 607	MTH 607 (Possibly offered alternate years)

## **Inactive Courses**

The following courses should probably remain in the course inventory.

MTH 634 Complex Analysis  
MTH 472 Projective Geometry  
MTH 675 Differential Geometry  
MTH 739 Complex Analysis  
MTH 771 Topology  
MTH 792 Special Problems  
MTH 799 Selected Topics  
MTH 800 Graduate Seminar  
MTH 830 Topics in Analysis  
MTH 850 Topics in Algebra  
MTH 870 Topics in Geometry

If MTH 700 is still needed, the course description should be rewritten to include both teaching and research (attending colloquia) experiences. MTH 700 does not count toward program requirements.

## Mth 471/671 Geometry (3 hrs)

- Hyperbolic geometry (upper half-plane model)
  - hyperbolic plane, hyperbolic lines
  - Möbius group
  - hyperbolic distance, hyperbolic area
  - hyperbolic trigonometry
- Topics in spherical geometry
  - sphere, great circles
  - distance, spherical triangles
  - spherical trigonometry
- Brief Riemannian geometry (if time permits)
  - geometric surfaces
  - distance, geodesics
  - Gaussian curvature
  - Gauss-Bonnet theorem

Prerequisite: Mth 232

### Notes:

- Learn non-Euclidean geometries.
- Use complex numbers to solve geometric problems.
- Students may be interested in projects on geometry for senior seminar (Mth 492?)
- A proof-oriented course involving concepts from geometry, algebra, and analysis. May serve as an transition course from Mth 280 to Mth 431-433.

Mth 730-732  
Real Analysis I (4 hrs)

- Cardinality of set
- Metric spaces: convergence, completeness, compactness. Fixed point theorem. Space of continuous functions, Ascoli-Arzelà theorem, Weierstrass-Stone theorem.
- Lebesgue measure and integration. Convergence theorems, Fubini theorem.  $L_p$  spaces.

Real Analysis II (4 hrs)

- Hilbert spaces, Riesz representation theorem, orthonormal bases.
- Banach spaces, dual spaces, weak and weak\* convergences.
- Bounded linear operators, adjoint operators, compact operators.
- Applications.

Prerequisite: Mth 433/633

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