I. General Information:

College:	Arts and Sciences		Department (Full name):	Mathematics
Major Name (full name please):	Mathematics		Degree Title:	BA/BS
Formal Option(s), if any:	Option A and Option B		Specialty Field w/in Formal Options, if any:	
Requested Effective Date:	<mark>FALL 2014, *IF* RECEIVED BY SENATE COUNCIL BY MONDAY, APRIL 7.</mark>			
Contact Person:	Serge Ochanine	Phone:	257-8837	Email: serge.ochanine@uky.edu

II. Parameters of the Graduation Composition and Communication Requirement (GCCR):

The new GCCR replaces the old Graduation Writing Requirement. It is fulfilled by a course or courses specified within a B.A./B.S. degree program. As outlined in draft Senate Rule 5.4.3.1, the GCCR stipulates that students must successfully complete this requirement after achieving sophomore status and prior to graduation. To satisfy the GCCR, students must earn an average grade of C or better on the designated Composition and Communication (C&C) intensive assignments produced in any given course designated as fulfilling some or all of the GCCR. The requirements for GCCR courses include:

- at least 4500 words of English composition (approximately 15 pages total);

- a formal oral assignment *or* a visual assignment;

- an assignment demonstrating information literacy in the discipline;

- a draft/feedback/revision process on GCCR assignments.

The program requirements for the GCCR include:

- at least one specific Program Student Learning Outcome for C&C outcomes;

- a plan for assessing both the writing and oral *or* visual components of the GCCR;

- clear goals, rubrics, and revision plans for GCCR implementation.

Upon GCCR approval, each program will have a version of the following specification listed with its Program Description in the

University Bulletin:

"Graduation Composition and Communication Requirement. Students must complete the Graduation Composition and Communication Requirement as designated for this program. Please consult a college advisor or program advisor for details. See also 'Graduation Composition and Communication Requirement' on p. XX of this Bulletin."

III. GCCR Information for this Program (by requirement):

A. *List the courses currently used to fulfill the old Graduation Writing Requirement:*
MA 330, MA 416, MA 417
B. *GCCR Program Outcomes and brief description:*
1. Please specify the Major/Program Student Learning Outcomes (SLOs) pertaining to Composition & Communication and the GCCR requirement. These are *program* outcomes, not *course* outcomes. Please specify the program-level SLOs for C&C in your program:
Math Major Goal D: Students will demonstrate the ability to communicate through writing in the field of mathematics. Students will demonstrate the ability to communicate either orally or through the creation of a visual artifact in the field of mathematics.
2. Please provide a short GCCR description for your majors (limit 1000 characters): Please explain the GCCR requirement in language appropriate for undergraduate majors to understand the specific parameters and justification of your program's GCCR implementation plan:
Mathematics majors must complete MA 391 as a part of their 18 hours of mathematics coursework. Successful completion of MA 391 will satisfy the GCCR requirement. As this course is a selected topics course in mathematics with mathematical content chosen by the instructor, the mathematical content will vary each semester.
C. *Delivery and Content:*

1. Delivery specification: for your major/program, how will the GCCR be delivered? Please put an X next to the appropriate option. *(Note: it is strongly recommended that GCCR courses be housed within the degree program.)*	☒ a. Single required course within program
	☐ b. multiple required or optional courses within program
	☐ c. course or courses outside program (i.e., in another program)
	☐ d. combination of courses inside and outside program
	☐ e. other (please specify): _

2. **Basic Course Information**: Please provide the following information for course(s) used to satisfy the GCCR, either in whole or in part:

Course #1: Dept. prefix, number, and course title: _MA 391, Mathematics: Composition and Communication_

- new or existing course? _new_ (*new courses should be accompanied by a New Course Proposal*)

  - ☐ *if a new course, check here that a New Course Proposal has been submitted for review via eCATS*

- required or optional? _required_

- shared or cross-listed course? _no_

- projected enrollment per semester: _25_

Course #2 (if applicable): Dept. prefix, number, and course title: _____

- new or existing course? _____ (*new courses should be accompanied by a New Course Proposal*)

  - ☐ *if a new course, check here that a New Course Proposal has been submitted for review via eCATS*

- required or optional? _____

- shared or cross-listed course? _____

- projected enrollment per semester: _____

Course #3 (if applicable): Dept. prefix, number, and course title: _____

- new or existing course? _____ (*new courses should be accompanied by a New Course Proposal*)

  - ☐ *if a new course, check here that a New Course Proposal has been submitted for review via eCATS*

- required or optional? _____

- shared or cross-listed course? _____

- projected enrollment per semester: _____

3. **Shared courses:** If the GCCR course(s) is/are shared from *outside* the program, please specify the related department or program that will be delivering the course(s). Please provide the following:

- **Contact information of providing program:**

  _____

- **Resources:** what are the resource implications for the proposed GCCR course(s), including any projected budget or staffing needs? If multiple units/programs will collaborate in offering the GCCR course(s), please specify the resource contribution of each participating program.

  _____

- **Memorandum of Understanding/Letter of Agreement**: Attach formal documentation of agreement between the

providing and receiving programs, specifying the delivery mechanisms and resources allocated for the specified GCCR course(s) in the respective programs (include with attachments).

Date of agreement: _____

4. **Syllabi: Please provide a sample syllabus for each course that will be designated to fulfill the GCCR.** Make sure the following things are clearly indicated on the syllabi for ease of review and approval (check off each):

- the GCCR assignments are <mark>highlighted</mark> in the syllabus and course calendar;

- the GCCR assignments meet the minimum workload requirements as specified by the Senate Rules for GCCR courses (see the draft Senate GCCR rule linked here);

- the elements are specified in the syllabus that fulfill the GCCR requirement for a clear draft/feedback/revision process;

- the grade level requirements for the GCCR are specified on the syllabus (i.e., an average of C or better is required on GCCR assignments for credit);

- the course or sequence of courses are specified to be completed after the first year (i.e. to be completed after completing 30 credit hours) for GCCR credit;

- the course syllabus specifies "This course provides full/partial GCCR credit for the XXX major/program"

    o if the course provides partial GCCR credit, the fulfilled portion of the GCCR must be specified and the other components of the GCCR for the program must be specified: e.g. "This course provides partial credit for the written component of the GCCR for the XXX major/program in conjunction with Course 2"

5. **Instructional plan:** Summarize the instructional plan for teaching the C&C skills specified in the program SLOs and delivered in the course(s). Include the following information in **brief** statements (1000 characters or less). Information can be cut-and-pasted from the relevant sample syllabus with indications **where** on the syllabus it is found:

- overview of delivery model: summarize how the GCCR will be delivered for **all** program majors: explain how the delivery model is appropriate for the major/program and how it is offered at an appropriate level (e.g. required course(s), capstone course, skills practicum sequence of courses, etc.):

    The mathematics department will require all majors to take a single GCCR course. Because the mathematical content of this course will be chosen by each instructor, this will expose our majors to a variety of rich and interesting, yet non-standard, mathematical ideas that are chosen with the purpose of supporting a wide range of written projects.

- assignments: overview or list of the assignments to be required for the GCCR (e.g. papers, reports, presentations, videos, etc.), with a summary of how these GCCR assignments appropriately meet the disciplinary and professional expectations of the major/program:

    From page two: The 15-page project requirement is that it must involve a "great idea" of modern mathematics and provide a well-supported argument justifying this choice of topic. All projects are expected to be well-written, free from grammatical errors, and have excellent mathematical depth and style. Students should direct a portion of their project toward a general university audience and articulate clearly which sections are aimed toward experts. Students will create a visual artifact in the form of a poster presentation. The purpose of this poster presentation is to communicate clearly and concisely the core of

the argument contained in your course project.   Additional comments: It is typical in mathematics for researchers, especially student researchers, to publish papers and disseminate their results through poster presentations at conferences. Thus, our requirements are directly aligned with standard practices in our discipline.
• revision: description of the draft/feedback/revision plan for the GCCR assignments (e.g. peer review with instructor grading & feedback; essay drafting with mandatory revision; peer presentations; etc.):
A first version of projects and posters will be submitted for peer review and instructor feedback, with mandatory revision.
• other information helpful for reviewing the proposal:
The assessment structure for this course is closely modeled on a previous math department GWR course, MA 330 (History of Mathematics). The use of homework, a course project, and a poster presentation based on this project has been used previously in this context. The department voted to create a new GCCR course with variable content in order to maximize participation by faculty, and to provide a course in which faculty can develop new undergraduate course modules on non-standard topics.
D. Assessment:
In addition to providing the relevant program-level SLOs under III.B, please specify the assessment plan at the program level for the proposed course(s) and content. Provide the following:
• specify the assessment schedule (e.g., every 3 semesters; biennially):
The GCCR course will be assessed every 3 semesters.
• identify the internal assessment authority (e.g. curriculum committee, Undergraduate Studies Committee):
The GCCR course will be assessed by the Undergraduate Committee in the Mathematics Department.
• if the GCCR course(s) is/are shared, specify the assessment relationship between the providing and receiving programs: explain how the assessment standards of the receiving program will be implemented for the provided course(s):

Signature Routing Log

General Information:

GCCR Proposal Name (course prefix & number, program major & degree):	MA 391, Mathematics: Composition and Communication
Contact Person Name:	Serge Ochanine, Director of Undergraduate Studies
Phone:	<u>257-8837</u>
Email:	serge.ochanine@uky.edu

Instructions:

Identify the groups or individuals reviewing the proposal; record the date of review; provide a contact person for each entry. On the approval process, please note:

- Proposals approved by Programs and Colleges will proceed to the GCCR Advisory Committee for expedited review and approval, and then they will be sent directly to the Senate Council Office. Program Changes will then be posted on a web transmittal for final Senate approval in time for inclusion in the Fall 2014 Course Bulletin.

- <u>New Course Proposals for the GCCR will still require review and approval by the Undergraduate Council</u>. This review will run parallel to GCCR Program Change review.

- In cases where new GCCR courses will be under review for implementation after Fall 2014, related GCCR Program Changes can still be approved for Fall 2014 as noted "*pending approval of appropriate GCCR courses."*

Internal College Reviews and Course Sharing and Cross-listing Reviews:

Reviewing Group	Date Reviewed	Contact Person (name/phone/email)
Home Program *review by Chair or DUS, etc.*	3/31/14	Serge Ochanine, Director of Undergraduate Studies / <u>257-8837</u> / serge.ochanine@uky.edu
Providing Program *(if different from Home Program)*		/ /
Cross-listing Program *(if applicable)*		/ /
College Dean	4/1/14	Ruth Beattie, Associate Dean / 3-9925 / rebeat1@uky.edu
		/ /

Administrative Reviews:

Reviewing Group	Date Approved	Approval of Revision/ Pending Approval[1]
GCCR Advisory Committee	4/16/2014	

Comments:

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[1] *Use this space to indicate approval of revisions made subsequent to that group's review, if deemed necessary by the revising group; and/or any Program Change approvals with GCCR course approvals pending.*

MA 391 001
Mathematics: Composition and Communication (sr)

SAMPLE TOPIC: Mathematical, Historical, and Cultural Aspects of Hilbert's Problems

Instructor: TBA
Office Address: TBA
Email: TBA
Office Phone: TBA
Office Hours/Location: TBA

Course Description:

BULLETIN DESCRIPTION: This is an undergraduate topics course in mathematics. The mathematical content of this course will be selected at the discretion of the instructor. This course satisfies the Graduation Composition and Communication Requirement for mathematics majors.

SAMPLE SPECIAL TOPIC INFORMATION: This course is centered around an exploration of mathematical, historical, and cultural aspects of Hilbert's 23 problems proposed at the beginning of the 20th century. These problems were a source of inspiration for many major developments in 20th century mathematics. Also, the mathematicians involved in working on these problems were affected by and involved in the global social and political events of the past 100 years. Thus, Hilbert's problems serve as a window into both the development of modern mathematics and the roots of our contemporary political and social climate.

Prerequisites:

MA 213
one of MA 261 or MA 214
MA 322
one of MA 321, MA 351, MA 361, or MA 471

AND 30 or more complete credit hours

Student Learning Outcomes:

After completing this course, the student will be able to:
1.   communicate in the discipline of mathematics through writing
2.   communicate in the discipline of mathematics either orally or through the creation of a visual artifact
3.   effectively use information resources in the discipline of mathematics

Course goals or objectives:

Students in this course will achieve the student learning outcomes listed above by engaging in the exploration of various mathematical, historical, and cultural ideas.

Required Materials:

SAMPLE SPECIAL TOPIC MATERIALS:
1) *The Honors Class*, by Ben Yandell
2) *The Hilbert Challenge*, by Jeremy Gray
3) "Periodicity, Quasiperiodicity, and Bieberbach's Theorem on Crystallographic Groups," A. Vince, *The American Mathematical Monthly*, Vol 104, No 1, Jan 1997, pp 27-35
4) "An Elementary Problem Equivalent to the Riemann Hypothesis," Jeffrey C. Lagarias, *The American Mathematical Monthly*, Vol 109, No 6, Jun-July 2002, pp 534-543

Description of Course Activities and Assignments

Homework contributing 30% to the course grade
Written course project contributing 35% to the course grade.
Visual communication assignment contributing 30% to the course grade.
Attendance/participation contributing 5% to the course grade.

Summary Description of Course Assignments

Homework

* Homework will be assigned regularly. Some portions of the homework must be typed. No late work will be accepted. You should work with other students and share your ideas as part of our course community. However, you should not let your collaboration devolve into letting someone else do all the "hard parts" and then copying their answers.

 Policy on group work on student collaboration (homework assignments only)

* Don't talk to anyone about the problems until you have made a genuine effort to solve them yourself.

* You must write up the solutions on your own.

* You may not search the internet for solutions to problems. We will use our creativity, course texts, and peer collaboration as our tools for investigating these problems.

Course Project

* You will choose a topic for and complete a written project during the course of the semester. This will be a written project of length (without references) 15 pages with 1 inch margins, 12 point Times New Roman font, double spaced. The main requirement is that your project must involve a "great idea" of modern mathematics and provide a well-supported argument justifying this choice of topic. All projects are expected to be well-written, free from grammatical errors, and have excellent mathematical depth and style. A grading rubric will be provided early in the semester.

* You should direct a portion of your project toward a general university audience and articulate clearly which sections are aimed toward experts. The course textbooks are good models for this type of exposition.

* You will turn in a first version of your project for peer review; the first version must be a complete project that you will revise substantially to create your final version.

Poster Presentation

* You will create a visual artifact in the form of a poster presentation.

* The purpose of this poster presentation is to communicate clearly and concisely the core of the argument contained in your course project.

* You will turn in a draft version of your poster for peer review.

Information Literacy Assignment

* You will turn in a course project proposal that will serve as an information literacy assignment. In preparing your proposal, you will use standard resources such as JSTOR, MathSciNet, and other databases to find relevant sources. You will also be introduced to well-known mathematical publications at the undergraduate level such as The American Mathematical Monthly, Math Horizons, Math Intelligencer, and Mathematics Magazine.

Course Grading

Grading scale:
90–100% = A
80-89% = B
70-79% = C
60-69% = D
below 60% = E

Note that in order to receive GCCR credit for this course, a C average must be received on the course project and course poster.

Final Exam Period Information

The final exam period will be used for a course poster display session and for the last class discussion. Time and date TBA.

Mid-term Grade

Mid-term grades will be posted in myUK by the deadline established in the Academic Calendar (http://www.uky.edu/Registrar/AcademicCalendar.htm)

Course Policies:

Submission of Assignments:
No late work will be accepted unless arranged prior to the deadline. Students will be notified of submission instructions in advance for each assignment.

Attendance and Classroom Behavior Policy.
Attendance will be taken daily. Students are expected to be engaged participants during class. Students are expected to behave in a civil and respectful manner at all times.

Excused Absences:
Students need to notify the professor of absences prior to class when possible. S.R. 5.2.4.2 defines the following as acceptable reasons for excused absences: (a) serious illness, (b) illness or death of family member, (c) University-related trips, (d) major religious holidays, and (e) other circumstances found to fit "reasonable cause for nonattendance" by the professor.

Students anticipating an absence for a major religious holiday are responsible for notifying the instructor in writing of anticipated absences due to their observance of such holidays no later than the last day in the semester to add a class. Information regarding dates of major religious holidays may be obtained through the religious liaison, Mr. Jake Karnes (859-257-2754).

Students are expected to withdraw from the class if more than 20% of the classes scheduled for the semester are missed (excused or unexcused) per university policy.

Verification of Absences
Students may be asked to verify their absences in order for them to be considered excused. Senate Rule 5.2.4.2 states that faculty have the right to request "appropriate verification" when students claim an excused absence because of illness or death in the family. Appropriate notification of absences due to university-related trips is required prior to the absence.

Academic Integrity:
Per university policy, students shall not plagiarize, cheat, or falsify or misuse academic records. Students are expected to adhere to University policy on cheating and plagiarism in all courses. The minimum penalty for a first offense is a zero on the assignment on which the offense occurred. If the offense is considered severe or the student has other academic offenses on their record, more serious penalties, up to suspension from the university may be imposed.

Plagiarism and cheating are serious breaches of academic conduct. Each student is advised to become familiar with the various forms of academic dishonesty as explained in the Code of Student Rights and Responsibilities. Complete information can be found at the following website: http://www.uky.edu/Ombud. A plea of ignorance is not acceptable as a defense against the charge of academic dishonesty. It is important that you review this information as all ideas borrowed from others need to be properly credited.

Part II of *Student Rights and Responsibilities* (available online http://www.uky.edu/StudentAffairs/Code/part2.html) states that all academic work, written or otherwise, submitted by students to their instructors or other academic supervisors, is expected to be the result of their own thought, research, or self-expression. In cases where students feel unsure about the question of plagiarism involving their own work, they are obliged to consult their instructors on the matter before submission.

When students submit work purporting to be their own, but which in any way borrows ideas, organization, wording or anything else from another source without appropriate acknowledgement of the fact, the students are guilty of plagiarism. Plagiarism includes reproducing someone else's work, whether it be a published article, chapter of a book, a paper from a friend or some file, or something similar to this. Plagiarism also includes the practice of employing or allowing another person to alter or revise the work which a student submits as his/her own, whoever that other person may be.

Students may discuss assignments among themselves or with an instructor or tutor, but when the actual work is done, it must be done by the student, and the student alone. When a student's assignment involves research in outside sources of information, the student must carefully acknowledge exactly what, where and how he/she employed them. If the words of someone else are used, the student must put quotation marks around the passage in question and add an appropriate indication of its origin. Making simple changes while leaving the organization, content and phraseology intact is plagiaristic. However, nothing in these Rules shall apply to those ideas which are so generally and freely circulated as to be a part of the public domain (Section 6.3.1).

Please note: Any assignment you turn in may be submitted to an electronic database to check for plagiarism.

Accommodations due to disability:
If you have a documented disability that requires academic accommodations, please see me as soon as possible during scheduled office hours. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (Room 2, Alumni Gym, 257- 2754, email address: jkarnes@email.uky.edu) for coordination of campus disability services available to students with disabilities.

Tentative Course Schedule

Week 1
a) Introduction to course

Week 2
a) Readings from Yandell, Introduction, and Gray, Ch 1 and Ch 3
b) 2-page critical essay regarding reading

Week 3
a) Readings from Yandell, "In The Original" and Gray, Ch 3
b) Homework regarding Dehn Invariants and Polyhedra
c) Course project proposal due – Information Literacy Assignment

Week 4
a) Readings from Yandell, "Set Theory, Anyone?" and Gray, Ch 4
b) Homework regarding countable vs uncountable sets, existence of infinitely many infinite cardinalities

Week 5

a) Readings from Yandell, "I Am Lying (Mathematics is Consistent)" and Gray, Ch 4
b) 3-page critical essay on cultural impact of Nazi party on German mathematics

Week 6
a) No readings, no homework, focus on completion of course project
<mark>b) First version of course project due</mark>

Week 7
a) Readings from Yandell, "Can't We Do This with a Computer?" and Gray, Ch 4
b) Homework regarding transfinite numbers

Week 8
a) Readings from Yandell, "First, State the Tune" and Gray, Ch 4
b) Homework regarding Riemann Zeta Function and connections to number theory

Week 9
a) Readings from Yandell, "The Inordinate Allure of Prime Numbers" and the article by Lagarias
b) Homework regarding logarithmic integrals and error estimates for Pi(x)

Week 10
a) Readings from Yandell, "How Many Kinds of Crystals are There, and Does the Grocer Know How to Stack Oranges?" and Gray, Ch 4
b) 3-page critical essay regarding Bieberbach and Nazi sympathizers

Week 11
a) Readings from article on Crystallographic Groups by Vince
b) Homework regarding crystallographic groups

Week 12
a) Readings from Yandell, "How Famous Can a Function Theorist Be?" and Gray, Ch 3
b) Homework regarding hyperbolic geometry

Week 13
a) Readings from Gray, Ch 3
b) Homework regarding hyperbolic geometry
<mark>c) First version of poster presentation due</mark>

Week 14
a) No readings, no homework, focus on final version of course project
<mark>b) Final version of course project due</mark>

Week 15
a) Readings from Yandell, "Schools Amid Turbulence" and Gray, Ch 6
b) Homework regarding differential equations

Week 16 – Final Period
<mark>a) Final version of poster presentation due</mark>

Grading Rubric for Mathematical Writing

You will receive a score of 0 through 10 for each of the five criteria.

1. Writing Style

Score: _____
A 10 paper is eloquent and effective, with varied sentence structures, good rhythm, fluid transitions, and a distinct voice. A 7 paper is coherent and appropriate, but uneventful and uninspiring. A 2 paper often contains sentences that are not comprehensible and alienating to the reader.

2. Arrangement and Development

Score: _____
A 10 paper guides the reader through the text with organizational clarity and ingenuity, providing the reader with the information that is needed at each moment. A 7 paper does not go out of its way to help readers, but is reasonably well structured and logically sound. A 2 paper is skimpy or bloated, with haphazard organization, regular disregard for logic, and little consideration for the reader.

3. Editing and Conventions

Score: _____
A 10 paper demonstrates maturity with regard to grammar, syntax, word choice, and attribution of sources. A 7 paper is reasonably well edited but features a small number of distracting errors in phrasing, punctuation, citation, etc. A 2 paper has regular or repeated problems with these features that impedes reader comprehension.

4. Mathematical Depth

Score: _____
A 10 paper demonstrates a sure grasp of mathematics, providing insightful connections from the material to other areas of mathematics and science and/or arguing effectively for the value of the material in play. A 7 paper responds appropriately to the assignment, but does not effectively communicate the worth of the material. A 2 paper exhibits mathematical errors that prevent understanding by the reader.

5. Mathematical Style

Score: _____
A 10 paper illustrates the mathematics under discussion with clear proofs, illuminating examples, or a combination thereof, and stimulates the intellect. A 7 paper contains adequate mathematical content, but provides too many or too few details in proofs and/or unenlightening examples. A 2 paper is often incomprehensible, even if mathematically correct.

Poster Grading Rubric

There are three grading criteria, each of which will be scored between 0 and 10.

1. Effectively and coherently conveys the focus/thesis of project

Score: _____

A 10 poster is eloquent, effective, and easy to understand, clearly articulating the focus of your project. A 7 poster is coherent and appropriate, but uneventful and uninspiring. A 2 poster does not convey the core purpose of the project and is alienating to the viewer.

2. Creativity and quality of presentation

Score: _____

A 10 poster demonstrates creativity and quality with regard to organization and presentation of material. A 7 poster presents the material reasonably but is hard to read and boring. A 2 poster has problems with readability and comprehension.

3. Mathematical Content

Score: _____

A 10 poster demonstrates a sure grasp of mathematics, providing insightful connections from the material to other areas of mathematics and science and/or arguing effectively for the value of the material in play. A 7 poster conveys some of the mathematics involved, but does not effectively communicate the worth of the material. A 2 poster exhibits mathematical errors that prevent understanding by the reader.

4. Instructor Comments