

Wartburg College Educational Policies Committee
REQUEST FOR NEW COURSES/COURSE CHANGES

SIGNATURE PAGE

Type of Request (Check one)

- ☐ **New course** including new special topics (NOTE: attach a course syllabus and statement of rationale. If this is an essential education course, please describe how it will meet the goals of essential education. Syllabus should contain the description, objectives, and requirements of the course, including the factors used to determine the final grade.)
- ☒ **Change in Existing Course** including course deletions (Complete items on both the right and the left hand columns)
- ☐ **Program Change**

Course Identification (Prefix/Number)

GM 303 (original) IDXXX and IDXXX+1

Course Title (35 character limit)

Historical Roots of Mathematics and Physics

Recommendation

Submitted By Mariah Birgen and Brian Birgen

11/24/15

Date

[Signature]
Department Chair

Yes

No

Date

Writing Across the Curriculum Coor.

Yes

No

Date

IS 201/DAC Coordinator

Yes

No

Date

Global Multicultural Committee

Yes

No

Date

General Education Committee

Yes

No

Date

Approval

EPC Chair

Yes

No

Date

Dean of the Faculty

Yes

No

Date

☐ EPC recommends this request be reviewed by Faculty Council for Resource Implications

EPC # _____ Page _____

Gen Ed # 13 Page _____

For Existing Courses

Please complete this column with current information AND enter changes in the right hand column.

For New Course Information or Changes to existing courses

Please complete this column

Course Identification (Prefix/Number)	Course Identification (Prefix/Number)
GM 303	ID XXX and ID XXX+1
Course Title	Course Title (35 character limit)
Historical Roots of Mathematics and Physics	Historical Roots of Mathematics and Physics
Abbreviated Title	Abbreviated Title (15 character limit)
Historical Roots of Math & Physics	Historical Roots of Math & Physics
Course Description An experience-based study of the historical and cultural underpinnings of 20th-century math and physics. Special attention will be given to the roles of society and politics. The class will visit important historical sites.	Course Description (35 word limit) An experience-based study of the historical and cultural underpinnings of 17 th to 20th-century math and physics. Special attention will be given to the roles of society and politics. The class will visit important historical sites.
Course Credit 1	Course Credit 1
Classroom Hours per term for lab or studio class	Classroom Hours per term for lab or studio class
Prerequisite/corequisite requirements	Prerequisite/corequisite requirements
Enrollment Cap 20	Enrollment Cap 20
Terms Offered and rotation May	Terms Offered and rotation May
Grading (A-F or P-D-F) A-F	Grading (A-F or P-D-F) A-F
Wartburg Plan Yes Writing Intensive and Diversity	Wartburg Plan <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Identify which part of the plan: Interconnected, Writing Intensive, and Diversity
Cultural Immersion Course Yes	Cultural Immersion Course <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Program Status (Major requirement, minor requirements, program elective, degree elective)	Program Status _____ Major requirement _____ _____ Minor requirement _____ _____ Major elective _____ _____ Minor elective _____ _____ General elective _____
	Effective Dates (Term/Year) May 2017

1. Reason for Requested Change:

Submit for Interdisciplinary Course for Wartburg Plan of Essential Education

2. In an effort to keep the curriculum as lean and effective as possible, EPC requests that with each new course departments evaluate current offerings. If proposing a new course, what course(s) could be deleted?

This is not a new course.

3. Resource Implications: IF THIS IS A NEW COURSE, you must provide a list of teaching assignments in the department to demonstrate that no adjunct faculty are required to teach this course. You may also submit a request to delete a course. New courses will not be considered without a clear understanding of faculty resources necessary to offer the course.

This is not a new course.

The Historical Roots of Math and Physics in the British Isles has been taught three times by two different faculty members over the last 15 years. The department and instructors have come to realize that this course fits best into the Interdisciplinary Course tier of the Wartburg Plan of Essential Education. The primary question that is asked by the course materials is

How does the study of the Mathematical Sciences benefit human societies, political institutions, and modern culture? Specifically:

- How did a series of public maritime accidents in the early 1700s lead to public funding of the study of mathematics, engineering, physics and astronomy?
- What was it about the educational and religious systems in the British Isles that lead to mathematics being the most important field of study in England while physics and chemistry were developed in Scotland?
- Should all graduating seniors be ranked on how well they do on an intense mathematics exam like they do at Cambridge University?
- Who benefited from the focus on automation that started with weaver's looms and ultimately lead to the invention of the world's first computer?

The course requires students to study these questions, and others, by using all available knowledge domains. By traveling to various locations, students gain first-hand understanding of the subtle complications that can arise from asking a seemingly simple question. This is especially important today where we are currently living in an anti-scientific, anti-knowledge culture that embraces technology it does not understand and rejects scientific findings that make it uncomfortable or that might cost money to mitigate.

The structure of the course is not changing as it transitions to an ID course. The students will still be learning to write in the disciplines as they write to learn about the problem they are studying. Their ideas and cultural norms will be challenged by living in and navigating through several different countries. Assignments include:

- Researching a mathematician or scientist from one of the countries we travel through, writing a report on that research, and presenting the results of the report orally in an appropriate setting while on the trip. For example, one year a student gave her report on Alan Turing during Tea at Bletchley Park which is the secret research facility outside of London where his team created the world's first computers in order to break the German encryptions during World War II.
- Researching a city that we stay in during our travel. The student in charge of the city is responsible for navigating the class from the train station to our housing, the various museums and libraries we visit, and having suggestions for the rest of the class on educational opportunities during the free time.
- Eating dinner with the class at a restaurant chosen by a class team. Students will be challenged to eat food they are not familiar with and consuming sufficient calories while doing so.
- Living for three weeks out of luggage that weighs less than 25 pounds. Being responsible for themselves and the wellbeing of other class members in unfamiliar, and often very wet locations.

- Reading and Journaling during the trip in response to daily prompts. The journals are used to track the development of students' thought processes through the course of the trip. Prompts vary from questions asking the students to integrate what they learned that day with the previous readings to soliciting advice on how to improve the course the next time it is offered.

Interdisciplinary Course Proposal

Course number & title GM 303 Historical Roots of Mathematics and Physics

Proposed by Mariah Birgen Date 11/24/2015

Natural Science discipline(s) included Physics, Chemistry, Engineering, Computer Science

Social Science discipline(s) included Political Science, Education, Museum Studies

Humanities/Fine Arts discipline(s) included History, Mathematics

Taught by: X one instructor two or more instructors

ID Criteria	Describe for the proposed course
Courses will contain concepts and skills from the three domains.	examples of included concepts and skills from Natural Science. <ul style="list-style-type: none"> • Study the development of a timepiece that would keep accurate time on a ship • Study the engineering behind the first iron bridge in Iron Bridge, UK • Study the invention of the world's first computer
	examples of included concepts and skills from Social Science. <ul style="list-style-type: none"> • Study the differences in higher education processes in England, Scotland, and Ireland • Study the interaction between religion, politics, and the growth of the sciences in England, Scotland, and Ireland • Study the development of the theory of economics in England, Scotland, and Ireland
	examples of included concepts and skills from Humanities/Fine Arts. <ul style="list-style-type: none"> • Study the historical development of the study of mathematics at Cambridge University. • Study the historical significance of the British Civil War, the Great London Fire, and the Glorious Revolution in the development of scientific study
Courses will include a significant, continuing problem of humankind.	the problem included. <ul style="list-style-type: none"> • How does the study of the Mathematical

	Sciences benefit human societies, political institutions, and modern culture?
ID Goals	Describe for the proposed course
Students will understand the limits and power of disciplines in addressing the phenomenon or problem.	examples of these limits and powers. <ul style="list-style-type: none"> The development of science is subject to historical and political factors including war, poverty, and personal ambition. When a scientist considers this development they often focus on the pure pursuit of knowledge.
Students will develop an holistic understanding of the phenomenon or problem based on the integration of knowledge and tools contributed by various disciplines.	examples of the integration emphasized. <ul style="list-style-type: none"> The development of science needs to be couched in historical and political terms in order to understand the reasons for different scientific emphases in different geopolitical regions. For example, why was mathematics developed in England and physics and chemistry in Scotland?
ID Outcome	Describe for the proposed course teaching strategies that will be used and ways this outcome will be assessed.
Students will use differing perspectives to reach a policy/problem solution.	<ul style="list-style-type: none"> Students research different scientists from different periods so that they can get an understanding of the perspectives that come from different locations and time periods. Students will attend many museum exhibits that have been developed to explain the problem from a local perspective. Specifically, the students will have the opportunity to view part of a lecture given by Einstein on general relativity in Oxford, UK captured on a chalkboard in the Museum of the History of Science, Oxford. The students will travel where the science will be developed to experience the effects of the geography and cultural differences on the development of science.

GM 303: Historical Roots of Math and Physics in the British Isles May 2012

Instructor: Dr. Mariah Birgen

Office: 358 Becker Hall

Phone number: 352-8565 (Office) (831) 440-8932 (Everywhere)

e-mail: mariah.birgen@wartburg.edu

Course Goals

Upon completion of the course the student should have:

1. An experience based understanding of 20th century mathematics and physics.
2. An understanding of how mathematics and physics are part of our cultural heritage and of how society and politics influence the growth and vitality of the disciplines.
3. Gained an appreciation for the struggles some individuals have faced in order to become mathematicians or scientists.
4. Developed a view of the life of professional researchers.
5. An understanding of how political events have changed the centers of activity of the scientific community.
6. Some experience in exploring the historical connections of mathematics and physics with other disciplines such as philosophy, architecture, and computer science.
7. Developed a broader understanding of how our society is different than even that of the British Isles and also an understanding of the great differences within societies.
8. Clarified their views on how our culture and history are so closely tied with the culture and history of these countries.

Course Requirements

Students will be expected to keep a daily journal and to complete an in-depth study of one individual. Each student will give a twenty-minute presentation on the person they studied and write a paper connected with this study. They will be assigned several historical readings connected with the travel areas and they will complete short writing assignments connected with these readings. There will be three shorter papers: one on the scientific or mathematical history of one of the great universities (e.g. Cambridge, Oxford or the University of Dublin) in the British Isles, one on a brief reflection on the history and current status of one of the cities we visit, and finally, one on cultural observations made during the trip. Finally, they will complete short observation papers on each museum visited.

Evaluation

Journals - 100 points Journals will be kept each day of the trip. Students will be expected to keep record of all encounters connected with the history and development of mathematics, science or technology. Students will also be expected to reflect on any cultural differences they experience.

In-depth study - 200 points Students may begin gathering information on an historical figure before the trip. The instructor will meet with them individually at least three times prior to the final draft of the paper. The first will be to discuss sources for their study. The second will be to discuss the focus of their study and to review a basic outline of their report. The third will be a review of a rough draft of their paper. (There may be additional conversations prior to the rough draft if the need arises.) The paper is to be about ten pages long.) The students will also make a 20-minute presentation connected with their person. This will be done at the appropriate city on the trip. (125 points written and 75 points oral)

Short paper on city - 100 points Students will research their selected city discovering some interesting historical facts about the city as well as items of interest to visit in the city. Students will be responsible for leading us from the train or bus station to the lodging as well as choosing a location for one dinner in their selected city.

Short papers on readings - 100 points For the required readings the students will be required to write short reviews. The expectation is that these will be less than a page in length.

Short paper on a university - 100 points The purpose is to reflect in depth on how one of these locations studied during our trip has changed over time. These papers should be 3 to 4 pages in length. Each student will be required to submit a proposal to the instructor. This proposal will need approval prior to the completion of the paper. Some students may elect to complete this paper with another student.

Short paper on cultural observations - 100 points The purpose of this paper is to reflect on the cultural differences and similarities they have observed. The readings and experiences of the trip will be focused to give them many different avenues to take in this endeavor.

Museum Observation papers - 100 points

Discussion group participation - 100 points

Detail Sheet: LS195 Historical Roots of Mathematics and Physics in the British Isles, May 2012

Cities: London, Oxford, Bath, Cambridge, Nottingham, Edinburgh, Glasgow, Dublin.

Mathematicians and Scientists: Newton, Hooke, Boyle, Turing, Sylvester, Babbage, Lovelace, Darwin, Hamilton, Franklin, Crick, Bacon, Faraday, Hardy, Whitehead, Russell, Thompson, Green, and many others.

Accommodations: Mainly youth hostels and home stays. We will stay in few hotels if any.

Food: Breakfast and your evening meal will be provided. On most days you will be responsible for your own noon meal. We will eat most evening meals together

Beverages: You will need to pay for your own drinks.

Travel: We will use the trains mostly. Your fees will cover air train, ferry and buses.

Cost: Estimated \$3800. \$100 of this is contingency.

Leaders: Mariah Birgen

Preparation: We will meet several times during the winter term of 2012. We will become familiar with the history, geography, customs and foods of the British Isles. We will also get to know each other. During this time you will also begin your study of your historical person.

Special note: You will need good walking shoes. We may walk up to 10 miles or more on some days. Most of us will pack in a backpack. It makes moving from trains to hostels easier.

Wartburg Plan: Diversity Across the Curriculum, Writing Intensive

Tentative Schedule

Date	Night Location	Hostel Name	Events
4/30/2012	On Plane		
5/1/2012	London	St Christopher's Inn - Shepherd's Bush	Clockworkers Museum, National Portrait Gallery, Evensong at Westminster
5/2/2012	London	St Christopher's Inn - Shepherd's Bush	Greenwich, British Museum
5/3/2012	London	St Christopher's Inn - Shepherd's Bush	Wren Church Walk, Tower of London?
5/4/2012	Oxford	Nanford Guest House	Visit Oxford University
5/5/2012	Oxford	Nanford Guest House	Explore the town of Oxford
5/6/2012	Iron Bridge	YHA Coalport	Visit oldest Iron Bridge
5/7/2012	Wolverhampton	Homestay	Learn about Wolverhampton
5/8/2012	Bath	YMCA Bath	Hershel Museum of Astronomy
5/9/2012	Bath	YMCA Bath	Stonehenge
5/10/2012	Nottingham	The Acorn Hotel	Green Museum
5/11/2012	Edinburgh	Cowgate	James Clerk Maxwell Hse
5/12/2012	Edinburgh	Cowgate	Explore Edinburgh
5/13/2012	Glasgow	Euro Hostel	Univeristy of Glasgow
5/14/2012	Glasgow	Euro Hostel	10 AM Lord Kelvin Archives
5/15/2012	Dublin	The Times Hostel - College St.	Travel ALL DAY
5/16/2012	Dublin	The Times Hostel - College St.	Trinity College, Guinness Tour
5/17/2012	Manchester	YHA Manchester	TBD
5/18/2012	Cambridge	Cityroomz	2 PM -Cavindish Laboratory
5/19/2012	Cambridge	Cityroomz	Explore Cambridge
5/20/2012	London	ABERCORN HOUSE HOSTEL	Science Museum, Victoria and Albert Museum
5/21/2012	London	ABERCORN HOUSE HOSTEL	Bletchley Park
5/22/2012	London	ABERCORN HOUSE HOSTEL	HP Studio Tour
5/23/2012	Fly out at 3:20 PM		

Interdisciplinary Course Proposal

Course number & title GM 303 Historical Roots of Mathematics and Physics in Germany

Proposed by Brian Birgen Date 11/24/2015

Natural Science discipline(s) included Physics, Chemistry, Engineering, Computer Science

Social Science discipline(s) included Political Science, Education, Museum Studies

Humanities/Fine Arts discipline(s) included History, Mathematics

Taught by: X one instructor two or more instructors

ID Criteria	Describe for the proposed course
Courses will contain concepts and skills from the three domains.	<p>examples of included concepts and skills from Natural Science.</p> <ul style="list-style-type: none"> • Study the scientific method as developed by Kepler to understand the motion of Mars. • Study the mechanics of time keeping pieces and how they have improved over the years. • Study the mechanics of the first calculator as developed by Schickard.
	<p>examples of included concepts and skills from Social Science.</p> <ul style="list-style-type: none"> • Study the motivations for the founding of the Berlin Academy of Sciences by William II. • Study the effects of the Reformation, Counter-Reformation and the Thirty Years War on the development of science, specifically on Kepler's life. • Study the effects of the Nazi Regime on the development of science, specifically on the University of Göttingen. • Study the politics of East Germany and the behavior of the Stasi.
	<p>examples of included concepts and skills from Humanities/Fine Arts.</p> <ul style="list-style-type: none"> • Study the interplay of religion and science and the effect on scientific development and funding. • Study the art and architecture of the large German cathedrals.

Courses will include a significant, continuing problem of humankind.	the problem included. <ul style="list-style-type: none"> How is the development of Science impacted by human societies, and how do societies benefit from the development of science?
ID Goals	Describe for the proposed course
Students will understand the limits and power of disciplines in addressing the phenomenon or problem.	examples of these limits and powers. <ul style="list-style-type: none"> The development of science is subject to historical and political factors including war, poverty, and personal ambition. The type of funding available influences the choices scientists make in their research pursuits.
Students will develop an holistic understanding of the phenomenon or problem based on the integration of knowledge and tools contributed by various disciplines.	examples of the integration emphasized. <ul style="list-style-type: none"> William II was educated in France and when he assumed leadership, he wanted to make Prussia more France-like. During the Third Reich, there was money being spent on weapons research, but little on theoretical research.
ID Outcome	Describe for the proposed course teaching strategies that will be used and ways this outcome will be assessed.
Students will use differing perspectives to reach a policy/problem solution.	<ul style="list-style-type: none"> Students research different scientists from different periods so that they can get an understanding of the perspectives that come from different locations and time periods. Students will attend many museum exhibits that have been developed to explain the problem from a local perspective. Students have homestays arranged in Göttingen (former West Germany) and Eisenach (former East Germany), to learn about the differing perspectives of growing up in the different regimes. The students will travel where the science was developed to experience the effects of the geography and cultural differences on the development of science.

GM 303: Historical Roots of Math and Physics in Germany May 2015

Instructor: Dr. Brian Birgen

Course Goals

Upon completion of this course students will have

- a) an understanding of how mathematics and physics are a part of our cultural heritage and how society and politics influence the development of the disciplines.
- b) gained an appreciation for the struggles some individuals have faced in order to pursue mathematics or science as a field of expertise.
- c) an understanding of how political events have changed the centers of activities for the scientific community.
- d) some experience exploring the historical connections of mathematics and physics with other disciplines such as philosophy, architecture and computer science.
- e) developed a broader understanding of how our society is different than that of Germany and an understanding of the great differences within societies.
- f) clarified view of how our culture and history are closely tied with the culture and history of Germany.

Course Itinerary

This is our intended itinerary for the trip. This may be subject to change due to travel conditions, availability of tours, lodging and a host of other factors.

Sun Apr 26 th	Fly out of Chicago
Mon Apr 27 th	Heidelberg
Tue Apr 28 th & Wed Apr 29 th	Stuttgart
Wed Apr 29 th	Visit Tübingen
Thu Apr 30 th & Fri May 1 st	Hannover
Sat May 2 nd	Kassel
Sun May 3 rd & Mon May 4 th	Göttingen
Tue May 5 th & Wed May 6 th	Leipzig
Wed May 6 th	Visit Dresden
Thu May 7 th , Fri May 8 th & Sat May 9 th	Berlin
Sun May 10 th & Mon May 11 th	Eisenach
Tue May 12 th & Wed May 13 th	München
Thu May 14 th	Visit Bonn
Thu May 14 th & Fri May 15 th	Köln
Sat May 16 th	Frankfurt
Sun May 17 th	Fly out of Frankfurt

Requirements

Students must sign the Financial Responsibility Form, the Venture Education Health Form and the Venture Education Conditions of Participation and provide a copy of their passport before they are officially enrolled in the course.

Course Work

Students will

- keep a daily journal
- complete an in-depth study of one individual
- give a twenty-minute presentation on the person they studied
- write a paper connected with this study
- read several historical excerpts and complete short writing assignments connected with these readings
- write a paper on the history of one of the German cities we will be visiting
- write a paper on cultural observations made during the trip
- complete short observation papers on each museum visited
- participate in group discussions

Evaluation:

Journal – 100 points

Journals will be kept each day of the trip. Students will be expected to keep a record of all encounters with the history and development of mathematics, science or technology. Students will also be expected to reflect on any cultural differences they experience.

In-depth study – 200 points

Students may begin gathering information on a historical figure before the trip. The instructor will meet with them individually at least three times prior to the final draft of the paper. The first will be to discuss sources for their study. The second will be to discuss the focus of their study and their basic outline of their report. The third will be a review of a rough draft of their paper. (There may be additional conversations prior to the rough draft if the need arises.) The paper is to be approximately ten pages long. The student will also make a 20-minute presentation with their person. This will be done at the appropriate city on the trip. (125 points written and 75 points oral)

Short papers on readings – 100 points

For 10 of the required readings the students will be required to write short reviews. The expectation is that these will be less than a page in length.

Short paper on a German City – 100 points

The purpose is to reflect in depth on how one of these locations studied during the trip has changed over time. These papers should be 3 to 4 pages in length. Each student will be assigned a city.

Short paper on cultural observations – 100 points

The purpose of this paper is to reflect on the cultural differences and similarities they have observed. The readings and experiences of the trip will be focused to give them many different avenues to take in this endeavor.

Museum Observation papers – 100 points

For 10 of the required activities the students will be required to write a paper on their observations. This should focus on what the student learned and experienced. The expectation is that these will be less than a page in length.

Discussion Group Participation – 100 points