

Term Information

Effective Term Spring 2020

General Information

Course Bulletin Listing/Subject Area Mathematics
Fiscal Unit/Academic Org Mathematics - D0671
College/Academic Group Arts and Sciences
Level/Career Undergraduate
Course Number/Catalog 2010S
Course Title Intersections of Mathematics and Society: Hidden Figures
Transcript Abbreviation Hidden Figures
Course Description This course examines the intersections of race, gender, and mathematics as it relates to the accomplishments of the African-American mathematicians featured in the book. We analyze how mathematics and the advancement of American society were intertwined from WWII to the Space Race and focus on understanding the mathematical tools used by human computers and scientists at Langley during this time.
Semester Credit Hours/Units Fixed: 3

Offering Information

Length Of Course 14 Week, 8 Week
Flexibly Scheduled Course Never
Does any section of this course have a distance education component? No
Grading Basis Letter Grade
Repeatable No
Course Components Lecture
Grade Roster Component Lecture
Credit Available by Exam No
Admission Condition Course No
Off Campus Sometimes
Campus of Offering Columbus

Prerequisites and Exclusions

Prerequisites/Corequisites A grade of C- or above in Math 1148 and Math 1149; or a grade of C- or above in Math 1150; or credit for Math 150; or Math Placement Level L.
Exclusions
Electronically Enforced Yes

Cross-Listings

Cross-Listings

Subject/CIP Code

Subject/CIP Code 27.0101
Subsidy Level Baccalaureate Course
Intended Rank Sophomore, Junior, Senior

Requirement/Elective Designation

General Education course:
Service-Learning (new)

Course Details

Course goals or learning objectives/outcomes

- Exposure to different careers in the mathematical sciences.
- Understand historical and contemporary mathematical tools and ideas.
- Critically examine the relationship between mathematical innovation, technological advancement, and society.
- Use intersectionality as a framework to critically examine how the intersections of race, gender, and socioeconomic status influence access to mathematical communities and opportunities in STEM.
- Effectively communicate mathematics to an audience of varying ages and mathematical backgrounds.
- Make connections between concepts and skills learned in class and service-learning activities.
- Demonstrate an understanding of the mathematical communities in which service-learning activities take place.
- Reflect on the impacts of mathematical outreach.

Content Topic List

- Intersections of Mathematics and Society: World War II
 - When Computers Were Human: Mathematical Tools during World War II
 - Mathematical Tools: from Slide Rules to TI-84s
 - Mathematical Tools: Understanding Wind Tunnels
 - Analytic Geometry: Mathematics of Space Travel
 - Intersections of Mathematics and Society: Executive Orders and Advancement at Langley
- Yes

Sought Concurrence

Attachments

- Service-Learning Designation Request Form.docx: Service Learning request
(Other Supporting Documentation. Owner: Husen, William J)
- AAAS Concurrence email - 8:27:2019.txt: AAAS Concurrence
(Concurrence. Owner: Husen, William J)
- WGSS Concurrence - 8:28:2019.txt: WGSS Concurrence
(Concurrence. Owner: Husen, William J)
- Math_2010S_syllabus.docx: Syllabus
(Syllabus. Owner: Husen, William J)
- Math 2010S GE Rationale.docx: GE Rationale
(Other Supporting Documentation. Owner: Husen, William J)
- Math 2010S GE Assessment.docx: GE Assessment
(Other Supporting Documentation. Owner: Husen, William J)
- GE Scoring Rubric.pdf: GE Scoring Rubric
(Other Supporting Documentation. Owner: Husen, William J)
- Additional Service.docx: Additional Service Learning Details
(Other Supporting Documentation. Owner: Husen, William J)

Comments

- Additional Service Learning Details Added. Intended rank changed to reflect 2000-level mathematics course.

Course number and associated documents updated to reflect "S" designation. *(by Husen, William J on 11/12/2019 12:37 PM)*

- Returned at department's request to address NMS Panel recommendations *(by Oldroyd, Shelby Quinn on 10/22/2019 01:37 PM)*
- This course should be numbered 2010S since it is requesting S designation. Please add on the form. *(by Vankeerbergen, Bernadette Chantal on 09/23/2019 10:14 AM)*

Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Husen, William J	09/17/2019 09:51 AM	Submitted for Approval
Approved	Husen, William J	09/17/2019 09:51 AM	Unit Approval
Approved	Haddad, Deborah Moore	09/17/2019 10:00 AM	College Approval
Revision Requested	Vankeerbergen, Bernadette Chantal	09/23/2019 10:14 AM	ASCCAO Approval
Submitted	Husen, William J	09/23/2019 11:41 AM	Submitted for Approval
Approved	Husen, William J	09/23/2019 11:41 AM	Unit Approval
Approved	Haddad, Deborah Moore	09/23/2019 11:53 AM	College Approval
Revision Requested	Oldroyd, Shelby Quinn	10/22/2019 01:37 PM	ASCCAO Approval
Submitted	Husen, William J	11/12/2019 12:37 PM	Submitted for Approval
Approved	Husen, William J	11/12/2019 12:38 PM	Unit Approval
Approved	Haddad, Deborah Moore	11/12/2019 01:03 PM	College Approval
Pending Approval	Jenkins, Mary Ellen Bigler Hanlin, Deborah Kay Oldroyd, Shelby Quinn Vankeerbergen, Bernadette Chantal	11/12/2019 01:03 PM	ASCCAO Approval
Pending Approval	Sweigart, Claire Germaine	11/12/2019 03:17 PM	Ad-Hoc Approval

Syllabus: Math 2010S

Intersections of Mathematics and Society: Hidden Figures

GE **Goals:** This course fulfills the service-learning Open Option GE requirement. Students will gain and apply academic knowledge from the course through civic engagement with the local Columbus Community through STEM programming at the Columbus Metropolitan Library (CML) branches.

Expected Learning Outcomes:

1. Students make connection between concepts and skills learned in an academic setting and community-based work.
2. Students demonstrate an understanding of the issues, resources, assets, and cultures of the community in which they are working.
3. Students evaluate the impacts of the service-learning activity.

Course Description

In this course we will critically examine the intersections of race, gender, and mathematics as it relates to the accomplishments of the African-American mathematicians featured in the book *Hidden Figures: the American Dream and the Untold Story of the Black Women Mathematicians Who Helped Win the Space Race* by Margot Lee Shetterly. In particular, we will contextualize the historical climate in which these accomplishments occurred and analyze how mathematics and the advancement of American society were intertwined from World War II to the Space Race. Finally, we will focus on understanding the mathematical tools used by human computers and scientists at Langley during pre and post-World War II.

Course Goals

The main learning goals for the course included below will influence the Portfolio, Final Project, the Mini-Projects, quizzes, reflections, and course discussions.

- Goal 1.** Exposure to different careers in the mathematical sciences.
- Goal 2.** Understand historical and contemporary mathematical tools and ideas.
- Goal 3.** Critically examine the relationship between mathematical innovation, technological advancement, and society.
- Goal 4.** Use intersectionality as a framework to critically examine how the intersections of race, gender, and socioeconomic status influence access to mathematical communities and opportunities in STEM.
- Goal 5.** Effectively communicate mathematics to an audience of varying ages and mathematical backgrounds.
- Goal 6.** Make connections between concepts and skills learned in class and service-learning activities.
- Goal 7.** Demonstrate an understanding of the mathematical communities in which service-learning activities take place.

Goal 8. Reflect on the impacts of mathematical outreach.

Course Materials

Required Text

Hidden Figures: the American Dream and the Untold Story of the Black Women Mathematicians Who Helped Win the Space Race by Margot Lee Shetterly, ISBN: 978-0-06-236359-6

Available for purchase at [Barnes & Noble](#) or [Amazon](#) and other book sellers

Suggested Text

Power in Numbers: Rebel Women in Mathematics by Talithia Williams, ISBN 978-1631064852

Available for purchase at [Barnes & Noble](#) or [Amazon](#) and other book sellers

Course Prerequisites

A grade of C- or above in Math 1148 and Math 1149; or a grade of C- or above in Math 1150; or credit for Math 150; or Math Placement Level L.

Grading

Assignment Category	Percentage of Final Grade
Hidden Figures Project	30%
Mini-Projects	25%
Communication	15%
Service-Learning Portfolio	10%
Service-Learning Reflections	10%
Discussion Posts/Quizzes	10%
Total	100%

Hidden Figures Project

The final project will be broken into three components with all three components totaling 30% of the course grade. These components will be included in the final portfolio to be submitted at the end of the semester. A more detailed description of each component can be found in the table below. Complete rubrics for these projects will be made available throughout the course.

Part	Percentage	Description
I. Hidden Figure Analysis	10%	In this project students will describe how their research figure meets the criteria of being a hidden figure using intersectionality as a framework for their discussion.
II. Mathematical Description	10%	In this project students will describe the mathematical tools used by their hidden figure. Students should also research connections between these modern tools and their historical roots. In addition, student will describe the

		relevance of the work being done by the hidden figure to their company and/or society at large.
III. Presentation	10%	The first two parts of the research project will culminate in a final in-class presentation during the last two weeks of class and a poster presentation at the Hidden Figures Showcase.

Mini-Projects

There will be two mini-projects throughout the semester, each worth 12.5% of the course grade. These mini-projects will focus on examining a mathematical tool that was integral to the advancements related to the Space Race discussed in the Hidden Figures text. Mini-Project 1 will focus on a mechanical tool, the slide rule, while Mini-Project 2 will focus on an analytical tool, the geometry involved in orbital flight.

Communication

The communication grade will be based on presentations given at the various CML branches, attendance, and meaningful contributions to in-class discussion.

Service-Learning Portfolio

The end of course assignment will be a Service-Learning Portfolio worth 10% of the course grade and turned in during finals week. The portfolio will be comprised of reflections from the service-learning activities, STEM programming materials from the service-learning with CML, and documents from the Hidden Figures Project. Thus, the portfolio will reflect a polished version of the major course assignments throughout the semester. In addition, students will write a cover letter for the portfolio that prompts them to reflect on the mathematical communities we study in class and the mathematical communities they are creating with their service activities in the CML branches.

Service-Learning Reflections

There will be multiple reflection activities throughout the semester in order to connect the service-learning activities with the content covered during class. Each short reflection will typically be 1 to 2 pages in length.

Discussion Prompts/Quizzes

There will be 5 quizzes and 5 discussion prompts, each worth 1% of the total course grade. The quizzes will be based on the readings and weekly course topics. The discussion prompts will be one-page responses to inspired by different themes explored throughout the course.

Percentage Grading Scale

A	A-	B+	B	B-	C+	C	C-	D+	D	E
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[100, 93]	[93, 90]	(90, 87]	(87, 83]	(83, 80]	(80, 77]	(77, 73]	(73, 70]	(70, 67]	(67, 60]	< 60
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Tentative Course Schedule

Week	Topic	Assignments/Events
1	No Class	
	Hidden Figures in Mathematics	
	Introduction to Service-Learning with CML	Perceptions of Mathematics Survey Due
2	Intersections of Mathematics and Society: World War II	Hidden Figure Project: Subject Ranking Due
	Introduction to Intersectionality	Hidden Figure Project: Groups Assigned
		Discussion Prompt 1 Due; Reading Quiz 1 (HF Ch.1,2,3,4) Due
	Civil Rights in World War II: "The Double V"	Service-Learning Reflection 1 Due
3	No Class: Labor Day	
	When Computers Were Human: Mathematical Tools during World War II	Hidden Figures Project: Interview Questions Due
		Discussion Prompt 2 Due; Reading Quiz 2 (HF Ch.5,6) Due
	Mathematical Tools: from Slide Rules to TI-84s	
4	Computing with Slide Rules	
	Mathematical Communities	Exponents, Radicals, and Logarithms Worksheet Due
		Discussion Prompt 3 Due; Reading Quiz 3 (HF Ch.7,8,9)
	Dorothy Vaughn: Opportunities in STEM	
5	Mathematical Tools: Understanding Wind Tunnels	
	What about the Men at NACA?	Mini Project 1 Due
		Discussion Prompt 4 Due; Reading Quiz 4 (HF Ch.10,11) Due
	Mary Jackson: Advocacy in STEM	
6	Analytic Geometry: Mathematics of Space Travel	
	Analytic Geometry: Mathematics of Space Travel	Hidden Figure Analysis Due

		Discussion Prompt 5 Due; Reading Quiz 5 (HF Ch.12,13,14) Due
	Understanding Trajectories: Go, No Go	
7	Katherine Johnson: Belonging in STEM	Geometry Worksheet Due
		Discussion Prompt 6 Due; Reading Quiz 6 (HF Ch.15,16) Due
	FORTRAN: Mathematical Training to Computer Programming	Service Learning Reflection 2 Due
	No Class: Autumn Break	
8	Communicating Mathematics: Technical Reports	Mathematical Description Consultations Scheduled
	Communicating Mathematics: Science Writing and Breaking things down for a General Audience	Mini Project 2 Due CML Presentations Signup
		Discussion Prompt 7 Due; Reading Quiz 7 (HF Ch.17,18) Due
	Sputnik: from NACA to NASA	
9	Civil Rights and the Space Race: A Tale of Two Virginias	CML Presentations Begin
	Mathematical Access: Mentors and Trail Blazers	Mathematical Description Consultation Deadline
		Discussion Prompt 8 Due; Reading Quiz 8 (HF Ch.19,20) Due
	Christine Darden: On Their Shoulders	
10	Evolution of the West Computers	
	Intersections of Mathematics and Society: Executive Orders and Advancement at Langley	Mathematical Description Due
		Discussion Prompt 9 Due; Reading Quiz 9 (HF Ch.21) Due
	Katherine Johnson and Orbital Flight: "Get the Girl to Check the Numbers"	
11	Mathematics of Getting to the Moon: Apollo 11 and Apollo 13	
	Mathematics of Getting to the Moon: Apollo 11 and Apollo 13	Service Learning Reflection 3 Due
		Discussion Prompt 10 Due; Reading Quiz 10 (HF Ch.22,23) Due
	Intersectionality and the Women in Hidden Figures	
12	No Class: Veterans Day Observed	

	Civil Rights and the Space Race	
		Reading: HF Epilogue Due
	Being a “Hyphen”-Scholar: Career Compromise in Hidden Figures	
13	Hidden Figures Revealed	Group Presentations
14	Hidden Figures Revealed	Group Presentations
	No Class: Thanksgiving Break	Service Learning Reflection 4 Due
	No Class: Indigenous Peoples’ Day Observed	
15	Hidden Figures Revealed	Group Presentations
	Last Day of Classes Intersections of Math and Society: World War II to Present	Hidden Figures Showcase (tentatively CML Main Library)

Academic Misconduct

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term “academic misconduct” includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct <http://studentlife.osu.edu/csc/>.

Mental Health Statement

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student’s ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life’s Counseling and Consultation Service (CCS) by visiting ccs.osu.edu or calling [614- 292-5766](tel:614-292-5766). CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower. You can reach an on call counselor when CCS is closed at [614-292-5766](tel:614-292-5766) and 24 hour emergency help is also available through the 24/7 National Suicide Prevention Hotline at 1-800-273- TALK or at suicidepreventionlifeline.org.

Disability Services

The University strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability (including mental health, chronic or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact information: slds@osu.edu; 614-292-3307; slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.

Title IX Statement

Title IX makes it clear that violence and harassment based on sex and gender are Civil Rights offenses subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories (e.g., race). If you or someone you know has been sexually harassed or assaulted, you may find the appropriate resources at <https://titleix.osu.edu> or by emailing the Ohio State Title IX Office at titleix@osu.edu.

Diversity Statement

The Ohio State University affirms the importance and value of diversity in the student body. Our programs and curricula reflect our multicultural society and global economy and seek to provide opportunities for students to learn more about persons who are different from them. We are committed to maintaining a community that recognizes and values the inherent worth and dignity of every person; fosters sensitivity, understanding, and mutual respect among each member of our community; and encourages each individual to strive to reach his or her own potential. Discrimination against any individual based upon protected status, which is defined as age, color, disability, gender identity or expression, national origin, race, religion, sex, sexual orientation, or veteran status, is prohibited.

Math 2010S - GE Rationale

a. What processes are in place to allow students to reflect on and make connections between concepts and skills learned in an academic setting and community-based work?

Students will be assigned multiple reflection activities throughout the semester where they will be prompted to connect the service learning activities with the content covered during class. The first reflection will be immediately after their service learning orientation during the first week of class. Other reflections will occur before the service learning begins and after it ends.

In addition to this, students will have to fill out surveys with a reflection component after each service-learning presentation given at CML branches. Lastly, we will utilize discussion board features weekly on the learning management system Carmen that will allow us to compare and contrast the mathematical communities and mathematical access available to those in the Hidden Figures text with patrons of CML.

b. What aspects of the course ensure that the students learn about the issues, resources, assets, and cultures of the community in which they are working?

Students will receive an orientation during the first week of classes to the CML and the Young Mind's Initiative. When the STEM presentations are scheduled mid-semester, students will be given information about the demographics of the patrons of a particular CML branch requesting programming. Thus, the content of the programming can be structured accordingly with the local community in mind.

c. How does the course promote reflection on and evaluation of the impacts of the service-learning activity?

Students will complete reflection assignments throughout the course before, during, and after the service learning activities at CML. There will also be a portfolio where students will compile all of the reflections throughout the semester, and will be prompted to write a cover letter that addresses the connections between the concepts and skills learned in class and their community work over the course of the semester, along with the impact of the final event showcase of the local Hidden Figures.

Math 2010S - GE Assessment Plan

a. Please explain the end of course assignment for your course.

The end of course assignment will be a Service Learning Portfolio worth 10% of the course grade. The portfolio will be comprised of reflections from the service-learning activities, STEM programming materials from the service-learning with CML, and documents from the Hidden Figures Project. Thus, the portfolio will reflect a polished version of the major course assignments throughout the semester. In addition, students will write a cover letter for the portfolio that prompts them to reflect on the mathematical communities we study in class and the mathematical communities they are creating with their service activities in the CML branches.

The Portfolio will include the following components.

- I. Cover Letter
- II. Service Learning Reflections
 - A. Post CML Service-Learning Orientation Reflection 1 (week 2)
 - B. Service Learning Reflection 2 (week 7)
 - C. Pre-service Service Learning Reflection 3 (week 11)
 - D. Presentation Service-Reflection Forms (weeks 9-13)
 - E. Pre-Showcase Service-Learning Reflection (week 13)
- III. Hidden Figures Project
 - A. Hidden Figures Analysis
 - B. Hidden Figures Mathematical Description
 - C. Hidden Figures Poster
- IV. STEM Programming Materials
 - A. Slide Rule Presentation
 - B. Geometry Presentation
 - C. Hidden Figures Presentation
 - D. Post-program Forms

For GE Assessment purposes, this portfolio will be scored on the ASCC Assessment Panel approved scoring rubric.

b. Once you collect the data on student achievement, how will you use it to make course improvements?

The initial offering of this course will be team taught. Throughout the semester, the instructors will be holding regular meetings to discuss the course and student progress week-to-week. We will also meet with representatives from CML to discuss the STEM programming before the students sign up for presentations. This will allow us to make improvements while the course is running and to also make sure the course content serves to best facilitate presentations that will meet the needs of CML.

After the course is concluded, the instructors will meet to debrief and summarize overall student achievement, identify aspects of the course that need to be improved, and identify the components of the course that lead to significant student learning and achievement as assessed by the portfolios and in-class discussions. We will consult with representatives from CML about the reception of the STEM programming by patrons and modify the service-learning model as necessary. These modifications will be influenced by student reflections of the service learning and surveys of the presentations by attendants.

c. How will the information be archived and made available to future instructors?

All course documents, including syllabus, two mini-project documents, contact lists, instructors notes, assessment tools, and Service Learning Portfolios will be made electronically available to future instructors via Box. In addition, the pilot instructors will be available as advisors/mentors to future instructors to help them develop their own iteration of the course.

Scoring Rubric:

Assessment of Service-Learning GE Courses

This scoring rubric is designed to help instructors and members of relevant committees assess how well students are meeting the ELOs as reflected in end-of-course reflection assignments. Students are not expected to have acquired all the knowledge, skills, and attitudes/perspectives listed under the various ELOs in order to complete the assignment satisfactorily. At a minimum, students are expected to meet Milestone 2.

	Capstone (4)	Milestone (3)	Milestone (2)	Benchmark (1)
(ELO1) Students make connections between concepts and skills learned in an academic setting and community-based work	Connects, analyzes, and extends knowledge (facts, theories, etc.) from course content to service-learning activity.	Connects and analyzes knowledge (facts, theories, etc.) from course content to service-learning activity.	Begins to connect knowledge (facts, theories, etc.) from course content to service-learning activity.	Expresses a limited, unclear connection of course content to service-learning activity.
(ELO2) Students demonstrate an understanding of the issues, resources, assets, and cultures of the community in which they are working.	Articulates a thorough and complex understanding of the issues, resources, assets, and cultures of the community in which he/she is working.	Identifies and clearly understands the issues, resources, assets, and cultures of the community in which he/she is working.	Identifies the issues, resources, assets, and cultures of the community in which he/she is working.	Shows minimal awareness of the issues, resources, assets and cultures of the community in which he/she is working.
(ELO3) Students evaluate the impacts of the service-learning activity.	Thoroughly evaluates the impacts of the service-learning experience on himself/herself, the organization, and also considers the long term impact of the work on the community.	Evaluates the impacts of the service-learning experience on himself/herself and the contributions that he/she made to the goals and aims of the organization.	Evaluates the impacts of the service-learning experience on himself/herself.	Minimally evaluates the impacts of the service-learning experience.

Service-Learning Designation Request Form

1. Has this class previously received an S-Designation? **No**
2. Is this class always taught with a service-learning component? **Yes**

Course Content/Planning

3. Please describe the planned service activities to be performed by students in this course.

We have developed a service-learning model with the Columbus Metropolitan Library (CML) where our students will deliver original STEM programming related to the course to patrons of various branches of CML. Student presentations will be based on course mini-projects related to mathematical tools and group research projects investigating Hidden Figures in the Greater Columbus Community. The group research projects will also be showcased in a final event, *Hidden Figures Revealed*, open to the general public and tentatively located at the main branch of CML.

4. Please describe how the planned service activities reflect priorities and stated goals/needs of the community partner(s).

Priorities of CML

We will be partnering with the Columbus Metropolitan Library (CML). The CML system includes a main branch and twenty-two branch locations that serve, in particular, the K-12 student population throughout the Columbus Metropolitan area. CML's vision is to create "a thriving community where wisdom prevails" via their mission to "inspire reading, share resources, and connect people." They serve 10 school districts in the Columbus Metropolitan area by providing programs and resources to students and parents to help with success in school.

CML is an urban library system. In 2017, they signed a statement from the Urban Libraries Council affirming its commitment to racial and social equity. Part of this statement includes the library's commitment to "eliminating racial and society equity barriers in library programs, services, policies, and practices" and to "creating and maintaining an environment of diversity, inclusion, and respect both in our library systems and in all aspects of our community role." In addition to valuing diversity, the CML has recently supported STEM (science, technology, engineering, and mathematics) initiatives, including a March 2019 Central Ohio STEM Expo at a local high school and a Girls in Science Program in the summer of 2018.

Goals/Needs of CML

In their 2019 Strategic Plan, the CML outlined a high priority initiative called Young Minds. This initiative consists of three main themes: Ready for Kindergarten, Third Grade Reading, and High School

Graduation. Our partnership with CML contributes to the ‘career and college preparation’ component of their High School Graduation theme and aligns with their strategic focus to engage the community via partnerships with higher education.

We have consulted with Kelli Bates, the Young Minds Program Leader, and developed an original service-learning model with CML that serves their initiatives but also facilitates the learning objectives of our course. Traditionally, the Ohio State service-learning model with CML involves students spending hours volunteering in CML’s Homework Help Centers. The model we have discussed with Kelli is unique: our students will use what they have learned in the course to develop a series of presentations that will in turn be given by student groups at the various library branches. Thus, rather than helping with routine homework problems, our students will be providing the library with original hands-on STEM programming that will shine a light on ‘math in real life.’

5. Service-learning activities are all based on agreements between three parties, each of whom has specific goals/expectations/responsibilities that are necessary to make it an effective service-learning experience.

Please describe goals/expectations/responsibilities for:

a. Faculty

The lecturers will model the creation of the initial STEM presentations via two in-class mini-projects on mathematical tools. The lecturers will also provide consultation for the Hidden Figures Analysis research project. Part of this consultation will include converting aspects of the research project into programming suitable for a K-12 audience.

b. Students

Students will be expected to develop and present STEM programming at multiple Columbus Metropolitan Library (CML) branch locations and participate in the end-of-semester *Hidden Figures Revealed* showcase. Students will have access to mathematical tools, AV equipment, handouts, and posters for their presentations.

c. The community partner(s)

Quoting from our letter of support from the Columbus Metropolitan Library:

Columbus Metropolitan Library (CML) will deliver an in-class presentation to introduce our Young Minds strategy, provide an overview of service-learning at CML, and discuss our expectations for interactions with our customers. We will provide logistical support via a contact person at each hosting location to schedule presentations, introduce the presenters, and track students’ service-learning hours.

6. Please describe your plans for sustainability and departmental support for offering this service-learning on a continuing basis.

This course will be offered as a permanent elective from the Department. It will function as a special topics course that covers the intersections of mathematics and contemporary society, with Hidden Figures being the first theme.

After the initial pilot semester, the course materials and CML contacts will be available to future instructors of the course. As designed, the course also aligns with on-going Departmental efforts to connect math and industry and to improve diversity and inclusion in STEM. These efforts have broad Departmental support from both administrators and faculty.

With regards to the service-learning component, based on our initial consultations with the CML, their Young Minds Initiative is an integral part of their long-term strategic plan and thus our service-learning model is compatible and suitably flexible to work with future iterations of the course.

Course Goals

7. How does the service activity connect with the academic content of the course and how is this content in turn enhanced by the service component of the course?

Our students will be providing original STEM programming to CML branches to support their Young Minds Initiative. This programming will be focused on mathematical tools and local Hidden Figures, which are the focus of three major course projects. More explicitly, these presentations will focus on two mathematical tools, each the source of a mini-project: a mechanical tool, the slide rule, which predates our modern calculators, and an analytical tool, geometry, which helps to understand issues involved in orbital flight. They will also focus on the Hidden Figures in the text, along with the Hidden Figures students are investigating in the Greater Columbus Community.

Since feedback from these major course assignments will be used to create the programming that constitutes the service activities, the course content will align well with service component of the course. Conversely, we will be discussing the importance of access to mathematical communities for the Hidden Figures in the course. The students will be creating their own mathematical community in the local CML branches. The final service activity, the *Hidden Figures Revealed* showcase, also celebrates and calls attention to these communities. Thus the service itself will provide a modern perspective on the creation of mathematical communities and emphasize the importance of mathematical communication which is one of our primary learning objectives.

GE Rationale

a. What processes are in place to allow students to reflect on and make connections between concepts and skills learned in an academic setting and community-based work?

Students will be assigned multiple reflection activities throughout the semester where they will be prompted to connect the service learning activities with the content covered during class. The first reflection will be immediately after their service learning orientation during the first week of class. Other reflections will occur before the service learning begins and after it ends.

In addition to this, students will have to fill out surveys with a reflection component after each service-learning presentation given at CML branches. Lastly, we will utilize discussion board features weekly on the learning management system Carmen that will allow us to compare and contrast the mathematical communities and mathematical access available to those in the Hidden Figures text with patrons of CML.

b. What aspects of the course ensure that the students learn about the issues, resources, assets, and cultures of the community in which they are working?

Students will receive an orientation during the first week of classes to the CML and the Young Mind's Initiative. When the STEM presentations are scheduled mid-semester, students will be given information about the demographics of the patrons of a particular CML branch requesting programming. Thus, the content of the programming can be structured accordingly with the local community in mind.

c. How does the course promote reflection on and evaluation of the impacts of the service-learning activity?

Students will complete reflection assignments throughout the course before, during, and after the service learning activities at CML. There will also be a portfolio where students will compile all of the reflections throughout the semester, and will be prompted to write a cover letter that addresses the connections between the concepts and skills learned in class and their community work over the course of the semester, along with the impact of the final event showcase of the local Hidden Figures.

GE Assessment Plan

a. Please explain the end of course assignment for your course.

The end of course assignment will be a Service Learning Portfolio worth 10% of the course grade. The portfolio will be comprised of reflections from the service-learning activities, STEM programming materials from the service-learning with CML, and documents from the Hidden Figures Project. Thus, the portfolio will reflect a polished version of the major course assignments throughout the semester. In addition, students will write a cover letter for the portfolio that prompts them to reflect on the mathematical communities we study in class and the mathematical communities they are creating with their service activities in the CML branches.

The Portfolio will include the following components.

- I. Cover Letter
- II. Service Learning Reflections
 - A. Post CML Service-Learning Orientation Reflection 1 (week 2)

- B. Service Learning Reflection 2 (week 7)
 - C. Pre-service Service Learning Reflection 3 (week 11)
 - D. Presentation Service-Reflection Forms (weeks 9-13)
 - E. Pre-Showcase Service-Learning Reflection (week 13)
- III. Hidden Figures Project
- A. Hidden Figures Analysis
 - B. Hidden Figures Mathematical Description
 - C. Hidden Figures Poster
- IV. STEM Programming Materials
- A. Slide Rule Presentation
 - B. Geometry Presentation
 - C. Hidden Figures Presentation
 - D. Post-program Forms

- b. Once you collect the data on student achievement, how will you use it to make course improvements?

The initial offering of this course will be team taught. Throughout the semester, the instructors will be holding regular meetings to discuss the course and student progress week-to-week. We will also meet with representatives from CML to discuss the STEM programming before the students sign up for presentations. This will allow us to make improvements while the course is running and to also make sure the course content serves to best facilitate presentations that will meet the needs of CML.

After the course is concluded, the instructors will meet to debrief and summarize overall student achievement, identify aspects of the course that need to be improved, and identify the components of the course that lead to significant student learning and achievement as assessed by the portfolios and in-class discussions. We will consult with representatives from CML about the reception of the STEM programming by patrons and modify the service-learning model as necessary. These modifications will be influenced by student reflections of the service learning and surveys of the presentations by attendants.

- c. How will the information be archived and made available to future instructors?

All course documents, including syllabus, two mini-project documents, contact lists, instructors notes, assessment tools, and Service Learning Portfolios will be made electronically available to future instructors via Box. In addition, the pilot instructors will be available as advisors/mentors to future instructors to help them develop their own iteration of the course.

Additional Service-Learning Details

1. Groups present at least four times onsite at the libraries and they must give a presentation from each of the three main categories: (1) a presentation based on the Hidden Figures in the book; (2) a presentation based on the local Hidden Figure; and (3) a presentation based on one of the mathematical tools covered in class. This way students will present at least twice in one category.
2. At the libraries, the anticipated audience would primarily include students in grades 6-12 that participate in the homework help center and various after school programming. When consulting with the Columbus Metro Library (CML), they stated student participation in the homework help center and programming can vary semester-to-semester and branch-to-branch, but an accurate picture of library usage among patrons is known after a few weeks into the semester. Therefore, near the beginning of the semester, instructors will work with CML to identify those branches that have high participation among the targeted age-group.
3. During the first-week of the course, students will have a presentation from the CML giving an overview of service-learning at CML and the range of audience they can expect. In addition, weekly discussions would also incorporate mathematical communication and presenting to a diverse audience. For example, students will complete weekly online discussion board posts on Thursdays. For example, the following prompt: "How would you describe the C, D, R, and K scales on the slide rule to a high school student?" would lead to an in-class discussion about the ideas the students came up with in addition to best practices for conveying information about the slide rule, while also leaving us room to discuss computations with these scales in further detail.
4. How the presentations be graded: Instructors will visit at least one of each group's library presentation for a formal evaluation. Their evaluation will be based on a rubric which will be completed before the semester begins. In addition to this formal evaluation, students will complete reflections after each presentation of their individual performance and their groups performance which will be included in the service learning portfolio.
5. Instructors will evaluate at least one of each group's library presentations. We anticipate providing mostly formative assessment for most of the library presentations.
6. The Service learning rationale and course goals mention that student presentations "will be based on course mini-projects related to mathematical tools and group research projects investigating Hidden Figures in the Greater Columbus Community." The wording is vague and could imply either that students are presenting in the Greater Columbus Community or are presenting about "Hidden Figures" of the Greater Columbus Community.
7. As mentioned above, students are required to present to the Greater Columbus Community (via various library branches) and present about their local Hidden Figures (as one of the three presentation categories).

From: "Skinner, Ryan" <skinner.176@osu.edu>
Date: Wednesday, August 28, 2019 at 9:06 AM
To: "Edmonds, Ranthony A.C." <edmonds.110@osu.edu>
Cc: "Johnson, John H." <johnson.5316@osu.edu>, "Drake, Simone" <drake.194@osu.edu>
Subject: Re: Meeting to discuss concurrence for Hidden Figures course

Dear Ranthony and John,

AAAS is happy to confirm concurrence for Intersections of Mathematics and Society at this time.

If you would like to meet on a Tuesday or Thursday afternoon (4-5pm), to address this course or any other matters that may concern our two programs, I can make myself available.

Best,

Ryan Skinner
Associate Professor
School of Music
Department of African American and African Studies
The Ohio State University

Director of Undergraduate Studies (AAAS)
Faculty member of the University Senate

Affiliated Faculty in French and Italian and Germanic Languages and Literature

Author of Bamako Sounds: The Afropolitan Ethics of Malian Music (University of Minnesota Press, 2015)

From: "Edmonds, Ranthony A.C." <edmonds.110@osu.edu>
Date: Tuesday, August 27, 2019 at 2:29 PM
To: Ryan Skinner <skinner.176@osu.edu>
Cc: "Johnson, John H." <johnson.5316@osu.edu>, Simone Drake <drake.194@osu.edu>
Subject: Meeting to discuss concurrence for Hidden Figures course

Hello Dr. Skinner,

We are following up on an earlier email we sent this past Spring 2019 semester about obtaining a concurrence from AAAS for our course, Intersections of Mathematics and Society: Hidden Figures. Initially, you inquired about additional references outside of the Hidden Figures text we would be using, and our general plan for how the course would address the intersectional, historical, political, and sociological aspects of the subject matter.

We would like to set up a meeting (30-45 minutes) with you in the near future to discuss these points at your convenience. Between the two of us, we are most available on Tuesdays from 12:30pm-3:00pm and 4:00pm-5:00pm and Thursdays from 12:30pm-2:00pm and 4:00pm-5:00pm. Are you available to meet with us during these blocks this Thursday August 29 or the following Tuesday September 3?

We are attaching an updated syllabus for the course. Note that we have decided to offer the course for the first time in the Spring 2020 semester.

-Best-

Ranthony and John

The Ohio State University
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“The only way to learn mathematics is to do mathematics.” Paul Halmos

From: Winnubst, Shannon <winnubst.1@osu.edu>
Sent: Wednesday, August 28, 2019 3:10 PM
To: Edmonds, Ranthony A.C.
Cc: Johnson, John H.
Subject: Re: Request for concurrence for Hidden Figures Course

Dear Ranthony,

I am very happy to offer concurrence on behalf of the Department of Women's, Gender & Sexuality Studies.

As we discussed yesterday, please alert me when the class begins enrolling, as I think you would do well to advertise it heartily through both WGSS and Comparative Studies, among other departments across ASC.

All my best,
Shannon

Shannon Winnubst
Chair & Professor
Department of Women's, Gender & Sexuality Studies
Affiliated Faculty, Department of Comparative Studies
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286 University Hall 230 N. Oval Mall, Columbus, OH 43210
614.292.3915 Office
winnubst.1@osu.edu
Pronouns: she/her/hers

From: "Edmonds, Ranthony A.C." <edmonds.110@osu.edu>
Date: Wednesday, August 28, 2019 at 11:24 AM
To: "Winnubst, Shannon" <winnubst.1@osu.edu>
Cc: "Johnson, John H." <johnson.5316@osu.edu>
Subject: Re: Request for concurrence for Hidden Figures Course

Hi Shannon,

The two GE categories where this class fits best is (1) Service Learning – open option hours (2) Social Diversity in the US.

The syllabus has not changed in its content. In fact it is largely the same as what we sent last Spring. What is different is that we attended the Course Design Institute in May from the UITL and thus refined our learning objectives and the assignments. Everything is a bit more explicit in this version of the syllabus, though of course it is still a draft.

Please let us know if you have any other questions!

-Best-

Ranthony and John

The Ohio State University
Ranthony A.C. Edmonds, Ph.D.

Ross Assistant Professor
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"The only way to learn mathematics is to do mathematics." Paul Halmos

From: "Winnubst, Shannon" <winnubst.1@osu.edu>
Date: Wednesday, August 28, 2019 at 9:55 AM
To: "Edmonds, Ranthony A.C." <edmonds.110@osu.edu>
Cc: "Johnson, John H." <johnson.5316@osu.edu>
Subject: Re: Request for concurrence for Hidden Figures Course

Dear Ranthony & John,

I continue to support this class wholeheartedly. Can you tell me which specific GE you are pursuing? Also, has this syllabus changed significantly from the one we approved last term? If so, can you indicate those changes, perhaps by highlighting them?

Many thanks,
Shannon

Shannon Winnubst
Chair & Professor
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From: "Edmonds, Ranthony A.C." <edmonds.110@osu.edu>
Date: Wednesday, August 28, 2019 at 9:49 AM
To: "Winnubst, Shannon" <winnubst.1@osu.edu>
Cc: "Johnson, John H." <johnson.5316@osu.edu>
Subject: Request for concurrence for Hidden Figures Course

Hello Shannon,

We are writing to request a concurrence from WGSS for our course Intersections of Mathematics and Society: Hidden Figures. As we will be exploring the intersections of the race, gender, and socioeconomic status of the women featured in the text as it relates to their mathematical accomplishments, we wanted to ensure that we had the support from your department as we work through the process of this class becoming a GE.

A current syllabus is attached.

-Best-

Ranthyony and John

The Ohio State University

Ranthyony A.C. Edmonds, Ph.D.

Ross Assistant Professor

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