MAT 503 - History of Mathematics
W 4:25 – 7:10

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Office Hours: Tuesday and Thursday from 9:15 to 10:45 a.m. and from 3:15 to 3:45 p.m. Wednesday 3:00 to 4 p.m. Others by appointment.
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Course Description: This course will cover selected topics from the History of Mathematics. Many great mathematicians will be studied including Hippocrates, Euclid, Archimedes, Heron, Cardano, Newton, the Bernoulli Brothers, Euler, Gauss, and others. Mathematics problems will be approached using the methods and knowledge of the era studied. A solid background in undergraduate mathematics is required.

Student Learning Outcomes: Throughout this semester we will study mathematics topics from a historic point of view. The topics, for the most part, should be familiar so we will focus our discussion on historical contexts and connections. Upon completion of this course the students will be able to:

1. discuss the human side of mathematics and its development. Mathematics has always been part of human cultures, but its role has changed throughout history.

2. construct an overview of mathematics, so they can see how various courses fit together and where the important ideas come from.

3. analyze and critique connections to mathematics in a historical context to the mathematics learned today.

4. compose and report on topics in mathematics.

5. formulate how one might use the history of mathematics in their future.

6. interpret some contributions of female and non-western mathematicians to the mathematics discipline.

7. differentiate and calculate mathematical problems from both a contemporary and historical approach.

This course will be run primarily in a seminar style, which places a great deal of responsibility on you. I expect that you will keep up with reading assignments, turn work in on time, organize your presentations in a professional way, and participate fully in small group and class discussions. The quality of your experience in this course depends on *everyone* striving to meet these expectations.

Required Texts:
- *Journey Through Genius*, William Dunham, Penguin 1991
- *Math Through the Ages*, Berlinghoff and Gouvea, Oxton House Publishers, 2002
- *Mastering the Art of Oral Presentations: Winning Orals, Stand-Up Presentations 1st Edition, Kindle Edition,* John P Stewart and Don Fulop, Wiley, March 27, 2019 (This text is optional)

The Writing Center –FHG Library:

The Writing Center's purpose is to help you become a better writer. Here is what you can expect at the Writing Center:

- A free, 30-minute or 60-minute session with a trained and highly qualified writing tutor.
- A friendly environment offering one-to-one attention; and
- Discussions about planning, drafting, revising, and proofing papers and projects for any class.

I encourage you to take any type of writing assignment to The Writing Center, where you will get help developing writing skills vital to your success. You can make an appointment be going online to http://www.wcupa.edu/academics/writingcenter/ and clicking on "online scheduling system". You should plan to take advantage of this benefit, as the appointment schedule routinely fills up rapidly.

I have scheduled a one-hour workshop with the writing center for week five. Here they will help you in understanding the format for an annotated bibliography and how to find research articles for your topic.

Presentation Skills

Good presentation skills, both individual presentation skills and team presentation skills, will be discussed at the beginning of the semester. These skills include, but are not exclusive to, the following:

- Own and organize your time.

Be cognizant of your allotted time and organize your presentation to fit. Plan to include time for a brief and purposeful introduction, a discussion of elucidated key points, mathematics engagement activities and time for the attendees to work on the math problems, and time for follow-up questions at the end.

- Be aware of your body language.

Eye contact - look others in the eye when talking
Facial expressions - smiling lightens the room and eases your nerves.
Posture and shoulder positioning – Keep your head high and shoulders back. Keep your body open, positioning your shoulders towards the audience.
Hands - Remove them from your pockets and try to avoid rubbing them together and touching your neck and shoulders, which conveys anxiety and discomfort.

- Engage in active listening and do not start answering questions until you fully understand them.
- Know when to stop talking
- Don't use a lot of fillers
- Bring positive energy to the room
- Be able to think on your feet, and pivot if necessary
- Do not just read your slides or prepared notes
- Know your material and your mathematics and be confident
- Expect questions and feedback. Be prepared to support your ideas without being defensive but remain open to feedback. If you don't know an answer, it's okay to say, "Great question! I'm going to look into that." If you try to be an expert on something that you're clearly not, you'll quickly lose credibility.
- Think about the big picture
- Be comfortable and authentic
- If you're working as a team have your duties divided equally and give your team members support and allow them their time

The best presentations are not always the most perfect or polished. No matter how much you practice, the presentation will inevitably be different on the big day. But that's okay. Be able to solve problems and communicate. Finally, humor and vulnerability go a long way.

Students may reference the book *Mastering the Art of Oral Presentations: Winning Orals, Stand-Up Presentations 1st Edition, Kindle Edition* as needed. After each presentation, the team, if it's a team presentation, or the individual, if it's an individual presentation, will be given a brief written evaluation with suggestions for improvement. This will help them to implement these suggestions the next time they make a presentation.

Evaluation of Students

Your work in the course will be evaluated through three exams, two group presentations, one individual presentation, weekly written assignments, a research paper, and attendance and participation based on the reading and written assignments.

1. **Exams -** There will be three exams in the course. Two will be scheduled during the semester and the third will be held during the final examination period. 50% of your exams will be generated by the students. The other 50% will come from the work we do in class and mathematics we encounter in the readings. (SLOs 3, 4 and 7)

2. **Group Presentations -** There are two group presentations that each student will complete. Students will work in groups of two to complete their presentations or by themselves. The presentations will be based on the 25 sketches in the Math through the Ages textbook. Each group will prepare PowerPoint slides (around 10 to 15 slides) and will, according to a schedule, present this presentation to the class. Please see D2L course content for specific guidelines and the grading rubric. These presentations are both subject and general specific for both speaking and writing. **Either presentation, or both, can be recorded and added to your ePortfolio.** It is expected that audience members will pose thoughtful questions to the presenters. I expect that we will have time for 3-5 questions for each presentation. (SLOs 1, 2 and 6)

3. **Individual Presentation -** There is one individual presentation to the class about your research paper. This presentation will be a short presentation (around 15 minutes) about the content of your research paper. A brief synapsis of your paper will be given to each student. Please see D2L course content for specific guidelines and the grading rubric. These presentations are both subject and general specific. **This presentation can be recorded and added to your ePortfolio.** (SLOs 4 and 5)

4. **Daily Assignments -** Each week, we will spend the first half of one class discussing a reading you will do outside of class. We will cover "The History of Mathematics in a Large Nutshell" in one class and then we will cover 10 chapters of *Journey through Genius.* Prior to each class each student must carefully complete the assigned reading and bring to class **at least one page** of notes summarizing the main ideas of the **entire** chapter. (SLOs 4 and 6)

   Additionally, students will submit the following to me in their assignments folder.

   - The summary of the main ideas of the **entire** chapter. This must be **at least one page.** This summary must be uploaded to your assignments folder in D2L. It will be graded, and you will receive feedback about it so you may improve on your subsequent submissions.

   - Three thoughtful "exam" questions for the chapter. See Group Presentation Guidelines on D2L.
     - When submitting questions, you **MUST** include the page number from the book of where you got the question.

- You **MUST** include answers to your questions. There must be 4 possible answers for each question with one of them being correct if a MC question.
- These questions must be uploaded to your assignments folder in D2L. They will be graded, and you will receive feedback about them.

Please allow yourself at least 3-4 solid hours to read a chapter, write up notes, and create questions.

5. **Research Paper -** Each student will complete one research paper. This assignment is part of the **literacy requirement for graduate students in the department of mathematics**. Specific instructions are detailed below, and a scoring rubric is on D2L. **The finished paper will be uploaded to your ePortfolio.** (SLOs 1 to 6)

- Topics can be chosen from the below or suggested to and approved by the instructor. The paper is to focus on a subject, problem or issue that spans more than one generation of mathematicians. Students with minors are encouraged to select a topic which intersects with the minor.
- Length should be 6 to 8 pages (typed, double-spaced, with 1-inch margins and 12-point font)
- Specify the focus of your paper. Your paper should have good structure, correct spelling and grammar, and proper quoting/paraphrasing practices.
- Your paper should be written so that it can be understood by your peers in the class.
- References, citations, and footnotes should follow the MLA guidelines as taught by the English Department. You may also use the Chicago or APA writing guidelines.
- Plagiarism of any form will not be tolerated. Students who submit another person's work as their own will be reported and receive a 0 for their research paper.
- **Don't forget the Writing Center!**

Annotated Bibliography: As part of the research process, you will be asked to submit an annotated bibliography during the semester. This will count as part of your overall research paper grade. (SLOs 2, 3, 4)

An annotated bibliography is an organizing tool that is helpful when working on a research project. An effective annotated bibliography is used to compile research sources in one location and provide the researcher with quick access to the information contained in each source. Your annotated bibliography will consist of the sources that you have deemed relevant to your topic and/or question(s) of inquiry.

- Cite the source in proper MLA format or APA or Chicago format. The citations should be organized in alphabetical order by the author just as in an MLA References page or APA or Chicago format.
- Follow with a brief annotation (paragraph) that summarizes the source (approx. 3-5 sentences). You may quote from the source, but do not copy and paste the abstract. Ideally, all the annotation should be in your own words.
- In one paragraph, explain the source's relevance and importance to your issue.

Both the research paper and the annotated bibliography will be uploaded to your assignments fold on D2L. You will receive feedback from me and may make corrections and submit your paper a second time on the last day of class before the final exam.

Possible Topics for the Research Paper

- History of perfect numbers
- Comparison of Algebra texts: turn of the century vs. today
- History of math education
- How our view of early history of math has changed in last 100 years

- History of prime numbers
- History of quadratic numbers
- History of probability
- History of combinatorics
- Mathematics of early astronomy
- Geometry vs. arithmetic in ancient Greece
- Maria Agnesi
- Reimann Hypothesis
- History of the binomial theorem
- History of statistics
- How New was new math
- American Mathematics prior to 1875
- The influence of social needs on the uses of mathematics
- History of Chinese mathematics
- Mathematics and the Catholic Church
- Emmy Noether
- Changing notation of function
- Calculus priority dispute
- History of linear programming
- History of numerical analysis
- What the Chinese knew about the Pythagorean Theorem and when
- Fermat's Last Theorem and Sophie Germain
- History of statistics in sports
- Women in Computer Science
- Navigation and Mathematics
- Mathematics of calendars
- History of Hindu mathematics
- History of Japanese mathematics
- Mathematics and art
- History of Islamic mathematics
- Mathematics and music

6. **Attendance/Participation – Readings and Presentations**

At the beginning of each "readings" class, I will randomly choose a subset of students to summarize the "big ideas" of the section. Everyone will be selected at least once during the semester. (You may use your notes.) After this overview, students will meet in small groups to answer more detailed questions based on the reading. One person from each group will report back to the class a summary of the group's discussion. This role should be rotated among the group members. After the groups' report back, students will have an opportunity to work on mathematics problems like what was discussed in the chapter. These mathematics problems (or problems like them) will appear on the exams. All mathematics problems will be reviewed and presented before the end of class by either myself or one of the students. Mathematical Writing will be taught throughout the semester by myself, and feedback will be given on all writing assignments.
Throughout the student presentations, each audience member is expected to ask at least two questions.

Grading: Your numerical course grade will be determined as follows:

Three Exams	51% (17% each)
Presentations (2)	18% (9% each)
Daily Assignments (includes test questions and chapter summaries)	10% (5 for test q and 5 for chap sum)
Research Paper (grade includes components like annotated bibliography, draft critiques, and speed dating)	15 % (10 for paper and 5 for bib)
Attendance/Participation (includes activity participating in groups and asking questions during group presentations)	6%

Your letter grade in the course will be assigned as follows:

Grade	**A**	**A-**	**B+**	**B**	**B-**	**C+**	**C**	**F**
Percentage	93-100	90-92	87-89	83-86	80-82	77-79	70-76	0-69

Make-up Policy

1. **Make-up tests may be taken if the student contacts me on the day of the test or immediately after it to explain a serious reason for the absence.** If a student must take a make-up test, it should be taken within one week of the student's return to class, and it absolutely must be taken before the next test is given. **It is the student's responsibility to discuss a make-up test time with the instructor** as soon as the student returns to class.
2. Hand in homework follows the same policy as tests if there is any.

Conduct

Both teachers and students have the responsibility to be **courteous and respectful** to others in the class. Everyone is expected to listen when someone else is speaking to the class. Questions from the students help me know what you understand and what is causing you problems and are always welcomed. If anyone disrupts the class with constant private conversations, they **will be asked to leave the room.** If you are late for class, please try to enter the room without distracting the other student's attention and be seated on the closest available seat. Always try to be **on time! If a student needs to leave the class early on any specific day, please let me know before class starts.**

EXTRA HELP

I am always willing to give extra help to anyone who asks me. If you think you will need extensive tutoring, there may be summer tutors. Another excellent way to learn is to form study groups with other students in your class. **The ultimate responsibility is yours. Please note that I will be always available if you need my help. Please see me to set up an appointment.**

CLASS CANCELATION POLICY

If I am unable to meet a class, I will a) notify you in class prior to that effect or b) an official class cancellation notification will be sent via email. All other postings announcing the cancellation of this class are to be considered unofficial and are to be ignored.

Week 1	Introductions/ Course Syllabus/Historical Problems/Form Groups Homework ☐ Read MTA – History in a Nutshell ☐ Outline and test questions must be submitted to DROPBOX on D2L by 4:30 p.m. the day of our next meeting. ☐ Bring a copy of your outline and your MTA book to our next class. ☐ Each group will generate top three lists of sketches from the group below: ○ Sketches: 2 - 13
Week 2	MTA – History in a Nutshell (Exam 1) Sample Presentation – MTA Sketch 1 (Exam 1) Group Presentation Preparations Homework ☐ **Review research topic list on syllabus and e-mail top three choices.** ☐ Read JTG – Chapter 1 ☐ Outline and test questions must be submitted to DROPBOX on D2L by 4:30 p.m. the day of our next meeting. ☐ Bring a copy of your outline and your JTG book to class.
Week 3	**Research topics assigned.** JTG – Chapter 1 (Exam 1) Presentations of MTA Sketches (Exam 1)

	Homework ☐ Read JTG – Chapter 2 ☐ Outline and test questions must be submitted to DROPBOX on D2L by 4:30 p.m. the day of our next meeting. ☐ Bring a copy of your outline and your JTG book to class.
Week 4	JTG – Chapter 2 (Exam 1) Presentations of MTA Sketches (Exam 1, 2) Homework ☐ Read JTG – Chapter 3 ☐ Outline and test questions must be submitted to DROPBOX on D2L by 4:30 p.m. the day of our next meeting. ☐ Bring a copy of your outline and your JTG book to class. Review for Exam 1 ☐ MTA - History in a Nutshell, ☐ Appropriate Sketches ☐ JTG – Chapter 1 – 2
Week 5	Exam 1 **Library Research Session FHG Rm. 309.** **Attendance and Participation will be taken at session.**
Week 6	JTG – Chapter 3 (Exam 2) Presentations of MTA Sketches 6, 8 (Exam 2) Homework ☐ Read JTG – Chapter 4 ☐ Outline and test questions must be submitted to DROPBOX on D2L by 4:30 p.m. the day of our next meeting. ☐ Bring a copy of your outline and your JTG book to class. ☐ **Annotated Bibliography (See Annotated Bibliography Guidelines for details)**
Week 7	JTG – Chapter 4 (Exam 2) **New groups assigned.** **Possible movie** **Annotated Bibliography Due** Homework ☐ Read JTG – Chapter 5 ☐ Outline and test questions must be submitted to DROPBOX on D2L by 4:30 p.m. the day of our next meeting. ☐ Bring a copy of your outline and your JTG book to class.
	Spring Break
Week 8	JTG – Chapter 5 (Exam 2) Presentations of MTA Sketches (Exam 2) Homework ☐ Read JTG – Chapter 6 ☐ Outline and test questions must be submitted to DROPBOX on D2L by 4:30 p.m. the day of our next meeting. ☐ Bring a copy of your outline and your JTG book to class.
Week 9	JTG – Chapter 6 (Exam 2) Presentations of MTA Sketches (Exam 3) Review for Exam 2 ☐ MTA – Sketches 5 – 6, 8, 10, 17, 18 ☐ JTG – Chapters 3 – 6
Week 10	Exam 2

	Release time for paper. Homework ☐ Read JTG – Chapter 7 ☐ Outline and test questions must be submitted to DROPBOX on D2L by 4:30 p.m. the day of our next meeting. ☐ Bring a copy of your outline and your JTG book to class.
Week 11	JTG – Chapter 7 (Exam 3) Presentations of MTA Sketches (Exam 3) Homework ☐ Read JTG – Chapter 8 ☐ Outline and test questions must be submitted to DROPBOX on D2L by 4:30 p.m. the day of our next meeting. ☐ Bring a copy of your outline and your JTG book to class. ☐ **ROUGH DRAFT OF RESEARCH PAPER DUE NEXT WEEK FOR PEER REVIEW!**
Week 12	JTG – Chapter 8 (Exam 3) **Peer Review** Homework ☐ Read JTG – Chapter 9 ☐ Outline and test questions must be submitted to DROPBOX on D2L by 4:30 p.m. the day of our next meeting. ☐ Bring a copy of your outline and your JTG book to class. ☐ **Research Paper DUE NEXT WEEK**
Week 13	JTG – Chapter 9 (Exam 3) **SUBMIT RESEARCH PAPER** Homework ☐ Read JTG – Chapter 10 ☐ Outline and test questions must be submitted to DROPBOX on D2L by 4:30 p.m. the day of our next meeting. ☐ Bring a copy of your outline and your JTG book to class.
Week 15	JTG – Chapter 10 (Exam 3) Presentations of MTA Sketches 22 (Exam 3) Review for Exam 3 ☐ MTA Sketches 19 - 22, 25 ☐ JTG – Chapters 7 – 10 Homework ☐ **Revise paper if desired**
	Exam 3 **PAPER revisions due**

<u>Calculators:</u>
Calculators will be allowed in class, graphing or scientific, and may be used on the final exam.

Final Exam Date: Wednesday May 8th from 4:30 to 6:30. If anyone has a conflict then it will be from 6 to 8 pm.

References:

Bertsekas, Dimitri P., (2002) Ten Simple Rules for Mathematical Writing. MIT Press, https://www.mit.edu/~dimitrib/Ten_Rules.pdf

Bowater, L and Yeoman, K (2012) Science Communication: A Practical Guide for Scientists. Wiley, West Sussex.

Brown, Tony, and Jennifer Brown. (2014) *Teaching Advanced Language Skills through Global Debate: Theory and Practice*. Georgetown University Press. http://www.jstor.org/stable/j.ctt13x0dn6.

Harvard College Writing Project, Guides to Teaching Writing: https://writingproject.fas.harvard.edu/pages/teaching-guides

Hughes, Rebecca. (2013) *Teaching and Researching Speaking*. 2nd ed. Applied Linguistics in Action.

Levasseur, D. G., Dean, K. W., & Pfaff, J. (2004). Speech pedagogy beyond the basics: A study of instructional methods in the advanced public speaking course. *Communication Education*, *53*(3), 234-252

Palmer, Erik. (2011) *Well Spoken: Teaching Speaking to All Students*. Portland, Me.: Stenhouse Publishers.

Teaching Tolerance, Writing for Change (diversity) activities:
https://www.tolerance.org/magazine/publications/writing-for-change

Statements Common to All WCU Graduate Syllabi

ACADEMIC & PERSONAL INTEGRITY

It is the responsibility of each student to adhere to the university's standards for academic integrity. Violations of academic integrity include any act that violates the rights of another student in academic work, that involves misrepresentation of your own work, or that disrupts the instruction of the course. Other violations include (but are not limited to): cheating on assignments or examinations; plagiarizing, which means copying any part of another's work and/or using ideas of another and presenting them as one's own without giving proper credit to the source; selling, purchasing, or exchanging of term papers; falsifying of information; and using your own work from one class to fulfill the assignment for another class without significant modification. Proof of academic misconduct can result in automatic failure and removal from this course. For questions regarding Academic Integrity, the No-Grade Policy, Sexual Harassment, or the Student Code of Conduct, students are encouraged to refer to the Department Graduate Handbook, the Graduate Catalog, the Ram's Eye View, and the University website at www.wcupa.edu.

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

West Chester University is committed to providing equitable access to the full WCU experience for Golden Rams of all abilities. Students should contact the Office of Educational Accessibility (OEA) to establish accommodations if they have had accommodations in the past or if they believe they may be eligible for accommodations due to a disability, whether or not it may be readily apparent. There is no deadline for disclosing to OEA or for requesting to use approved accommodations in a given course. However, accommodations can only be applied to future assignments or exams; that is, they can't be applied retroactively. Please share your letter from OEA as soon as possible so that we can discuss accommodation. If you have concerns related to disability discrimination, please contact the university's ADA Coordinator in the Office of Diversity, Equity, and Inclusion or 610-436-2433.

EXCUSED ABSENCES POLICY

Students are advised to carefully read and comply with the excused absences policy, including absences for university-sanctioned events, contained in the WCU Graduate Catalog. Please note that the "responsibility for meeting academic requirements rests with the student," that this policy does not excuse students from completing required academic work, and that professors can require a "fair alternative" to attendance on those days that students must be absent from class in order to participate in a University-Sanctioned Event.

REPORTING INCIDENTS OF SEXUAL VIOLENCE

West Chester University and its faculty are committed to assuring a safe and productive educational environment for all students. To comply with the requirements of Title IX of the Education Amendments of 1972 and the University's commitment to offering supportive measures in accordance with the new regulations issued under Title IX, the University requires faculty members to report incidents of sexual violence shared by students to the University's Title IX Coordinator. The only exceptions to the faculty member's reporting obligation are when incidents of sexual violence are communicated by a student during a classroom discussion, in a writing assignment for a class, or as part of a university-approved research project. **Faculty members are obligated to report sexual violence or any other abuse of a student who was, or is, a child (a person under 18 years of age) when the abuse allegedly occurred to the person designated in the University Protection of Minors Policy.** Information regarding the reporting of sexual violence and the resources that are available to victims of sexual violence is set forth at: Diversity, Equity, and Inclusion at WCU website

INCLUSIVE LEARNING ENVIRONMENT AND ANTI-RACIST STATEMENT

Diversity, equity, and inclusion are central to West Chester University's mission as reflected in our Mission Statement, Values Statement, Vision Statement and Strategic Plan: Pathways to Student Success. We disavow racism and all actions that silence, threaten, or degrade historically marginalized groups in the U.S. We acknowledge that all members of this learning community may experience harm stemming from forms of oppression including but not limited to classism, ableism, heterosexism, sexism, Islamophobia, anti-Semitism, and xenophobia, and recognize that these forms of oppression are compounded by racism.

Our core commitment as an institution of higher education shapes our expectation for behavior within this learning community, which represents diverse individual beliefs, backgrounds, and experiences. Courteous and respectful behavior, interactions, and responses are expected from all members of the University. We must work together to make this a safe and productive learning environment for everyone. Part of this work is recognizing how race and other aspects of who we are shape our beliefs and our experiences as individuals. It is not enough to condemn acts of racism. For real, sustainable change, we must stand together as a diverse coalition against racism and oppression of any form, anywhere, at any time.

Resources for education and action are available through WCU's Office for Diversity, Equity, and Inclusion (ODEI), DEI committees within departments or colleges, the student ombudsperson, and centers on campus committed to doing this work (e.g., Dowdy Multicultural Center, Center for Women and Gender Equity, and the Center for Trans and Queer Advocacy).

Guidance on how to report incidents of discrimination and harassment is available at the University's Office of Diversity, Equity and Inclusion.

EMERGENCY PREPAREDNESS

All students are encouraged to sign up for the University's free WCU ALERT service, which delivers official WCU emergency text messages directly to your cell phone. For more information, visit WCU Alert. To report an emergency, call the Department of Public Safety on 610-436-3311.

ELECTRONIC MAIL POLICY

It is expected that faculty, staff, and students activate and maintain regular access to university provided e-mail accounts. Official university communications, including those from your instructor, will be sent through your university e-mail account. You are responsible for accessing that mail to be sure to obtain official University communications. Failure to access will not exempt individuals from the responsibilities associated with this course.