

## MATH 105 - SPRING 2022

### Mathematics Applications, Appreciation & Skills

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Office Hours: MTWR 12:00 – 12:50 pm

My office hours are listed above, and they're posted on my office door.

If those are inconvenient, please let me know and we'll find a time to meet that is convenient for each of us.

Section 3 ~ MT R 3:00 – 3:50 pm CCC 212

Prerequisite: Math 90 or a suitable placement score.

Text: The Heart of Mathematics: An Invitation to Effective Thinking, 3<sup>rd</sup>-ed. by Edward Burger & Michael Starbird.

*The Heart of Mathematics* introduces students to the most important and interesting ideas in mathematics while inspiring them to actively engage in effective mathematical thinking.

#### Course Outline:

In this course, we will explore some of the greatest ideas within the realm of mathematics - comparable to the works of Shakespeare and Plato. Mathematics is an artistic endeavor, which is shaped by each person's imagination and creativity.

There are three basic goals for this course:

1. *To help you attain a better understanding of some significant mathematical ideas by recognizing pattern and design.*
2. *To sharpen your comprehension and analytical skills for life issues that are beyond the realm of mathematics.*
3. *To develop a fresh perspective and outlook on your view of the world.*

In addition, we will also explore ways

4. *To help you better and more concisely communicate mathematical ideas to others and*
5. *To help you learn how to work more effectively in groups...*

#### Critical Thinking Learning Objectives:

This course is part of a pilot program that focuses on the intention to develop in students critical thinking skills across the disciplines.

In mathematics, critical thinking helps us identify mathematical problems, transform them into solvable problems, and then solve them using appropriate techniques.

The pilot program adds the following learning outcomes for students to the course:

- The intention is to have students learn to recognize critical thinking as a process of identifying, evaluating and constructing mathematical reasoning in deciding what conclusions to draw or what techniques to apply to resolve a problem
- The intention, also, is to have students learn to recognize that “perfect practice” and persistence are critical to developing and strengthening mathematical ability and acuity.
- The intention is to have students learn to demonstrate persistence, perseverance and resourcefulness in mastering mathematical concepts and techniques.

This course satisfies the Quantitative Literacy Requirement. In particular, it addresses the following:

#### Quantitative Literacy Learning Outcomes

- Select, analyze, and interpret appropriate numerical data used in everyday life in numerical and graphical format.
- Identify and apply appropriate strategies of quantitative problem solving in theoretical and practical applications.
- Construct a conclusion using quantitative justification.

For more information see <http://www.uwsp.edu/acadaff/Pages/generalEducation.aspx> (Links to an external site.)

**Calculators:** This course will be more concerned with mathematical ideas than formulas or computations, and so for the most part, calculators will not be necessary, but they will be handy. Your smart phone probably has a good enough calculator for most of the work we will do. However, **you will need an actual, approved calculator for the exams.**

We will **RIGOROUSLY** cover only part of the text, as there is more than a semester's worth of material presented therein. This will include about six different sections of topics. The "bottom line," so to speak, is to gain an appreciation for mathematics and to discover the power of mathematical thinking in your everyday life.

*“...It is essential in this course that you have an open mind, a piqued curiosity, and a willingness to explore and discover pattern and design...”*

Minimal mathematical background will be assumed.

## SECTIONS TO BE COVERED:

Here are the sections that I intend to cover. There may be some adjustment based on time available.

### M105 Tentative Score Sheet

Assignment	Score
<b>CH 1: Fun and Games</b>	<b>183</b>
Densa	/10
Autobiography	/10
Surfing the syllabus and book	/40
Polya, frog, Hanoi	/15
Evoking techniques of thinking	/45
First day puzzles & Conundrums	/43
Chapter 1 Review	/20
<b>CH 2: Number Contemplation</b>	<b>579</b>
Pigeonhole Principle Exercise 1	/42
Pigeonhole Principle Exercise 2	/50
Fibonacci Ratios	/25
Fibonacci Golden Body Ratios	/20
Fibonacci Rabbits	/55
Fibonacci Nim	/25
Prime Factors & Investigations	/100
Prime infinity	/10
Modular clocks & algorithms	/40
Check that UPC digit	/90
RSA coding	/27
Irrationality Proofs	/21
Periodic Decimals	/50
Chapter 2 Review	/50
<b>CH 4: Geometric Gems</b>	<b>292</b>
GEOMETRIC GEMS	/100
GEOMETRIC GEMS ppt	/50
Symmetry and pinwheels	/20
Rigid symmetry and patterns	/20
Escher type pattern	/20
Polygons	/20
Platonic solids	/22
Great circles & spatial reality	/40
<b>CH 5: Contortions of Space</b>	<b>49</b>
Define Topology	/25
Mobius Bands and Klein Bottles	/24
<b>CH 6: Fractals and Chaos</b>	<b>36</b>
Chaos and fractals	/16
Sierpinski triangles	/20
<b>CH 7: Taming Uncertainty</b>	
Odds and Probabilities	

### Attendance Policy:

You are required to **attend each class period and participate** as these elements form a part of your course grade. You actually will have to pay attention, ask questions, and try stuff. You are expected to **attend the tutoring sessions, as required**, as well. It is your responsibility to obtain notes and information for the class times that you miss. When circumstances arise to prevent you from coming to class, you should let me know prior to the absence, usually BEFORE the day in question (detailed texts and emails are ways to do so).

Permission to miss tests, exams and/or presentation days will only be allowed for extreme circumstances, and you will be required to provide sufficient reason and appropriate documentation for the intended absence. In the case of an intended absence, all arrangements for make-up quizzes and exams must be made before the scheduled exam time. Absences for serious illness, family emergencies, military duty or University sponsored activities may be excused provided you inform me, timeously. Homework assignment due dates may be adjusted for excused absences.

*More than 4 unexcused absences will affect and lower your grade.*

### Academic Misconduct Policy:

You are expected to complete the coursework for this course. Failure to complete any assignment will result in zero points being awarded for that assignment. Late assignments will lose points as per my discretion. Also read the following link:

<http://www.uwsp.edu/admin/stuaffairs/rights/rightsChap14.pdf> (Links to an external site.)

**Evaluation:** There will be a total of 1000 points for the semester.

**Homework (50%):** (500 out of 1000 pts.)

Homework will be assigned for each section covered in class and will be due as posted or stated. Your success in learning the material presented requires that you complete each assignment and do not fall behind. We will use class time to go over some of your questions regarding the assignments. We will not, however, have enough class time to answer all questions that arise. Your textbook and classmates are also valuable resources. Homework grades will reflect daily participation, accuracy and effort.

**Exams (30%):** There will be 3 take home exams, each worth 120 points (**weighted to 30% of your grade**). Actual dates will be announced as they are confirmed.

Again, make-up exams and accommodations will be available only in very special cases and will be handled on an individual basis. Notification and arrangements in such cases must be made prior to the examination.

**NOTE:** *Once an exam has been passed out, it can only receive a grade if returned to me.*

**Research Project / Poster Session Presentations (20%):** (200 out of 1000 pts.)

This project is an opportunity to explore and discover a mathematical topic on your own.

You will select a mathematical topic outside of those covered in our class, learn any necessary background information and then investigate the topic.

This may be a topic that is related to your discipline, for instance, or you may choose to depict a mathematical idea in a creative way (via a song or poem, for example).

You may work individually or in a group of two (collaboration is encouraged - it's more fun!).

*Each student will submit an abstract of the intention for their project, write a final paper on their findings, and present a Powerpoint display at the end of the semester (during the last few class periods and the final exam period: Monday, May 16th, 10.15am-12:15pm.*

Some interim reports on the progress of the project might be collected during the semester.

Discussion and further details will be provided during class.

#### Grading and Grading Scale:

Homework:	500 pts. = 50%
Exams:	300 pts. = 30%
Research Project:	200 pts. = 20%
Total:	1000 pts. = 100%

Course letter grades will be based on the scale below, with + and - marks within each range:

A: 90 - 100
B: 80 - 89
C: 70 - 79
D: 65 - 69
F: below 65

I may use my discretion to raise a student's grade if her/his final grade does not reflect the quality of her/his work in the course (for example, from a low exam score early in the course). I will not, however, use such discretion to lower a student's final grade.

#### Student COVID-19 Symptom and Exposure Disclosure

##### Preparation

- Please watch Student and Staff **Training Videos** about COVID-19 and complete daily Student Wellness Check-in protocols. Electronic forms are located on the UWSP website/homepage re- COVID-19 Information and Resources. You should complete them prior to or during your first week of class.
- Periodically, review this information to **keep yourself updated** about new developments.
- Please complete the Student COVID-19 Symptoms and Exposure Disclosure **reporting form when appropriate**. This electronic form is located on the UWSP website.

## Prevention

### Face Coverings:

- At all UW-Stevens Point campus locations, the wearing of face coverings is mandatory in all buildings, including classrooms, laboratories, studios, and other instructional spaces.
- Face coverings have been required by the university's administration in all classrooms and buildings. They are mandatory based on the advice of medical professionals because, combined with physical distancing and other measures, they help protect both the health of others and the person wearing the face covering.
- Any student who cannot wear a face covering due to their own concerns or health condition that impacts their use of a face covering should contact the Disability and Assistive Technology Center to discuss and seek a formal accommodation in classes.
- Flexibility will be exercised in the early days of the semester as the campus community adjusts to this requirement, but please do not abuse the instructor's discretion.
- Please note that unless everyone is wearing a face covering, in-person classes cannot take place. This is university policy and not up to the discretion of individual instructors.
- If you refuse to wear a face covering and you refuse to leave class, the only option, currently, is to cancel the day's class for everyone and report you to the Dean of Students. This will begin a disciplinary process, one result of which may be that you are officially withdrawn from this course.
- Yes, failure to adhere to this requirement could result in formal withdrawal from the course.

### Social distancing

- Maintain a minimum of 6 feet of physical distance from others whenever possible.
- Do not congregate in groups before or after class; stagger your arrival and departure from the classroom, lab, or meeting room.
- Wash your hands or use appropriate hand sanitizer regularly and avoid touching your face.
- Please maintain these same healthy practices outside the classroom.

## Management

### Symptoms and exposure

- Please proactively monitor your own health each day using this screening tool <https://eforms.uwsp.edu/form.aspx?pid=437e63f1-d262-48a8-9537-504eb3d5ceb2&formid=b2094535-fab1-4025-b5d7-f2d38ea819e8&nohome=0&completepageprompt=0&completepage=&completetext=> (Links to an external site.).

- Have you been exposed to COVID-19? Or are you experiencing any of the following symptoms: fever (over 100.4°F) or chills; persistent dry cough; shortness of breath or difficulty breathing; unusual fatigue, muscle or body aches; intense and persistent headache; new loss of taste or smell; sore throat; congestion or runny nose; nausea or vomiting; or diarrhea? If you are not feeling well or believe you have been exposed to COVID-19, please do not come to class; instead, email your instructor and contact Student Health Service (715-346-4646) to report this update in your information using the COVID reporting form. [https://cm.maxient.com/reportingform.php?UnivofWisconsinStevensPoint&layout\\_id=110](https://cm.maxient.com/reportingform.php?UnivofWisconsinStevensPoint&layout_id=110) (Links to an external site.)
- If you suspect exposure or are experiencing symptoms, this will necessitate your absence
- As with any type of absence, students are expected to communicate their need to be absent and complete the course requirements online as outlined in the syllabus.

### Community Bill of Rights and Responsibilities:

In accordance with UW system policies, Math 105 is dedicated to a safe, supportive and non-discriminatory environment for all persons regardless of age, race, religion, gender, sexual orientation or disability.

You have certain rights and responsibilities as a UWSP student, and you are expected to be fully aware of them.

These are detailed in the UWSP Community Bill of Rights and Responsibilities:

<http://www.uwsp.edu/dos/Documents/Community%20Rights%20and%20Responsibilities.pdf> (Links to an external site.)

In particular, this includes the UWSP Student Academic Disciplinary Procedures:

<http://www.uwsp.edu/stuaffairs/Documents/RightsRespons/SRR-2010/rightsChap17.pdf> (Links to an external site.)

Information concerning accommodations made as per Section 504 of the Rehabilitation Act or the Americans with Disabilities Act can be found at:

<http://www4.uwsp.edu/special/disability/> (Links to an external site.)

In particular, to request any accommodations of this type, relevant to this class, discuss the matter with the Disability Services Office. Information and contact information may be found at:

<http://www4.uwsp.edu/special/disability/ToQualifyforDisabilityServicesProcedure/> (Links to an external site.)

Canvas Storage and homework boards (POSSIBILITY??)

Canvas may or will serve as a storage space for homework assignments and some daily worksheets. That way you can easily get access to them if you miss them. There may also be discussion boards available for you to post comments or questions.

The boards would be monitored after the fact. That is, you would post directly to the board, and I would monitor it (semi-weekly).

Postings are never anonymous and must not contain inappropriate (foul, rude, hostile, offensive) language. Violations of this rule may constitute academic misconduct (see links above)

There would be a discussion board each week for homework questions. You would get extra credit if you post a question from the homework or an answer to another person's question (it does not matter if the question is required or suggested).

To earn the extra credit, your post must meet the following criteria:

1. You ask a question about how to do part of the homework/quiz assignment for the week, or you answer such a question or correct someone else's wrong answer, and
2. The posting contains new content (so a posting which says: "I agree" is not worth extra credit!)
3. You cannot earn credit for asking or answering a question that was previously asked by someone else on the board.

You can earn up to one extra credit point per week by posting in this way.

I intend to check all boards at least once every 24 hours (except on weekends)