Information sheet for Math 204 Winter 2022

Class meets: MTRF 9:00 - 9:50 am in BH 225

Credits: four credits

Teacher: Branko Ćurgus, Proofessor of Mathematics

Office Hour: MTRF 11 am or by appointment (see the class **Canvas page** for a Zoom link)

Email: curgus@wwu.edu

Course website: http://faculty.wwu.edu/curgus/Courses/204_202140/204.html

Text: *Linear algebra and its applications, Fifth edition* by David C. Lay, Steven R. Lay, Judy J. McDonald, ISBN: 9780321982384

Material covered: We will cover Sections 1.1-1.9, 2.1-2.4, 2.8, 2.9, 3.1-3.3, 4.1-4.7, 5.1-5.3.

Course Objectives: The successful student will demonstrate: (1) Ability to translate between systems of linear equations, vector equations and matrix equations; (2) Understanding of the concept of (reduced) row echelon form of a matrix and ability to perform elementary row operations to reduce a matrix to its reduced row echelon form; (3) Ability to use (2) to solve equations from (1) and answer related existence and uniqueness questions; (4) Understanding of the concepts of linear combination and span; (5) Ability to represent the solution set of a system of linear equations in parametric vector form and understand the geometry of the solution set; (6) Understanding of linear dependence and independence of sets of vectors; (7) Understanding of linear transformations defined algebraically and geometrically, and ability to find the standard matrix of a linear transformation; (8) Ability to perform matrix operations including computation of the inverse and determinant of a matrix; (9) Knowledge of all aspects of the Invertible Matrix Theorem; (10) Understanding of the notions of a vector space and its subspaces and knowledge of their defining properties; (11) Knowledge of the definitions of a basis for and the dimension of a vector space, and ability to compute coordinates in terms of a given basis and to find the change of basis transformation between two given bases; (12) Ability to find bases for the row, column, and null spaces of a matrix, find their dimensions, and knowledge of the Rank Theorem; (13) Ability to find eigenvalues and eigenvectors of a matrix; (14) Knowledge of the Diagonalization Theorem and ability to diagonalize a matrix.

Exams: There will be two "mid-term" exams and a comprehensive final exam. The dates for the "mid-term" exams are Thursday, January 27 and Friday, February 25. The final exam is scheduled for **three hours** on Thursday, March 17 from 8 am to 11 am. There will be no make-up exams. If you are unable to take an exam for a very serious reason verified in writing, please see me beforehand. This does not apply to the final exam which cannot be taken neither early nor late.

Assignment: There will be one assignment that will be graded, and it will count towards your final grade. This assignment will consist of several challenging problems and your "portfolio of questions." I will post the assignment on Canvas after the second exam, and it will be due on Friday, March 18 at 11:59 pm. I will write more about the "portfolio of questions" on Canvas.

Homework: A list of suggested homework problems is on the class calendar at the end of this file. I will post additional problems on the class website. To succeed in class, you should do each problem on your own. While working on problems, you should recognize which theoretical tools are being used to solve a particular problem. As a result, you will acquire general problem-solving strategies, which is one of the goals of education. Incidentally, this will also lead to your success on exams. However, I will not collect and grade the homework. Whenever an interesting question or idea arises while working on homework problems, please share it with the class in **Discussions on Canvas** or ask it in class or visit my office hour.

Grading: Your assignment and each exam will be graded by an integer from 0 to 100. Your final grade will be determined using the following formula

$$\texttt{FG} = \max\Big\{\big\lceil(\texttt{E1}+\texttt{E2}+\texttt{A}+2\texttt{*EF})/5\big\rceil, \big\lceil(\texttt{E1}+\texttt{E2}+\texttt{A}+3\texttt{*EF})/6\big\rceil\Big\},$$

where E1 and E2 stand for the grades on inclass exams, A is the grade for the assignment and EF stands

for the grade on the final exam. In the above formula the symbol $\lceil x \rceil$ denotes the ceiling of a real number x. Your letter grade will be assigned according to the following table:

F : 0 - 49	D : 50 - 54	C−: 55 - 59	C : 60 - 64	C+: 65 - 69
B−: 70 - 74	B : 75 - 79	B+: 80 - 84	A−: 85 - 89	A : 90 - 100

Technology: For classroom demonstrations, I will use the computer algebra system *Mathematica*. I will use version 12, which is available on many campus computers. I will provide basic information on how to use *Mathematica* and welcome questions about it during my office hours. I want to encourage you to start using *Mathematica* since I believe that it will enhance your understanding of the math that you are studying. However, you can succeed in class without using any technology. Many calculators can perform matrix algebra which can be helpful when there are tedious computations to perform. As with *Mathematica*, you will benefit from learning how to use a calculator. In the Math Center in BH 211A you can get help from students who are calculator experts. Calculators are allowed but not required on exams; my exams are technology-independent.

This course is an extremely fast-paced course. A lot of new concepts will be introduced. It takes time to internalize these concepts. Therefore it is essential that you keep up with the material presented every day; do the homework problems in such a way that you internalize new concepts; look for help if you encounter difficulties.

How to succeed: Doing well in mathematics depends on understanding not memorizing. Exercise critical thinking while reading the textbook and my writing and doing the problems. Understanding cannot be achieved through superficial studying. Talking to other students is a good way to check your understanding. If you feel that you are not on your way to understanding the material do not hesitate to ask questions. Use the **Math Center**. I will be glad to talk to you during my office hours, or you can make an appointment to talk to me at some other time.

Diversity, Equity, Inclusion: Welcome to my class. I would love to have a face-to-face class with you. Until that is possible, we will make the best out of this mode of learning. We can make it better than a regular class since we can meet outside of class more often. I promise to keep my mind open for the mathematical experiences that you bring to this class. I want to help each one of you use those personal experiences in creative ways to build your own understanding of the material studied in this class. I will bring diverse approaches to most concepts. For example, to make this class more diverse, I looked into the history of our subject. Amazingly, the first known system of linear equations appears on old Babylonian clay tablet VAT 8389, which is between 3600 and 4000 years old (2000-1600 BC). The second oldest one is from ancient Egypt in the Rhind papyrus, which dates from around 1550 BC. This system involves five unknowns, but the solution in the papyrus is cryptic. The oldest treatment of systems of linear equations from antiquity which resembles the methods that we will use in this class is in Chapter 8 of the Chinese textbook *Nine Chapters of the Mathematical Art* which is at least 1800 years old.

I do understand that each one of you comes to this class with a diverse mathematical background. I believe that mathematics is so universally diverse that it offers a path to understanding to everybody. The only prerequisite is to be open to the human worth of rigorous thinking which is practiced in Mathematics. Let me help you build your own understanding of linear algebra. The goal is to create an environment where you can succeed in Mathematics and be proud of your achievement.

Academic Honesty Policy: Academic dishonesty is not tolerated at Western Washington University. Representing the work of another as one's own is an act of academic dishonesty. For a full description of the academic honesty policy and procedures at Western, see **Appendix D** in the University Catalog.

Flexibility Statement: This syllabus is subject to change. Changes, if any, will be announced in class or online. Students will be held responsible for all changes.

Sylabii@WWU: Please go to https://syllabi.wwu.edu/ where you will find Syllabi Policies for Students and Campus Resources for Students

COVID: Please respect all the University safety requirements related to the ongoing pandemic: https://studenthealth.wwu.edu/covid-vaccines