

Information sheet for Math 204 Winter 2021

Class meets: MTRF 9:00 - 9:50 am (Zoom classes scheduled on Canvas)

Credits: four credits

Teacher: Branko Ćurgus, Profesor of Mathematics

Office Hour: MTRF noon or by appointment (see Canvas for a Zoom link)

Email: curgus@wwu.edu

Course website: http://faculty.wwu.edu/curgus/Courses/204_202110/204.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, 2.7-2.9, 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.

On Your Written Work: Students must submit their work electronically through Canvas Assignments. The only allowable file type is pdf. I cannot grade work submitted by email. Please make sure that you produce a high-quality, readable pdf file of your work. \LaTeX is a free software designed for typesetting high-quality mathematical documents. I encourage you to learn \LaTeX and use it for your writing. If you submit your handwritten work, write neatly on paper with a light-colored background using a dark pencil or ink. Please use a good scanning app to produce a high-quality, readable pdf file.

Since you will have enough time to work on the homework and assignments, your papers should be well-written. Presenting calculations alone without the context in which they occur and explanations of your reasoning is not sufficient for the full credit. I believe that writing mathematics in complete sentences organized in meaningful paragraphs enhances the learning process. As a guide for writing, you can use examples in the textbook or my writing on the class website.

Assignments: There will be no traditional exams. Instead of the exams there will be three assignments for which you will have from Wednesday until Sunday to finish. The due dates for the assignments are Sunday, January 31 and Sunday, February 28 both at 11:59 pm. The final assignment will be posted on Canvas on the last day of classes and it will be due on Friday, March 19 at 11:59 pm.

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.

The due dates for homework are on January 16, January 23, February 6, February 20, March 13 at 11:59 pm. At the due dates, you should submit (through Canvas Assignments) your solutions to the two most challenging linear algebra problems that you solved during the time between the two due dates. I will grade each problem by an integer between 0 and 10. The grade will be based on how well you solved the problem, how well you wrote your solution and how hard the problem was. A well-written solution of an easy problem can earn you 7 points. The grade for your homework is the sum of all the individual scores for the submitted problems. This grade will count towards the final grade for the class.

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

$$FG = \max\left\{\lceil (HW + A1 + A2 + A3)/4 \rceil, \lceil (HW + A1 + A2 + 2 * A3)/5 \rceil\right\},$$

where HW stands for the score on the homework problems, A1, A2, A3 are the grades for the assignments. 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

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 text and doing the problems since 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.

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

WINTER 2021 Math 204 Introduction to Linear Algebra

The number highlighted in gray is the ordinal number of the particular class. That is, **1** means that Tuesday, January 5th is the first class. If two sections are listed in one day, then the corresponding assigned problems are separated by a boldface ; semicolon. The dates highlighted yellow are related to the due-dates of assignments. For more details see the Canvas page. Please check the class website regularly since I will post updates to assigned problems regularly.

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
JAN	Sec. to read 4 Problems More Problems	1 1.1 5 3, 6, 7, 5, 9, 11, 12, 16, 17, 18, 21, 22	6	2 1.1; 1.2 7 23, 24, 25, 27, 31, 33; 3, 5, 6, 7, 8	3 1.2; 1.3 8 12, 17-31; 1, 5, 9, 15, 17
JAN	4 1.3 11 18, 19, 21-25, 32,	5 1.4 12 1, 5, 13, 14, 15, 16, 17-20, 21, 22, 23	13	6 1.4; 1.5 14 24, 25, 26, 35, 36; 1, 3, 5, 6, 7, 9, 11, 12	7 1.5 15 13-16, 19, 21, 23, 24, 26, 29, 32, 35, 37-40
JAN	18 Martin Luther King Day	8 1.6 19	20	9 1.7 21 2, 4, 5, 8, 10, 11, 17, 21, 23-29, 32-40	10 1.8 22 1-4, 12, 13-17, 19, 20, 25, 27, 28
JAN	11 1.9 25 1, 3, 4, 5, 7, 8, 11, 12 , 18, 19, 23, 25, 26-30	12 Review Q&A 26	27	13 2.1 28 1, 4, 5, 7, 9-12, 17, 20-25, 27, 28, 34	14 2.2 29 1, 4, 5, 7, 12, 13, 21-24, 28, 32-38
FEB	15 2.3 1 1, 3, 5, 8, 11-13, 15-21, 26, 27, 33	16 2.4 2	3	17 2.8 4 5, 6, 8-20,	18 2.8; 2.9 5 24-26, 30-36; 1-7, 9, 11, 12
FEB	19 2.9 8 14, 15, 19-24	20 Review Q&A 9	10	21 3.1 11 1-13 (odd), 17, 20-22, 25-32, 37, 41, 42	22 3.2 12 5-11 (o), 16-20 (e), 21, 25, 31, 33-35, 40c
FEB	15 Presidents' Day	23 3.3 16 2, 4, 6, 7, 9, 13, 14, 18-24, 27, 30-32	17	24 4.1 18 1, 3, 5-9, 11, 13, 15-18, 21-24	25 4.2 19 1-5, 7-9, 12, 15, 17, 18, 23-28, 31, 33
FEB	26 4.3 22 3-5, 9-15, 21-23, 25, 26, 33, 34	27 4.4 23 3, 4, 7-14, 27, 28	24	28 4.5 25 3, 6-13, 15, 18-24	29 4.6 26 3-9, 11, 13, 15, 17, 18, 23, 24, 27-30
MAR	30 4.7 1 4-10, 13, 14	31 Review Q&A 2	3	32 5.1 4 1-8, 11, 15-17, 19, 20, 24-27, 29-31	33 5.2 5 1-9, 11-15, 18-21, 24-27
MAR	34 5.3 8 2, 3, 5, 8-13, 16, 18, 20, 23, 24	35 Review Q&A 9	10	36 Review Q&A 11	37 Review Q&A 12
MAR	15	16	17	18	19