Syllabus

1. (September 2, 3.) Fundamentals of number theory, theorems about primes (1.1). Congruences (1.2).
2. (September 9,10.) Linear congruences. Simultaneous congruence systems (1.4). Euler-Fermat theorem, little Fermat theorem (1.3).
3. (September 16.) Number theoretic algorithms: basic operations, exponentiation (1.5.1-1.5.3).
4. (September 23, 24.) Euclidean algorithm, its application for solving linear congruences (1.5.4-1.5.5). Primality testing, public key criptography, RSA-encoding (1.5.6-1.5.7).
5. (October 7, 8.) Geometry of 3-space: equations of planes, lines; intersections (2.1). $\mathbf{R}^n$, operations in $\mathbf{R}^n$. Subspaces of $\mathbf{R}^n$. (2.2.1-2-2-2)
6. (October 14, 15.) Linear combination, spanned (generated) subspace, generating system. Linear independence (2.2.3-2.2.4).
7. (October 21, 22.) Exchange theorem, I-G inequality. Basis, dimension, standard basis, the dimension of $\mathbf{R}^n$ and its subspaces(2.2.5-2.2.6).
8. (October 25.) **First midterm**. Material: up to linear independence (1.1-2.2.4). (The retake of it: November 15.)
9. (October 28, 29.) Systems of linear equations, Gaussian elimination. Conditions on solvability and uniqueness (2.3). Definition of determinants (2.4.1-2.4.2).
10. (November 4, 5.) Determinants: ways of evaluation, expansion theorem. Cross product (2.4.3-2.4.7).
11. (November 11, 12.) Matrices, operations on matrices. Product theorem for determinants. Connection between systems of linear equations and matrix equations (2.5.1-2.5.2).
12. (November 18, 19.) Inverse of a matrix, necessary and sufficient condition for its existence, calculation of the inverse. Rank of a matrix (2.5.3-2.5.4).
13. (November 25, 26.) Linear maps. Matrix of a linear map. Composition (product) of linear maps. Inverse of a linear transformation. Kernel and image of linear maps. Dimension theorem (2.6.1-2.6.4).
14. (November 26.) **Second midterm**. Material: up to rank (2.2.5-2.5). (The retake of it: December 9.)
15. (December 2, 3.) Changing bases, the matrix of a linear transformation in a given basis. Eigenvalues and eigenvectors of matrices, characteristic polynomial. Diagonalisation (2.6.5-2.6.6).
16. (December 16.) Re-retake of both midterms.

The numbers in parentheses denote the chapters and sections in the Lecture Notes.