RUSSIAN - ARMENIAN UNIVERSITY

Master Program

MATHEMATICAL MODELING

MODULE DESCRIPTION

Professional Cycle (64 ECTS credit points)

Continuous Mathematical Models

Lecturer: Prof. Dr. Garnik Karapetyan
Labor intensity: 3 ECTS, 108 academic hours
Form of final control: exam (graded)
Standard Studies Period: 2 years

Course description: A course aimed at the construction, simplification, analysis, interpretation and evaluation of mathematical models that shed light on problems arising in the physical and social sciences. Derivation and methods for solution of model equations, heat conduction problems, simple random walk processes, simplification of model equations, dimensional analysis and scaling, perturbation theory, and a discussion of self-contained modular units that illustrate the principal modeling ideas. Students will normally be expected to develop a modeling project as part of the course requirements.

Recommended literature:

1. G.I. Marchuk. Mathematical modeling in the environmental problem - M., Nauka, 1982
2. G.I. Marchuk. Methods of computational mathematics - M., Nauka, 1989
3. V. Volterra. Mathematical theory of the struggle for existence - M., Nauka, 1976
4. Yu.M. Svirizhev, D.O. Logofet. Stability of biological communities - M., Nauka, 1978
5. L.A. Petrosyan, V.V. Zakharov. Introduction to mathematical ecology - M., Nauka, 1986
6. O.V. Besov, V.P. Ilyin, S.M. Nikolsky. Integral representations of functions and embedding theorems.-M., Nauka, 1975
7. V.S. Of the world. Equations of mathematical physic-M., Nauka, 1971.
8. L. HERMANDER. Linear differential operators with partial derivatives. - M., Mir, 1965.
9. L. HERMANDER. Analysis of linear partial differential operators, vol.1 (Theory of distributions and Fourier analysis) - M., Mir, 1986.
10. V.S. Vladimirov. Generalized functions in mathematical physics.-M., Nauka, 1979.

Discrete stochastic models

Lecturer: Dr. L. Kachaturyan
Labor intensity: 3 ECTS, 108 academic hours
Form of final control: exam (graded)
Standard Studies Period: 2 years

Course description: The main purpose of this course for muster students is to demonstrate on various examples the power and generous possibilities of probabilistic methods applied to problems from different areas of mathematics.

The course consists of three main parts. The first part contains preliminary facts from probability theory including general discrete probability model, model of sequence of independent trials and Markov scheme (Markov chains). All these material is accompanied by practical examples.
The second part is dedicated to application of probabilistic methods in graph theory, combinatorics, Ramsey theory and extreme theory of sets. We demonstrate on various examples how to use probabilistic methods to obtain deterministic assertions. Generally such statements are existence theorems, but we also demonstrate how probabilistic approach gives an opportunity to create (deterministic) algorithms of finding objects which existence are proved.
In the third part of this course the mathematical theory of communication (Shannon's information theory) is expound. The notion of entropy and its properties are considered. The source coding theorems are discussed both for uniform and variable-length coding. The Shannon's theorems of optimal information transmission in discrete channels without memory are proved.

Recommended literature:

1. Parzen, E. (1962) Stochastic Processes, Holden-Day.
2. Dodge, Y. (2006) The Oxford Dictionary of Statistical Terms, OUP.

Algorithms and information security

Lecturer: Prof. Dr. R. Tonoyan
Labor intensity: 4 ECTS, 144 academic hours
Form of final control: exam (graded)
Standard Studies Period: 2 years

Course description: 1.Recursive algorithms. 2. Computable functions. Solvable and enumerable sets. 3. Algorithmically insoluble problems. 4. The 10th problem of Hilbert. 5. Probabilistic algorithms. 6. Hashing. 7. Introduction to the theory of algorithms and examples. 8. Complexity of algorithms. 9. Linear Programming.

Recommended literature:

1. William Stallings. Cryptography and Network Security, 7th edition, Pearson, 2016.

Modern Operating Systems

Lecturer: Prof. Rouben Topchyan

Labor intensity: 4 ECTS, 144 academic hours
Form of final control: exam (graded)
Standard Studies Period: 2 years

Course description: The foundations of the organization of modern multiprocessor operating systems arestudiedin the course. The concepts of the organization of interactions between parallel processes and questions connected with deadlocks, the issues of planning of the computer system processors loading, as well as memory management, the organization of file systems, and information securityissues are examined. The course contains both a thorough familiarization with system calls that control flows, processes, objects of interprocess communication, and existing utilities that facilitate the process of developing software in the environment of operating systems of various types. The principles of the organization of operating systems for computer networks in multiprocessor systemsare being studied. A comparative analysis of the performance of different operating systems is carried out. Methods and features of programming in Windows, Linux and Unix-like operating systems are being studied.

Topics cover the following themes:

- interfacing synchronous and asynchronous processes
- input/output system,buffering
- interrupts
- general parallel processes using fork and join
- critical sections, mutual exclusion
- other coordination primitives
- segmentation and paging
- virtual memory
- storage allocation and sharing

Recommended literature:

1. TanenbaumA., WoodhallA. OperatingSystems: Design and Development. (3rded.) 2005
2. Stollins W. OperatingSystems: InternalsandDesignPrinciples. — Addison Wesley,2003.
3. TanenbaumA.ModernOperating Systems (6th ed.), Prentice-Hall, 2010.

Architecture of Modern Computer Systems

Lecturer: Prof. Gagik Sardaryan
Labor intensity: 4 ECTS, 144 academic hours
Form of final control: exam (graded)
Standard Studies Period: 2 years

Course description: In the course the various fundamental components of computer systemsare explored. The operation of the computer CPU in detail is explained and some of the many variations on the basic CPU design in different systemsare introduced. The fundamental group of instructions that make up the repertoire of the computer and a fetch-execute cycle are learned.The variations in instruction sets and memory addressing techniques that differentiate computers from one another and extend the flexibility of the basic architecture are considered. In the course various CPU architectures, memory enhancements, and CPU organizations that expand the processing power of the CPUare explored. Various techniques used to perform I/O operationsare considered as well. The advantages of adding additional CPUs in the form of multiprocessing and of off-loading operations into additional processors built into I/O modulesare explored. The workings of various peripheral devices and some of the interactions between the various components in the computer system are presented.

Topics cover the following themes:

- Performance Measurement
- Instruction Set Architecture
- Arithmetic and ALU Design
- CPU Design and Execution
- Pipelining for Increased Performance
- Memory: Cache, Main, Virtual
- I/O Devices and Protocols

Recommended literature:

1. Patterson, D.A. and J.L. Hennesey. Computer Organization and Design: The Hardware/Software Interface, Second Edition, San Francisco, CA: Morgan Kaufman, 1998.
2. Tanenbaum, A. S. Structured Computer Organization. Englewood Cliffs, New Jersey: Prentice-Hall,1979.
3. John L. Hennessy and David A. Patterson. Computer Architecture: A Quantitative Approach (3rd ed.). Morgan Kaufmann Publishers.2001.
4. Joseph D. Dumas II. Computer Architecture: Fundamentals and Principles of Computer Design. CRC Press, 2005.
5. Tanenbaum A., Austin T. Computer Architecture. (6th ed.), Prentice-Hall, 2014.

Principles of Database Systems

Lecturer: Prof. Manuk Manukyan
Labor intensity: 4 ECTS, 144 academic hours
Form of final control: exam (graded)
Standard Studies Period: 2 years

Course description: The theoretical and practical aspects of the implementation of the concept of databases are being considered within the course. Entity-relationship and object definition models are used as formalism for database modeling. Problems of relational database scheme design are emphasized. Issues for object, object-relational, deductive and semistructured data models are considered as well. SQL and OQL (Object Query Language) are examined.The algebraic and logical approaches of the query language construction, active, semi-structured and deductive databases are examined in detail. The problems of database integrity constraints are considered in the context of the relational model. Theoretical considerations are accompanied by development of corresponding projects in well-known database systems which help to acquire the knowledge. A comparative analysis of different approaches in database systems is provided.

Topics cover the following themes:

- an introduction to the implementation of database systems;
- data storing essentials;
- system and index structures:
- query development;
- parallel management;
- transaction development;
- security and information integration;
- semi-structured and deductive databases;
- distributed databases.

Prerequisites: Data Structures and Fundamental Algorithms, Discrete Mathematics, Programming languages, BasicsofDatabaseSystems.

Recommended literature:

1. Ricardo C.M. Database Systems: Principles, Design and Implementation.Prentice Hall PTR Upper Saddle River,1990
2. C. J. Date, An Introduction to Database Systems, Addison-Wesley, 2004.
3. H. Garcia-Molina, J. D. Ullman, J. Widom, Database System: The Complete Book, Printice Hall, 2002.
4. L. A. Kalinichenko, Data model transformation method based on axiomatic data model extension, 4th International Conference on VLDB, pp. 549-555, Germany, September, 1978.

Finite Element Method

Lecturer: Dr. Kamo Harutyunyan
Labor intensity: 2 ECTS, 72 academic hours
Form of final control: exam (pass/fail)
Standard Studies Period: 2 years

Course description: The course gives the theoretical framework for the finite element method, and formulates elements for beams, plates, shells, axisymmetric and three-dimensional structures. Element properties, convergence requirements and modelling errors are discussed. The course emphasizes modelling, choice of element type, discretization, introduction of loads and boundary conditions, and results control. An introduction in using Abaqus for simple two- and three-dimensional structures will be given.

Recommended literature:

1. O. Zenkevich, K. Morgan. Finite elements and approximation. - M .: Mir, 1986.
2. G.I. Marchuk, V.I. Agoshkov. Introduction to projection-grid methods.-Moscow: Nauka, 1981.
3. E. Mitchell, R. Waite. The finite element method for partial differential equations. - M .: Mir, 1981.
4. S.G. Michlin. Variational methods in mathematical physics. - Moscow: Nauka, 1970.
5. L.A. Oganesyan, L.A. Rukhovets. Variational-difference methods for solving elliptic equations. - Yerevan: AR Arm. SSR, 1979.
6. G. Streng, J. Fix. The theory of the finite element method. - M .: Mir, 1981.

Matrix Analysis

Lecturer: Prof. Dr. Yuri Hakobyan
Labor intensity: 3 ECTS, 108 academic hours
Form of final control: exam (pass/fail)
Standard Studies Period: 2 years

Course description: Topics covered will include: vector and matrix norms; Hilbert space; spectrum and eigenvalues; unitary, normal and symmetric matrices; Jordan canonical form; the minimal polynomial and the companion matrix; the real Jordan and Weyr canonical forms; matrix factorizations; trace and determinant; positivity and absolute value; tensor product, block matrices and partial ordering, kernel functions, projections and positivity preserving mappings; matrix calculus (matrix exponent, matrix square root, log of matrix, sign of matrix, derivatives), matrix convexity; matrix means and inequalities, properties of positive and nonnegative matrices, primitive matrices, stochastic and doubly stochastic matrices; mean transformation; singular values.

Recommended literature:

1. F.R. Gantmakher. The theory of matrices.-M .: Nauka, 1967.
2. R. Horne, C. Johnson. Matrix Analysis. - M.,: World, 1989.
3. P. Lancaster. Theory of matrices. - Moscow: Nauka, 1978.
4. D. Watkins. Fundamentals of matrix calculations. - Moscow: BINOM. Laboratory of Knowledge, 2006.
5. R. Bellman. Introduction to the theory of matrices. - Moscow: Nauka, 1969.
6. D.V. Beklemishev. Additional chapters of linear algebra. - Moscow: Nauka, 1983.

Numerical methods and optimization

Lecturer: Prof. Dr. Yuri Hakobyan
Labor intensity: 4 ECTS, 144 academic hours
Form of final control: exam (graded)
Standard Studies Period: 2 years

Course description: Numerical methods are an important branch in Applied Mathematics. It aims at numerically solving all kinds of mathematical problems which arise from practical applications and can be modelled by different mathematical equations or inequalities, for example, linear or nonlinear differential equations and integral equations.
Course prerequisite:
Most fundamental: advanced calculus and linear algebra.
The course is focused on both numerical methods and numerical analysis. And mathematicalanalysis is needed for nearly every numerical method to be introduced. So students should bevery solid in analysis, and have a very good feeling and understanding of numerical methodsand rigorous mathematical reasoning.

Recommended literature:

1. V.M. Verzhbitsky. Fundamentals of numerical methods.-M .: Higher School, 2002.
2. D. Watkins. Fundamentals of matrix calculations. - Moscow: BINOM. Laboratory of Knowledge, 2006.
3. D.V. Beklemishev. Additional chapters of linear algebra. - Moscow: Nauka, 1983.
4. D. Kincaid and W. Cheney. Numerical Analysis: Mathematics of Scientific Computing.- Brooks / Cole Publishing Company, 1991.

Generalized functions and their applications

Lecturer: Prof. Dr. Vachagan Margaryan
Labor intensity: 4 ECTS, 144 academic hours
Form of final control: exam (graded)
Standard Studies Period: 2 years

Course description: The main goal of this subject is to bring a student a basic tool in the theory of generalized functions which is needed to understand papers in this area of research.
Course content/topics:

- Dirac's delta function A space of test functions and a space of distributions;
- Operations with distributions;
- Even, odd and positive distributions;
- Convergence of sequences and series of distributions;
- Periodical distributions;
- Relation between distributions from physics and mathematics;
- Derivatives of distributions and a derivative of a function in distributional sense;
- Derivative of a product of a smooth functions and a distribution;
- Distributions and differential equations;
- Application of distributions in Sobolev spaces.

Recommended literature:

1.O.V. Besov, V.P. Ilyin, S.M. Nikolsky. Integral representations of functions and imbedding theorems.-M., Nauka, 1975
2.S. Agmon. Lectures on Elliptic Boundary Value Problems .- D. van Norstrand C., Princeton, 1965.
3. V.S. Of the world. Equations of mathematical physics.-M., Nauka, 1971.
4.L. HERMANDER. Linear differential operators with partial derivatives. - M., Mir, 1965.
5.L. HERMANDER. Analysis of linear differential operators with partial derivatives, Vol.1 (Theory of distributions and Fourier analysis) .- M., Mir, 1986.
6. V.S. Vladimirov. Generalized functions in mathematical physics.-M., Nauka, 1979.

Big Data

Lecturer: Dr. Arman Darbinyan
Labor intensity: 3 ECTS, 108 academic hours
Form of final control: exam (pass/fail)
Standard Studies Period: 2 years

Course description: Big data is a term for data sets that are so large or complex that traditional dataprocessing applications are inadequate to deal with them. Challenges include analysis, capture,data curation, search, sharing, storage, transfer, visualization, querying, updating andinformation privacy. The term "big data" often refers simply to the use of predictive analytics,user behavior analytics, or certain other advanced data analytics methods that extract valuefrom data, and seldom to a particular size of data set.

Recommended literature:

1. Victor Maer-Schoenberger, Kenneth Cuciere. Big Data: A revolution that will change how we live, work and think. - Moscow: Mann, Ivanov and Ferber, 2013.
2. Gaurav Vaish. Getting Started with NoSQL - 2013.
3. A. Blum, J. Hopcroft, R. Kannan. Foundations of Data Science. 2016.
4. Franks B. Per. with English. Baranov A. The Taming of large data: how to extract knowledge from information arrays with the help of deep analytics. - Mann, Ivanov and Ferber, 2014.
5. Maeks D. Per. with English. Mironova P. Key figures. How to earn more using the data that you already have. - Mann, Ivanov and Ferber, 2013.

Multidimensional Approximations

Lecturer: Prof. Dr. Yuri Hakobyan
Labor intensity: 2 ECTS, 72 academic hours
Form of final control: exam (pass/fail)
Standard Studies Period: 2 years

Course description: This course is concerned with interpolation by multidimensional periodic splines associated with certain elliptic differential operators. There will investigate the problem of uniform approximation by multidimensional periodic splines (as basis funnctions).

Recommended literature:

1. WilliFreeden. Interpolation by multidimensional periodic splines. Journal of Approximation Theory, Volume 55, Issue 1, October 1988, Pages 104-117.
2. J. W. S. CASSELS, "An Introduction to the Geometry of Numbers," Springer-Verlag, Berlin/Heidelberg/New York, 1981.
3. F. J. DELVES AND W. SCHEMPP, On optimal periodic spline interpolation, J. Math. Anal. Appl. 52 (1975), 553-560.
4. J. J. J~NGARRA, J. R. BUNCH, C. B. MOLER, AND G. W. STEWART, "LINPACK User's Guide," SIAM, Philadelphia, 1979.
5. W. FREEDEN, On spherical spline interpolation and approximation, Math. Methods Appl. sci. 3 (1981), 551-575.
6. W. FREEDEN, On the permanence property in spherical spline interpolation, The Ohio State University, Department of Geodetic Science, Columbus, OH, OSU Report No. 341, 1982.
7. W. FREEDEN, On spline methods in geodetic approximation problems, Math. Methods Appl. Sci. 4 (1982), 382-396.

Iterative methods of linear algebra

Lecturer: Dr. Marine Mikilyan
Labor intensity: 2 ECTS, 72 academic hours
Form of final control: exam (pass/fail)
Standard Studies Period: 2 years

Course description: Introduction to the state-of-the-art iterative methods for solving linear and nonlinear systems of equations. This will be a very practical course, involving Matlab programming and a project.

Recommended literature:

1. Kress A. Numerical Analysis. Springer, 2005.
2. Dahlquist G., Bjorck. Numerical Methods, Englewood Cliffs, N.J., Prentice-Hall. 1974.

Economic-mathematical methods and models

Lecturer: Dr. Arman Darbinyan

Labor intensity: 2 ECTS, 72 academic hours
Form of final control: exam (pass/fail)
Standard Studies Period: 2 years

Course description: The course builds on the foundation provided in the first level courses in Mathematics and Economics. The concepts in this course provide a solid foundation for the mathematical analysis. Emphasis will be placed on the understanding and application of mathematical concepts rather than just computational skills, the use of algorithms and the manipulation of formula.

Recommended literature:

1. Berezhnaya EV, Berezhnoy VI Mathematical Methods of Modeling Economic Systems - Moscow: Finance and Statistics, 2005.
2. Kuznetsov A.V. Economic-mathematical methods and models. Minsk: BSEU, 1999.
3. Kuznetsov B.T. Mathematics. M .: UNITY-DANA, 2004.
4. Malykhin VI Mathematical modeling of the economy. - Moscow: URAO, 1998.
5. Shikin EV, Chkhartishvili AG Mathematical methods and models in control .: Proc. allowance. - Moscow: The Case, 2000.
6. Wagner G. Fundamentals of Operations Research. - Moscow: The World, 1972.
7. Zamkov OO et al. Mathematical Methods in Economics. - Moscow: DIS, 1998.
8. Kremer N.Sh. Investigation of operations in the economy. M .: UNITI, 1997.
9. Taha X. Introduction to the study of operations: In 2 books. - Moscow: Mir, 1995.

Fast Fourier transform

Lecturer: Dr. Artsrun Sargsyan
Labor intensity: 1 ECTS, 36 academic hours
Form of final control: exam (pass/fail)
Standard Studies Period: 2 years

Course description: The goals for the course are to gain a facility with using the Fourier transform, both specific techniques and general principles, and learning to recognize when, why, and how it is used. Together with a great variety, the subject also has a great coherence, and the hope is students come to appreciate both.
Topics include: The Fourier transform as a tool for solving physical problems. Fourier series, the Fourier transform of continuous and discrete signals and its properties. The Dirac delta, distributions, and generalized transforms. Convolutions and correlations and applications; probability distributions, sampling theory, filters, and analysis of linear systems. The discrete Fourier transform and the FFT algorithm. Multidimensional Fourier transform and use in imaging.

Recommended literature:

1. Vagharshakyan A., Astola J., On hidden periodicities.Circuits Systems & Signal Processings. 19 (2000),no.1, pp. 27-42.
2. J. Cooley and J. Turkey, An algorithm for the machine calculation of complex Fourier series, Math. Comp. 19, 1965, p. 297-301.
3. James Hamilton, Time Series Analysis, Princetion University Press, New Jersey, 1994.

Approximate solutions of integral equations

Lecturer: Dr. Marine Mikilyan
Labor intensity: 2 ECTS, 72 academic hours
Form of final control: exam (pass/fail)
Standard Studies Period: 2 years

Course description: This course will cover classification of linear integral equations, the Fredholm and Volterra equations of the first and second kind, examples of physical problems leading to integral equations, linear operators in infinite-dimensional Euclidean space, completely continuous operators, the homogeneous Fredholm equation of the second kind.

Recommended literature:

1. Smirnov Yu. G. Mathematical methods of research of electrodynamics problems, 2009.
2. Bakhvalov NS, Zhidkov NP, Kobelkov GM Numerical methods.
3. Verlan AF, Sizikov VS Integral equations: methods, algorithms, programs. - K .: NaukovaDumka, 1986.

Corporate Games

Lecturer: Dr. Arman Darbinyan
Labor intensity: 2 ECTS, 72 academic hours
Form of final control: exam (pass/fail)
Standard Studies Period: 2 years

Course description: Students are exposed to the fundamentals of game theory; unpacking the principles that make games, such as chess, popular across centuries and cultures. Building on this base, students analyze contemporary non-digital games and discuss the risk/reward, captured through von Neumann’s minimax theory. The result of this class is the development of an analog game prototype.

Recommended literature:

1. Prajit K. Dutta: “Strategies and Games: Theory and Practice”.

2. Joel Watson: “Strategy: An Introduction to Game Theory”.
3. Martin J. Osborne: “An Introduction to Game Theory”.
4. Drew Fudenberg and Jean Tirole: “Game Theory”.

Spectral theory of differential operators

Lecturer: Prof. Dr. Vachagan Margaryan
Labor intensity: 2 ECTS, 72 academic hours
Form of final control: exam (pass/fail)
Standard Studies Period: 2 years

Course description: The course will be devoted mainly to the spectral theory of differential operators with focus on applications in quantum mechanics. Differential operators can be seen as linear transformations in infinite dimensional spaces and spectral theory can be considered as an attempt to understand diagonalization of infinite size matrices corresponding to such transformations. As a byproduct one obtains expansions in terms of eigenfunctions generalizing classical Fourier analysis. The role of spectral theory is not limited to proving the spectral theorem for self-adjoint operators, but forms the foundation of quantum mechanics, where physical systems are described precisely by self-adjoint operators acting in infinite dimensional Hilbert spaces. Such operators similar to Hermitian matrices have real spectrum ensuring that physical observables for different states give real numbers, which can be measured in experiments. Development of spectral theory can be successfully carried out only if ideas from both mathematics and physics are used simultaneously.

Recommended literature:

1.N.I.Aihezer, IMGlazman. The theory of linear operators in Hilbert spaces .- M., Nauka, 1968.
2.G.G.Kazaryan and others. Ordinary differential equations (in Armenian).
3.K.Isida. Functional analysis. - M., Mir, 1967.
4.E.B. Devis. Spektral theory and differentional operators - Cembriguniwersity Press, 1995.

Functional spaces and their applications in mathematical physics

Lecturer: Prof. Dr. Haik Ghazaryan
Labor intensity: 3 ECTS, 108 academic hours
Form of final control: exam (pass/fail)
Standard Studies Period: 2 years

Course description: This course will cover normed spaces, completeness, functionals, Hahn-Banach theorem, duality, operators; Lebesgue measure, measurable functions, integrability, completeness of L-p spaces; Hilbert space; compact, Hilbert-Schmidt and trace class operators; as well as spectral theorem.

Recommended literature:

1. L. HERMANDER. Analysis of linear differential operators .- M., Mir, 1986.
2. O.V. Besov, V.P. Ilyin, S.M. Nikolsky. Integral representations of functions and embedding theorems.-M., Nauka, 1996.
3. V.N. Maslennikova. Differential equations in partial derivatives.-M., 1997.
4. L. Bors, F. John, M. Schechter. Equations with partial derivatives .- M., Mir, 1996.

Economy and policy of transition

Lecturer: Prof. Dr. Armen Darbinyan
Labor intensity: 1 ECTS, 36 academic hours
Form of final control: exam (pass/fail)
Standard Studies Period: 2 years

Course description: This course studies the economics of public policy towards the environment. We begin by examining the problem of market failure in the presence of externalities and public goods. Then, we consider the public policy responses to these market failures, including command-and-control regulations, tax and subsidy incentives, marketable pollution permits, voluntary programs, and information as regulation. We consider these policies in contexts such as local pollution, climate change, threats to biodiversity, environmental justice, international trade, and development. In addition, we learn how to measure the costs and benefits of pollution control. By the end of the semester, you will learn how economists think about environmental problems, understand the advantages and disadvantages of a range of environmental policies, be able to conduct a cost-benefit analysis, and have a complete economic analysis of an environmental problem.

Foreign language

Labor intensity: 5 ECTS, 180 academic hours
Form of final control: exam (pass/fail)
Standard Studies Period: 2 years

Course description: This course will provide instruction in academic and professional language skills for non-native speakers of English. Emphasis is placed on development of integrated language skills for use in studying a particular content area. Upon completion, students should be able to demonstrate improved language skills for participation and success within the particular topic area.

Modern problems of applied mathematics and computer science

Lecturer: Prof. Dr. Parkev Avetisyan
Labor intensity: 2 ECTS, 72 academic hours
Form of final control: exam (pass/fail)
Standard Studies Period: 2 years

Course description: The course is designed for the future specialists in applied mathematics. It aims to show students the modern problems of their specializations and to unfold some methodological problems that anyone working in the field most frequently encounters. This is the major rationale for the course.

History and Methodology of Applied Mathematics and Informatics

Lecturer: Prof. Dr. Parkev Avetisyan
Labor intensity: 2 ECTS, 72 academic hours
Form of final control: exam (pass/fail)
Standard Studies Period: 2 years

Course description: The course is designed for the future specialists in applied mathematics. It aims to show students the historical roots of their specializations and to unfold some methodological problems that anyone working in the field most frequently encounters. This is the major rationale for the course.