

**Western Libraries
Collections Management Policy
For Applied Mathematics**

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Subject librarian: Dan Sich

Purpose of the Collection:

The Applied Mathematics collection of Western Libraries is intended to support the research activities of faculty, students and staff and the instructional requirements of undergraduate and graduate programs. The collection also provides support for teaching and research in a wide variety of related fields such as Engineering and the Sciences.

The Allyn & Betty Taylor Library is the primary location for material supporting the research and instructional needs of the Applied Mathematics department.

Research Support:

The library supports research by collecting in areas of research interest including:

- Algorithms (especially for Computer Algebra)
- Anomalous diffusion
- Applied dynamical systems
- Applied probability theory
- Biological mathematics
- Biological physics
- Biomechanics
- Black hole thermodynamics
- Blood flow
- Cellular automata
- Chaos, dynamical systems and predictability
- Colloidal systems & electrokinetics
- Complex fluids
- Computational materials science
- Computational methods, multiscale modeling
- Computer algebra systems
- Computer simulation
- Cosmology
- Developing numerical methods and analytical techniques to study the above
- Difference equations
- Differential equations (ODEs, PDEs, FDEs)

- Dynamical symmetry breaking
- Dynamical systems
- Elementary particle physics
- Energy finance (electricity spot price modelling; weather derivatives, optimal control of generating assets)
- Evolutionary game theory
- Evolutionary theory
- Field theory
- Financial mathematics (including credit risk management and pricing)
- Flow-induced vibration
- Flows in industrial machinery
- Gauge theory
- Geometric & algebraic algorithms
- Granular matter
- Gravitation
- Information theory and cryptography based chaos
- Interaction of signal and noise in the nervous system
- Limit cycles and Hilbert's 16 problem
- Low Reynolds number flow
- Lubrication
- Materials physics
- Mathematical biology
- Mathematical models of experimental evolution
- Microhydrodynamics
- Models in population biology, disease transmission
- Monte Carlo methods
- Monte Carlo simulation
- Nanomagnetism
- Nanosystems
- Neural networks
- Nonlinear differential equations (especially PDE)
- Nonlinear systems and chaotic dynamics
- Normal form theory of differential equations
- Numerical methods and analysis
- Organic mathematics
- Pattern formation
- Phase transitions and critical phenomena
- Population biology
- Population genetics
- Quantum field theory
- Quantum gravity
- Radiation thermodynamics
- Real options (application of financial math ideas to operations research problems)

- Reliability of numerical methods for dynamical systems
- Scientific computation
- Self-assembly
- Soft condensed matter physics
- Soft matter physics
- Stability, bifurcation control and chaos control
- Statistical mechanics
- Stochastic modeling
- Structure and transition rates for complex ions
- Superstring theory
- Supersymmetry
- Suspensions of particles
- Symbolic computation
- Theoretical atomic physics
- Theoretical biology
- Theoretical physics
- Theory and simulation of micro and nano-fluidic devices
- Tracer kinetics in positron tomography
- Ultra-thin magnetic films
- Vector/parallel code development and computations on CRAY J90

Instructional Support:

A. Graduate Programs

Graduate degrees are offered at the Master of Science and Ph.D. levels. Supervisors are assigned at the point of admission because of the associated financial support. Areas of research specialization are within the areas mentioned above.

Collecting supports these areas of strong research specialties. Collecting is done with attention to the courses listed in the academic calendar which currently include:

- Applications of Group Theory in Physics
- Applications of Fluid Dynamics
- Applied Computer Algebra
- Applied Mathematical Stochastics
- Asymptotic Evaluation of Integrals
- Asymptotic Solutions of Differential Equations
- Boundary Layers
- Chaos
- Classical Field Theory
- Compressible Flow
- Computational Financial Mathematics
- Computational Linear Algebra
- Continuum Mechanics

- Elementary Particle Theory
- Field Theory
- Financial Markets (including Quantitative Finance)
- Finite Elements
- Fluid Dynamics
- General Relativity
- Gravitation
- Hydrodynamic Stability
- Information Theory and Its Applications
- Integral Equations and Wiener-Hopf Technique
- Integral Transforms and their Applications
- Integral Transforms and Eigenfunction Expansion
- Linear Operators for Physical Science
- Materials Modelling
- Mathematical Biology
- Mathematical Methods for Engineers
- Mathematics of Financial Options
- Modern Perturbation Theory
- Methods of Applied Mathematics
- Methods of Low Probability, High Impact Events
- Monte Carlo Finance
- Non-Abelian Field Theory
- Non-linear Dynamics
- Numerical Analysis
- Numerical Methods
- Numerical Solutions to Partial Differential Equations
- Optimal Control
- Optimal Control of Stochastic Systems and its Applications
- Partial Differential Equations
- Particle Physics
- Plasma Physics
- Principles of Continuum Mechanics
- Quantitative Finance
- Quantum Field Theory
- Quantum Mechanics
- Quantum Theory
- Scientific Computing
- The Solitary Wave and Inverse Scattering
- Special Functions
- Statistical Physics
- Supersymmetry in Particle Physics
- Theoretical Condensed Matter Physics
- Theory and Modeling of Transport in Fluids and Materials
- Turbulence

- Viscous Flow
- Wavelets Theory and Applications

Collecting is also done to support general competence in the field outside the research specialty.

B. Undergraduate Programs

The Department offers a variety of programs leading to undergraduate degrees with a focus on the fields of Biomathematics, Computational Methods and Numerical Analysis, Financial Mathematics, or Theoretical Physics.

Applied Mathematics courses are fundamental for many science and applied sciences students across the campus. Collecting is done with systematic attention to the courses listed in the academic calendar which currently include:

- Applied Mathematics
- Calculus
- Linear Algebra
- Differential Equations

Physical format:

Acquisitions will include monographs, book series, and journals. Resources, particularly journals, in digital format are preferentially selected over their print counterparts. Alternate formats, such as CD-ROM, video, DVD, and microform, are considered on an individual request basis.

Language:

English is the primary language of the collection. Materials in other languages may be acquired upon request to support the research.

Source of Publication:

Sources of publication are primarily Canada, the United States, the United Kingdom, and Western Europe. Material published in other regions may be considered on request and will be evaluated for quality and relevance.

Date of publication:

Materials with a recent imprint date are preferred. Older material will be considered upon request.

Exclusions:

With the exception of individual requests and some selective acquisitions, the following types of material are not acquired: conference proceedings, theses or dissertations from other institutions, and course textbooks.

Related collections and cooperation:

The Western Libraries collection for Applied Mathematics is supplemented by collections in related fields, such as Physics, Pure Mathematics and Statistical & Actuarial Sciences.

Gifts:

The library gratefully accepts gifts of materials in good condition. As considerable expense is incurred by Western Libraries in the receipt and processing, the library only accepts gifts of materials which support current teaching and research needs, or which are not adequately represented in the collection.

Managing the Collection:

In order to ensure that collections remain optimally useful for our patrons, it is necessary to analyze collection usage and available space regularly. Items will need to be selectively removed from the active collection from time to time.

Duplicate items that are no longer required to support the curriculum, and damaged items that can no longer be replaced may be removed from the collection at the discretion of the Subject Librarian.

Items that are unique to Western may be transferred to a storage facility. Material housed in these storage facilities is available on request through the Library Catalogue.

Criteria for transfer selection include, but are not limited to, the following:

- 1) Outdated or previous editions of titles
- 2) Medium- to low-use items
- 3) Material that is available in alternate formats, i.e., online
- 4) Materials that would benefit from storage in a more controlled environment

Consult the Subject Librarian for Applied Mathematics for further details about these criteria.

Resources to aid in acquisition of material:

Subject profiles have been set up in Coutt's OASIS to facilitate the discovery of new publications. OASIS also enables the ordering of items.

Book reviews and other library's holdings (via WorldCat) are used to gauge the suitability of titles for the library collection.