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discusses the

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of random

experiments using the
theory of probability.

It focuses on the way
in which the results or
outcomes of

experiments vary and

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evolve over time. The text begins with a review of relevant

fundamental probability. It then covers several basic gambling problems, random walks, and Markov chains. The authors go on to develop random processes continuous in time, including

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Poisson, birth and death processes, and general population models. While focusing on queues, they present an extended discussion on the analysis of associated stationary processes. The book also explores reliability and other random processes,

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such as branching processes, martingales, and a

simple epidemic. The appendix contains key mathematical results for reference. Ideal for a one-semester course on stochastic processes, this concise, updated textbook makes the material accessible to

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students by avoiding specialized applications and

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from this introduction
with only a basic
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and probability.

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This book covers the

most important

elementary facts

regarding stochastic

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undergraduates as well as to others who want to gain

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financial mathematics, etc., who want to learn the basics of

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mathematical analysis, but is not assumed to have any particular knowledge of probability theory

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(which is rapidly developed in Chapter 2 of the book).

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although numerical methods and statistical inference

methodologies for studying diffusion processes are also presented. The goal is the development of techniques that are applicable to a wide variety of stochastic models that appear in physics, chemistry and

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other natural sciences. Applications such as stochastic resonance, Brownian motion in periodic potentials and Brownian motors are studied and the connection between diffusion processes and time-dependent statistical mechanics is elucidated. The book contains a large

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students interested in
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textbook is to bring
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of being acquainted with stochastic, kinetic and nonequilibrium

processes. Although the research

techniques in these areas have become

standard procedures, they are not usually

taught in the normal courses on statistical

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subject. Brownian motions

are a stochastic process, central to many applications and easy to treat.

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Markov chains and stochastic analysis. The readers are led directly to the core of the main topics to be treated in the context. Further details and additional materials are left to a section containing abundant exercises for further reading and studying. In the part on Markov

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chains, the focus is on the ergodicity. By using the minimal nonnegative solution method, we deal with the recurrence and various types of ergodicity. This is done step by step, from finite state spaces to denumerable state spaces, and from discrete time to

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continuous time. The methods of proofs adopt modern techniques, such as coupling and duality methods. Some very new results are included, such as the estimate of the spectral gap. The structure and proofs in the first part are rather different from other existing

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textbooks on Markov chains. In the part on stochastic analysis,

we cover the martingale theory and Brownian motions, the stochastic integral and stochastic differential equations with emphasis on one dimension, and the multidimensional stochastic integral

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*rather concise
manner where we
present the two*

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parts in stochastic
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*readers are lead
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structure and
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***Markov chains. In
the part on
stochastic
analysis, we cover
the martingale
theory and
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essential
application of the
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has been a

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University in St

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Paul Vrbik is

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processes a few
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**two principles.
The first is to
prove things "p
robabilistically"
whenever
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"probabilistic"
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as possible.

Thus, for
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example, the
asymptotics of
 p_n for large n ,
where P is a
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developed in
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**and hitting
times rather
than, say,
pulling in
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Similarly in
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**studied through
conditional
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forms. The
second
principle I have
tried to follow
is to only prove
results in their
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