

**Course:** MATH 4P85 (Topics in Advanced Statistics)  
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## Topics to be covered

### Continuous-time stochastic processes:

Poisson process and its extensions (non-homogeneous, in several dimensions, compound, of random duration, the  $M/G/\infty$  queue).

Birth and Death processes and their stationary distribution (pure birth, pure death, linear growth with and without immigration,  $M/M/\infty$  queue, power supply problem).

$M/M/c$  queue and servicing problems (server utilization, expected waiting time, busy and idle cycles, etc.)

Absorbing states and related issues (probability of ultimate extinction, expected time till extinction, etc.)

Continuous-time Markov chains and their infinitesimal generators (constituent matrices, extinction, etc.)

Diffusion and Brownian motion (drift and diffusion coefficients, absorbing barrier, etc.)

**Textbook:** Vrbik J and Vrbik P: "Informal Introduction to Stochastic Processes with Maple"

**Reference book:** Pinsky M and Karlin S: "An Introduction to Stochastic Modelling"

<b>Marking Scheme:</b>	<b>Assignments (bi-weekly)</b>	<b>25%</b>
	<b>Two Midterms</b>	<b>15% each</b>
	<b>Final Exam</b>	<b>45%</b>

Academic misconduct is a serious offence. The principle of academic integrity, particularly of doing one's own work, documenting properly (including use of quotation marks, appropriate paraphrasing and referencing/citation), collaborating appropriately, and avoiding misrepresentation, is a core principle in university study. Students should consult Section VII, "Academic Misconduct", in the "Academic Regulations and University Policies" entry in the Undergraduate Calendar, available at <https://brocku.ca/webcal/2019/undergrad/areg.html> to view a fuller description of prohibited actions, and the procedures and penalties.

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- a) If you require academic accommodation because of a disability or an ongoing health or mental health condition, please contact Student Accessibility Services at [askSAS@brocku.ca](mailto:askSAS@brocku.ca) or 905 688 5550 ext. 3240.
- b) If you require academic accommodation because of an incapacitating medical condition, you must, as soon as practicable, inform your instructor(s) of your inability to complete your academic work. You must also submit a Brock University Student Medical Certificate (found at <https://brocku.ca/registrar/toolkit/forms>). The University may, at its discretion, request more detailed documentation in certain cases. If you are unable to write a scheduled examination due to an incapacitating medical condition, you must follow the process set out in the [Faculty Handbook III:9.4.1](#).