

From Rash, Agnes M. and Brian Winkel. 2009. Birth and Death Process Modeling Leads to the Poisson Distribution: A Journey Worth Taking. *PRIMUS*. 19(1): 57-73.

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In this paper there are details of development of the general birth and death process from which we can extract the Poisson process as a special case. This general process is appropriate for a number of courses and units in courses and can enrich the study of mathematics for students as it touches and uses a diverse set of mathematical topics, e.g., probability, differential equations, difference equations, calculus, and infinite series. We guide the reader through the assumptions, derivation, and modeling applications which will permit the study of this useful subject in a number of settings. We offer illustrations of the Poisson process to demonstrate its applicability to interesting and real-life situations.