

**Speaker:**  
**Associate Professor Erik Schögl,**  
**Quantitative Finance Research Centre**  
**University of Technology, Sydney**

**Date: Tuesday, Tuesday June, 26 2007, 2-3pm**  
**Venue: E4A 523 (level 5 seminar room)**

**Title: Gram/Charlier Series A Expansions for Option Pricing**

**Abstract:** One of the key requirements for a model used to price tailored derivative financial instruments in practice is that the model fits observed market prices for standard options, which are typically expressed in the form of an "implied volatility surface." This can be achieved by extracting an implied probability distribution or stochastic process for the evolution of the underlying asset(s) from market prices. One way to go about this is to approximate the relevant probability densities by Gram/Charlier Series A expansions. In option pricing, this has been used previously to fit risk-neutral asset price distributions to the implied volatility smile, ensuring an arbitrage-free interpolation of implied volatilities across exercise prices. However, the existing literature is restricted to the case of the density of a single asset price, for a single time horizon, with the series expansion truncated after the fourth moment. I present an option pricing formula in terms of the full (untruncated) series and discuss a fitting algorithm, which ensures that a series truncated at a moment of arbitrary even order represents a valid probability density. The pricing formula is then extended to options on multiple assets and with multiple event dates.