LINKÖPINGS TEKNISKA HÖGSKOLA
Tekniska fakultetskansliet

FÖRSLAG TILL PROGRAMNÄMND INFÖR ÅR ____2012

NÄMND/NÄMNDER: EF och IL

Förslagsställare (Namn, funktion, Inst/Enhet)

John Noble, universitetslektor, MAI / Torbjörn Larsson, studierektor, MAI

FÖRSLAGET GÄLLER:

a) EXISTERANDE KURS (Ange kurskod och kursnamn)

b) NY KURS (Ange kursnamn, årskurs, önskad läsperiod, schemablocksplacering. Bifoga utkast till kursplan.)

Time Series, vt2

c) ÄNDRING I EXISTERANDE PROFIL/INRIKTNING (Ange Program och Profil/Inriktning. Bifoga beskrivning över vad förslaget går ut på.)

d) NY PROFIL/INRIKTNING (Ange Program och Profilnamn. Bifoga utkast till Profilbeskrivning.)

e) ÖVRIGT (Bifoga beskrivning över vad förslaget går ut på.)

PROGRAMNÄMNDENS BESKED:

FÖRSLAGET I DETALJ:

Time series is an important topic in several areas. One area where it is of crucial importance is financial mathematics. Students with a good training in financial mathematics tend to find good jobs rather easily when leaving the university. The course TAMS29 (Stochastic processes applied to

finance) gives important material for a finance profile, but an additional course in time series is needed to complement this. A course in Time Series would improve substantially the profile of students specialising in finance. Furthermore, following a time series course, they would have the expertise for a much larger selection of examensarbete projects.

The detailed proposal is to run a 6hp course in vt2 (following the course TAMS29 in vt1) loosely based on the book by P.J. Brockwell and R.A. Davis, 'Introduction to Time Series and Forecasting' using MATLAB and the 'System Identification' toolbox. The topics to be included are as follows:

Introduction, stationarity, trends, seasonal components, differencing.
Autocovariance of stationary time series, the spectral density. Time series models, moving averages, the MA(q), ARMA(p,q) and AR(p) processes.
Estimating the mean and autocovariance, prediction, the Durbin Levinson algorithm, the innovations algorithm.
The Wold decomposition, partial correlation / autocorrelation, ARMA processes in more detail, prediction of an ARMA process.
Spectral analysis, spectral representation of a time series, prediction in the frequency domain, interpolation and detection, application to the Itô integral.
Estimating the spectral density: the periodogram, smoothing the periodogram. Linear filters.
Estimation for linear filters: the ARMA model, Yule-Walker estimation, Burg's algorithm, the innovations algorithm, the Hannan-Rissanen algorithm, maximum likelihood and least squares estimation.
Unit roots: the ARIMA(p,d,q) and FARIMA(p,d,q) processes. Multivariate time series.
Financial time series, the ARCH and GARCH processes, the non linear ARCH process.
Kalman filtering.

Programs: I, Ii, MMAT, and Y
The prerequisities are the same as for TAMS29. Although the new course complements TAMS29, the latter course is not a prerequisite.