![CIT Instdiúid Teicneolaíochta Chorcaí Cork Institute of Technology]

Module Details

Title:	Time Series & Factor Analysis APPROVED
Long Title:	Time Series & Factor Analysis

Module Code:	STAT9005

Credits:	5

NFQ Level:	Expert

Field of Study:	Statistics

Valid From:	Semester 1 - 2017/18 (September 2017)

Module Delivered In	1 programme(s)

Module Coordinator:	AINE NI SHE

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Module Description:	This module will provide the learner with the necessary tools to develop and critically evaluate structural equation modelling and time series models. In this module, data will be summarised using factor analysis, while the forecasting function of models is presented and evaluated, enabling the learner to create short and medium term forecasting models.

Learning Outcomes

On successful completion of this module the learner will be able to:

LO1	Implement factor analysis techniques on a large dataset and interpret the resulting models.
LO2	Apply the theoretical principles that govern a time series.
LO3	Apply regression and time series model for prediction.
LO4	Critically analyse and report on the paradigm under which forecasts are being made, along with their reliability. Perform residuals analysis and tests of fit.
LO5	Use statistical packages to generate and analyse models.

Pre-requisite learning

Module Recommendations
This is prior learning (or a practical skill) that is strongly recommended before enrolment in this module. You may enrol in this module if you have not acquired the recommended learning but you will have considerable difficulty in passing (i.e. achieving the learning outcomes of) the module. While the prior learning is expressed as named CIT module(s) it also allows for learning (in another module or modules) which is equivalent to the learning specified in the named module(s).

No recommendations listed

Incompatible Modules
These are modules which have learning outcomes that are too similar to the learning outcomes of this module. You may not earn additional credit for the same learning and therefore you may not enrol in this module if you have successfully completed any modules in the incompatible list.

No incompatible modules listed

Co-requisite Modules

No Co-requisite modules listed

Requirements
This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed. You may not enrol on this module if you have not acquired the learning specified in this section.

No requirements listed

Co-Requisites

No Co Requisites listed

Module Content & Assessment

Indicative Content
Factor analysis Assumptions, Data screening, Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), Structural Equation Modelling (SEM).
Time series analysis Decomposition (trend, periodicity, seasonality, white noise), Smoothing Techniques, Autoregressive (AR), Moving Average (MA) and mixed (ARIMA) models.
Forecasting Forecast Error, Confidence Intervals, MAE, MAPE, RMSE, Ljung-Box statistic.
Software packages R, Minitab, Excel, SPSS

Assessment Breakdown	%
Course Work	100.00%

Course Work				
Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Practical/Skills Evaluation	Apply factor analysis to a dataset. Derive a model from the result.	1,5	30.0	Week 5
Short Answer Questions	Theory test	1,2,3,4	20.0	Week 9
Project	Analyse datasets and report on the results	1,2,3,4,5	50.0	Sem End

No End of Module Formal Examination

Reassessment Requirement
Repeat examination *Reassessment of this module will consist of a repeat examination. It is possible that there will also be a requirement to be reassessed in a coursework element.*

The institute reserves the right to alter the nature and timings of assessment

Module Workload

Workload: Full Time

WorkLoad Type	WorkLoad Description	Hours	Frequency	Average Weekly Learner Workload
Lecture	Lecture	2.0	Every Week	2.00
Lab	Computer practical	2.0	Every Week	2.00
Independent & Directed Learning (Non-contact)	Work based on texts and class material	3.0	Every Week	3.00
			Total Hours	7.00
			Total Weekly Learner Workload	7.00
			Total Weekly Contact Hours	4.00

Workload: Part Time

WorkLoad Type	WorkLoad Description	Hours	Frequency	Average Weekly Learner Workload
Lecture	Lecture	1.5	Every Week	1.50
Lab	Computer practical	1.5	Every Week	1.50
Independent & Directed Learning (Non-contact)	Work based on texts and class material	4.0	Every Week	4.00
			Total Hours	7.00
			Total Weekly Learner Workload	7.00
			Total Weekly Contact Hours	3.00

Module Resources

Recommended Book Resources

- **Douglas C. Montgomery, Cheryl L. Jennings, Murat Kulahci 2015,** *Introduction to Time Series Analysis and Forecasting*, **John Wiley & Sons [ISBN: 1118745116]**
- **Niels J. Blunch 2013,** *Introduction to Structural Equation Modeling Using IBM SPSS Statistics and Amos*, **2 Ed., Sage Publications Ltd [ISBN: 978-144624900]**

Supplementary Book Resources

- **Bruce L. Bowerman, Richard T. O'Connell, Anne B. Koehler 2005,** *Forecasting, time series, and regression: An Applied Approach*, **Thomson Brooks/Cole Belmont, CA [ISBN: 978-0534409777]**
- **Randall E. Schumacker 2016,** *A Beginner's Guide to Structural Equation Modeling*, **4 Ed., Routledge [ISBN: 1138811939]**
- **Timothy A. Brown 2015,** *Confirmatory Factor Analysis for Applied Research*, **2 Ed., Guilford Press [ISBN: 1462515363]**
- **Rex B. Kline 2015,** *Principles and Practice of Structural Equation Modeling*, **4 Ed., Guilford Press [ISBN: 1462523344]**

This module does not have any article/paper resources

Other Resources

- **Online textbook: Rob J Hyndman and George Athanasopoulos** *Forecasting: principles and practice* **http://otexts.com/fpp/**
- **Online textbook: StatSoft** *How To Identify Patterns in Time Series Data: Time Series Analysis* **http://www.statsoft.com/textbook/time-se ries-analysis/**
- **Website: Gaskin, J.** *http://statwiki.kolobkreations.com/wiki/ Main_Page*

Module Delivered In	
Programme Code	*Programme Title*
CR_SDAAN_9	Master of Science in Data Science and Analytics (Approved)