

BUSINESS ANALYTICS

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1. Introduction

Literature is not unanimous when defining the term business/data analytics. Analytics is “extensive use of data, statistical and quantitative analysis, exploratory and predictive models, and fact-based management to drive decisions and actions” (Davenport and Harris, 2007)¹. However, the Institute for Operations Research and the Management Sciences (INFORMS) recommends Boyd (2012) definition on analytics. “Analytics is the scientific process of transforming data into insight for making better decisions” (Boyd, 2012)². Analytics can be thought as a set of processes that transform raw data into meaningful information to improve decision making (Wilder & Ozgur, 2015)³. The body of knowledge of analytics is generally discussed under four categories based on the level of advancement and complexity: descriptive analytics, diagnostic analytics predictive analytics and prescriptive analytics (Power et al, 2018)⁴.

Literature identifies essential skills to pursue analytics employment opportunities at three different levels and each level may lead to different career paths (Watson 2013)⁵. The first skill level applies for STEM graduates (broadly referred to as data scientists) with sound foundation in computer science and probability & statistics (Davenport & Patil, 2012)⁶. The second skill level refers to data specialists. The final skill level applies to interdisciplinary roles known as business analytics / analysts or “data-savvy managers” (Manyika et al., 2011)⁷. They must be able to:

- Identify and exploit business opportunities.
- Demonstrate sufficient functional expertise to frame business problems.
- Efficiently and effectively use analytics tools confidently and report implications.

Wilder & Ozgur (2015) and INFORMS (2018)⁸ propose essential knowledge areas for a typical Business Analytics bachelors programme: Data Management, Descriptive Analytics, Data Visualization, Predictive Analytics, Prescriptive Analytics, Data Mining, and Analytics Practicum. Later, ACM⁹, in their

¹ Davenport, T. H. (2006). Competing on analytics. *Harvard business review*, 84(1), 98.

² Boyd, A. E. (2012). Profit center: Revisiting ‘what is analytics’. *Analytics Magazine*.

³ Wilder, C. R., & Ozgur, C. O. (2015). Business analytics curriculum for undergraduate majors. *INFORMS Transactions on Education*, 15(2), 180-187.

⁴ Power, D. J., Heavin, C., McDermott, J., & Daly, M. (2018). Defining business analytics: an empirical approach. *Journal of Business Analytics*, 1(1), 40-53.

⁵ Watson, H. J. (2013). All about analytics. *International Journal of Business Intelligence Research (IJBIR)*, 4(1), 13-28.

⁶ Davenport, T. H., & Patil, D. J. (2012). Data scientist. *Harvard business review*, 90(5), 70-76.

⁷ Manyika, J., Chui, M., Brown, B., Bughin, J., Dobbs, R., Roxburgh, C., & Hung Byers, A. (2011). *Big data: The next frontier for innovation, competition, and productivity*. McKinsey Global Institute.

⁸ Cochran, J. J. (Ed.). (2018). *Informatics analytics body of knowledge*. John Wiley & Sons.

⁹ <https://www.acm.org/binaries/content/assets/education/curricula-recommendations/is2020.pdf> (P106)

curriculum recommendations in 2020, identifies the following seven competencies a business analytics / data science graduate should be able to perform.

- Apply the principles of computational thinking (CT) to learning data science
- Analyze data science problems with a CT framework
- Express a business problem as a data problem
- Perform exploratory data analysis from inception to the value proposition
- Explain the core principles behind various analytics tasks
- Articulate the nature and potential of Big Data
- Demonstrate the use of big data tools on real world case-studies

2. Structure of Business Analytics Specialization

The Business Analytics 2021 curriculum contains 120 GPA credits and 10 NGPA credits¹⁰. Following the INFORMS Analytics Body of Knowledge published in 2018 and the ACM Data Science Task Force (2021) recommendations, the Business Analytics 2021 curriculum includes subject modules under four learning verticals: Analytics, Enterprise, Finance and Computing. Refer to the Qualification Structure shown in Figure 01¹¹.

A learning vertical progresses from Level 01 to Level 04 during a 4-year tenure. A level has two, 15-week long academic semesters and assessment periods. An undergraduate will be eligible for industrial training after completing all 8 academic semesters.

2.1. Minor in Quantitative Finance

Depending on the resource availability, candidates following the Business Analytics specialization may be offered a minor in Quantitative Finance. Quantitative Finance minor subjects are as follows:

- Semester 2: Fundamentals of Finance
- Semester 3: Financial Management
- Semester 4: Corporate Finance
- Semester 5: Business Valuation and Analysis, Ethics and Professionalism
- Semester 6: Investment and Portfolio Management
- Semester 7: Stochastic Finance, Financial Derivative, Time Series Econometrics
- Semester 8: Introduction to FinTech, Technical Analysis, Financial Risk Management

¹⁰ GPA and NGPA stand for Grade Point Average and None Grade Point Average. 1 Credits equals to 50 notional hours (SLQF, 2015).

¹¹ For easy use, this document uses the colour scheme given for learning verticals throughout.

2.2. Minor in Enterprise Systems

Depending on the resource availability, candidates following the Business Analytics specialization may be offered a minor in Enterprise Systems. Enterprise Systems minor subjects are as follows:

- Semester 3: Operations Management
- Semester 5: Digital Transformation in Practice, Innovation by Design Thinking
- Semester 6: Business Workflow Automation, Enterprise Resource Planning (ERP) Systems
- Semester 7: ERP: Financial, Demand-side & Supply-side Business Processes, Advanced Business Analysis

The rest of the document is organized as follows: Section 3 outlines semester offering details (Module code, Module label, Category, GPA/NGPA and assessment structure). Section 4 provides descriptors for each module.

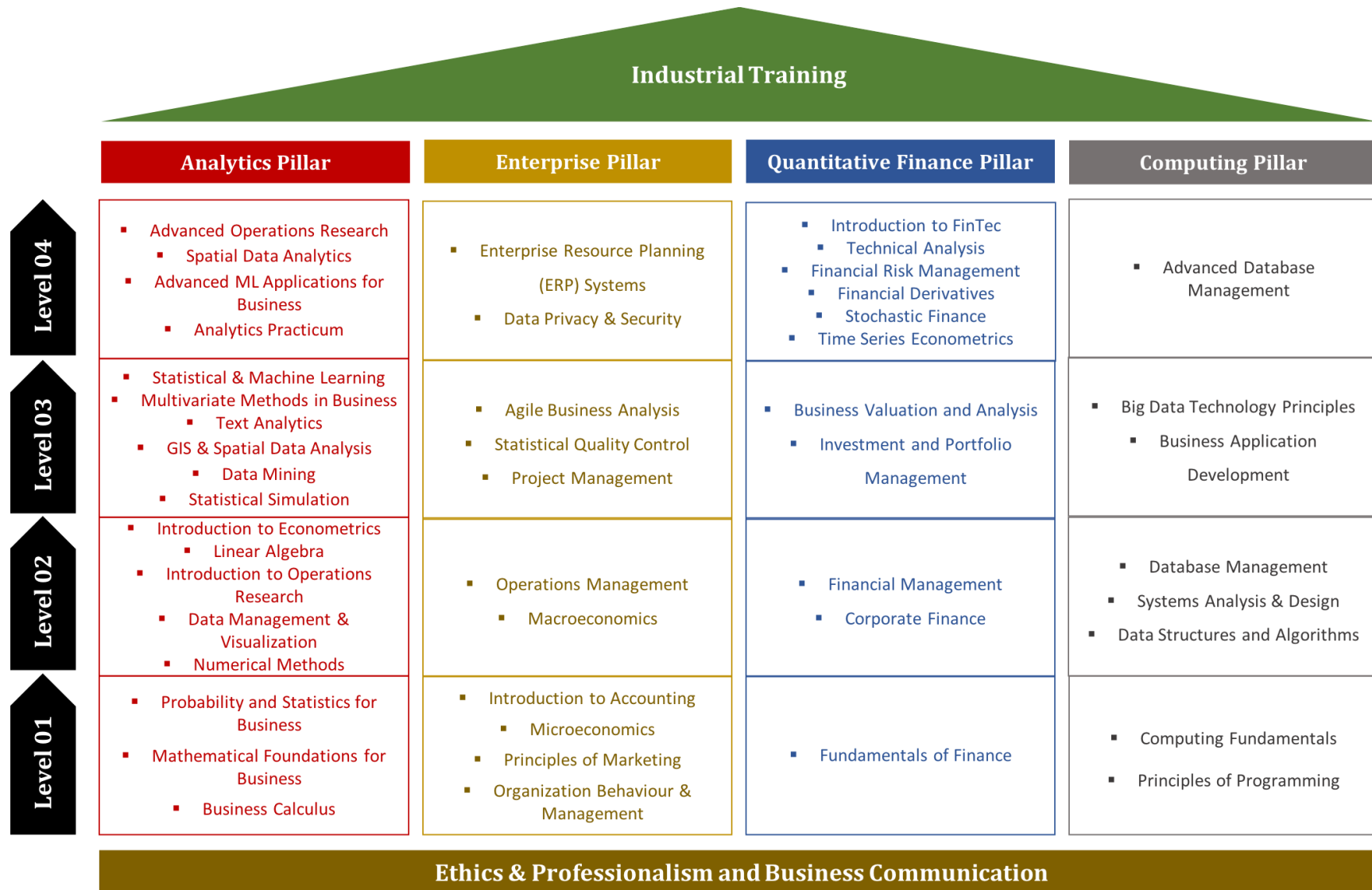


Figure 1. Qualification Structure

3. Semester offering details

Module Code	Module Name	Category C/E/O	Norm		Evaluation %	
			GPA	NGPA	CA	WE
Semester 1			16.0			
DA1111	Probability and Statistics for Business - I	C	3.0		50	50
DA1321	Principles of Programming	C	3.0		50	50
DA1311	Computing Fundamentals	C	3.0		50	50
DA1411	Mathematical Foundations for Business	E	3.0		50	50
IM1351	Introduction to Accounting	E			50	50
IM1641	Microeconomics	C	2.0		50	50
DB1111	Business Communication Skills – I	C	2.0		100	0
Total			16.0	0.0		

Note: DA1411 is compulsory for students who have not offered Combined Mathematics or Higher Mathematics at the G C E Advanced Level. IM1351 is compulsory for students who have not offered Accounting at the G C E Advanced Level.

Module Code	Module Name	Category C/E/O	Norm		Evaluation %	
			GPA	NGPA	CA	WE
Semester 2			15.0			
DA1121	Probability and Statistics for Business - II	C	3.0		50	50
DA1341	Data Structures and Algorithms	C	3.0		50	50
IM1631	Macroeconomics	C	2.0		50	50
DA1421	Business Calculus	C	3.0		50	50
IM1261	Fundamentals of Finance	C	2.0		50	50
DB1121	Business Communication Skills – II	C	2.0		100	0
Total			15.0	0.0		

Module Code	Module Name	Category C/E/O	Norm		Evaluation %	
			GPA	NGPA	CA	WE
Semester 3			16.0			
DA2421	Introduction to Econometrics	C	2.0		50	50
DA2311	Database Management	C	3.0		100	0
DA2321	Systems Analysis & Design	C	2.0		50	50
IM2211	Financial Management	C	3.0		50	50
DA2411	Linear Algebra	C	3.0		50	50
DA2921	Operations Management	C	3.0		50	50
Total			16	0		

Module Code	Module Name	Category C/E/O	Norm		Evaluation %	
			GPA	NGPA	CA	WE
Semester 4			16.0			
DA2111	Statistical & Machine Learning	C	3.0		100	0
DA2451	Multivariate Methods in Business	C	3.0		50	50
DA2431	Introduction to Operations Research	C	3.0		50	50
IM2221	Corporate Finance	C	3.0		50	50
DA2121	Data Management & Visualization	C	2.0		100	0
DA2911	Technical & Scientific Writing	C		2.0	100	0
Total			14.0	2.0		

Module Code		Module Name	Category C/E/O	Norm		Evaluation %	
				GPA	NGPA	CA	WE
Semester 5				14.0			
DA3111	Text Analytics	C	2.0		100	0	
DA3481	GIS & Spatial Data Analysis	E	3.0		100	0	
DA3411	Business Valuation and Analysis	E			50	50	
DA3331	Business Application Development	C	3.0		100	0	
DA3451	Numerical Methods	E	2.0		50	50	
DA3221	Digital Transformation in Practice	E			100		
DA3931	Ethics and Professionalism	C		2.0	50	50	
DA3941	Supply Chain Management	C	2.0		50	50	
DA3101	Innovation by Design Thinking	O		2.0	100		
Total			12.0	4.0			

Module Code	Module Name	Category C/E/O	Norm		Evaluation %	
			GPA	NGPA	CA	WE
Semester 6			15.0			
DA3211	Agile Business Analysis	C	2.0		100	0
DA3131	Data Mining	C	2.0		50	50
DA3311	Enterprise Resource Planning (ERP) Systems	C	2.0		100	0
DA3461	Advanced Operations Research	C	3.0		50	50
DA3121	Business Workflow Automation	E	2.0		100	0
DA3441	Investment and Portfolio Management	E			50	50
DA3951	Principles of Marketing	C	2.0		50	50
DA3921	Organization Behaviour & Management	C	2.0		50	50
Total			15.0	0.0		

Module Code	Module Name	Category C/E/O	Norm		Evaluation %	
			GPA	NGPA	CA	WE
Semester 7			16.0			
DA4421	Time Series Econometrics	C	3.0		50	50
DA4321	Data Privacy & Security	C	2.0		100	0
DA4131	Advanced ML Applications for Business	C	3.0		100	0
DA4481	Spatial Data Analytics	E	2.0 ^a		100	0
DA4411	Financial Derivatives	E			50	50
DA4211	ERP Applications for Financial, Supply-side and Demand-side Business Processes	E			100	0
DA4471	Stochastic Finance	E			50	50
DA4431	Statistical Simulation	E			50	50
DA4231	Advanced Business Analysis	E			100	0
DA4901	Analytics Practicum	C		4.0		100
Total			16.0	0.0		

^a Two electives should be selected accounting for 4 credits.

Module Code	Module Name	Category C/E/O	Norm		Evaluation %	
			GPA	NGPA	CA	WE
Semester 8			16.0			
DA4311	Advanced Database Management	C	2.0		100	0
DA4641	Introduction to FinTech	C	2.0		50	50
DA4621	Big Data Technology Principles	C	2.0		100	0
DA4631	Project Management	C	2.0		50	50
DA4461	Technical Analysis	E	2.0		100	0
DA4511	Statistical Quality Control	E			50	50
DA4441	Financial Risk Management	E	2.0		50	50
DA4451	Stochastic Programming	E			100	0
DA4901	Analytics Practicum	C	4.0		100	0
Total			16.0	0.0		

Module Code	Module Name	Category C/E/O	Norm		Evaluation %	
			GPA	NGPA	CA	WE
Industrial Training			6.0			
DA4801	Industrial Training	C	6.0		100	
Total Credits			120	10		

Module Code	Module Name	Category C/E/O	Norm		Evaluation %	
			GPA	NGPA	CA	WE
Minor in Quantitative Finance						
DA3411	Business Valuation and Analysis	E	3.0		50	50
DA3441	Investment and Portfolio Management	E	2.0		50	50
DA4411	Financial Derivatives	E	3.0		50	50
DA4471	Stochastic Finance	E	2.0		50	50
DA4461	Technical Analysis	E	2.0		50	50
Minor in Enterprise Systems						
DA2921	Operations Management	C	3.0		50	50
DA3221	Digital Transformation in Practice	E	2.0		100	
DA3101	Innovation by Design Thinking	O		2.0	100	
DA3311	Enterprise Resource Planning (ERP) Systems	C	2.0		100	0
DA3121	Business Workflow Automation	E	2.0		100	0
DA4211	ERP Applications for Financial, Supply-side and Demand-side Business Processes	E	2.0		100	0
DA4231	Advanced Business Analysis	E	2.0		100	0

4. Module Descriptors

Module Code	DA1111	Semester 1	Module Title			Probability and Statistics for Business – I				
Credits	3	Hours/Week			C	E	O	Evaluation %		Prerequisites
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	W E	None
		2	2	6				50	50	
Module Aim:	This module aims to provide a basic knowledge of probability and statistics for solving business problems.									
Learning Outcomes										
After completing this module, the students should be able to:										
LO-1	Apply fundamental probabilistic techniques to quantify the uncertainty of a random experiment									
LO-2	Analyze and evaluate data using fundamental descriptive statistical techniques									
LO-3	Apply rudimentary statistical techniques such as sampling, estimation and hypothesis testing in analyzing business scenarios and problems									
LO-4	Make use of statistical software (R, Python) for statistical data analysis									
Syllabus Outline										Learning Outcomes
1	Introduction to set theory and basic probability [6 hrs] <i>Counting and sets, basics of combinatorics and permutations, basics of probability, conditional probability, Bayes’ Theorem</i>									LO-1
2	Random variables and probability distributions [10 hrs] <i>Introduction to random variables, discrete and continuous distributions, moments of random variables, moment generating functions, Binomial, Poisson and normal distributions</i>									LO-1
3	Descriptive statistics and exploratory data analysis [10 hrs] <i>Types of data, organizing and visualizing data, measures of central tendency and dispersion, correlation analysis</i>									LO-2, LO-4
4	Sampling, estimations & distributions [6 hrs] <i>Sampling methods, sampling distribution of the mean and proportion, the Central Limit Theorem</i>									LO-1, LO-3
5	Confidence interval estimation [6 hrs] <i>Confidence interval estimation for the mean and proportion, determining sample size</i>									LO-3, LO-4
6	Fundamentals of hypothesis testing [4 hrs] <i>Null and alternative hypothesis, critical value, errors in testing, power of a statistical test, one-sample tests</i>									LO-1, LO-3, LO-4
Assessments										
Assessment							Weight		Learning outcomes	
Continuous Assessments (CA)		In-class test - 01					25% [1.5 hrs]		LO-1, LO-2, LO-3	
		Lab practical test – 01					25% [1.5 hrs]		LO-2, LO-3, LO-4	
Written examination (WE)							50% [3 hrs]		LO-1, LO-2, LO-3	
References										

Module Code	DA1321	Semester 1	Module Title		Principles of Programming					
Credits	3	Hours/Week			C	E	O	Evaluation %		Prerequisites
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	W E	None
		2	2	6				50	50	
Module Aim:	The aim of this course is to build students’ confidence in their ability to learn programming and problem-solving skills.									
Learning Outcomes										
After completing this module, the students should be able to:										
LO-1	Analyze simple computing problems									
LO-2	Apply procedural statements — assignments, conditional statements, loops, method calls and arrays									
LO-3	Develop small programs in a selected programming language (e.g. Python) that meet the expressed requirements									
Syllabus Outline										Learning Outcomes
1	Concepts of Programming [6hrs] <i>Programming languages, problem definition, flow charts, pseudo codes</i>									LO-1
2	Elementary Programming [10 hrs] <i>Expressions, variables, operators</i>									LO-1, LO-2
3	Programming Structures [12 hrs] <i>Conditions, Loops, Procedures and Functions</i>									LO-2, LO-3
4	Advanced Concepts in Programming [12 hrs] <i>Lists, recursions, algorithms for problem solving</i>									LO-3
Assessments										
Assessment							Weight		Learning outcomes	
Continuous Assessments (CA)		In-class programming test - 01					20% [2 hrs]		LO-1, LO-2	
		In-class programming test - 02					30% [2 hrs]		LO-2, LO-3	
Written examination (WE)							50% [3 hrs]		LO-1, LO-2	
References										

Module Code	DA1311	Semester 1	Module Title		Computing Fundamentals					
Credits	3	Hours/Week			C	E	O	Evaluation %		Prerequisites
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	W E	None
		3	-	7				50	50	
Module Aim:	This course aims to introduce the fundamental principles on which computer systems are based on.									
Learning Outcomes										
After completing this module, the students should be able to:										
LO-1		Describe how a program is executed in a computer								
LO-2		Design Boolean circuits for simple logical problems								
LO-3		Apply knowledge about operating system behavior to develop efficient programs								
LO-4		Explain the basic models of computation								
Syllabus Outline										Learning Outcomes
1	Boolean logics [6 hrs] <i>Boolean algebra, Truth tables, Logic gates and circuits</i>									LO -2
2	System architecture [12 hrs] <i>von Neumann architecture, Memory hierarchy, Instruction sets and I/O Techniques</i>									LO-1
3	Basics of operating systems [12 hrs] <i>Process model, threads, scheduling, deadlocks and IO management</i>									LO-1, LO-2
4	Computing models [12 hrs] <i>Basic models of computation, finite automata and Turing machines</i>									LO-1, LO-4
Assessments										
Assessment							Weight		Learning outcomes	
Continuous Assessments (CA)		In-class test - 01					25% [1.5 hrs]		LO-1, LO-2	
		In-class test - 02					25% (1.5 hrs)		LO-2, LO-3	
Written examination (WE)							50% [3 hrs]		LO-1, LO-2, LO-3	
References										

Module Code	DA1411	Semester 1	Module Title			Mathematical Foundations for Business				
Credits	3	Hours/Week			C	E	O	Evaluation %		Prerequisites
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	W E	None
		2	2	6				50	50	
Module Aim:	The primary aim of this course is to provide an understanding of business calculus and apply basic calculus to solve applications in business and economics									
Learning Outcomes										
After completing this module, the students should be able to:										
LO-1	Demonstrate algebraic knowledge with topics including quadratic, exponential, logarithmic and trigonometric functions.									
LO-2	Analyze problems in business and management sciences to find optimal solutions using the theory of maxima and minima									
LO-3	Construct and interpret graphs of basic functions and their derivatives									
LO-4	Evaluate limits, continuity and derivatives of functions from their graphs and/or equations.									
Syllabus Outline									Learning Outcomes	
1	Fundamentals of Algebra [8 hrs] <i>Real numbers, polynomials, factoring polynomials, rational expressions, integral exponents and radicals, quadratic equations, inequalities and absolute value.</i>									LO -1
2	Functions and their graphs [6 hrs] <i>Cartesian coordinate system, equations of lines, functions and their graphs, algebra of functions, linear functions, cost, revenue & profit functions, quadratic functions, market equilibrium, demand & supply curves</i>									LO-1, LO-4
3	Exponential and Logarithmic Functions [6 hrs] <i>Introduction to exponential functions and its inverse, the logarithmic function and their applications.</i>									LO-1, LO-2
4	Topics in Trigonometry [4 hrs] <i>Trig functions and their graphs, Trig identities</i>									LO-1, LO-4
5	Calculus of one variable [18 hrs] <i>Limits, continuity, derivatives, Marginal functions, applications of the derivative, optimization, Implicit differentiation</i>									LO 2, LO-3, LO- 4
Assessments										
Assessment							Weight		Learning outcomes	
Continuous Assessments (CA)	In-class test – 1						15% [1.5 hrs]		LO-1, LO-3	
	In-class test – 2						15% [1.5 hrs]		LO-2, LO-3, LO-4	
	Quizzes [Take home]						10% [3 hrs]		LO-2, LO-3, LO-4	
	Homework [Tutorials]						10% [12 hrs]		LO-2, LO-3, LO-4	
Written examination (WE)							50% [3 hrs]		LO-1, LO-2, LO-3, LO-4	
References										

Module Code	IM1351	Semester 1	Module Title	Introduction to Accounting						
Credits	3	Hours/Week			C	E	O	Evaluation %		Prerequisites
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	WE	-
		2	2	6				50	50	
Module Aim:	This module aims to provide an introductory knowledge on accounting principles, standards and policies relating to the preparation of financial reports to facilitate sound decision making.									
Learning Outcomes										
After completing this module, the students should be able to:										
LO-1 Explain the concepts of financial reporting.										
LO-2 Demonstrate the reporting of accounting transactions.										
LO-3 Apply accounting concepts, principles and standards in accounting practice										
LO-4 Develop financial statements for profit motive and non-profit motive organization										
Syllabus Outline										Learning Outcomes
1	Accounting information in its decision-making context [9 Hrs] <i>History of accounting, Accounting environment, Double entry system, Ledger system and trial balance, Discuss accounting concepts and Accounting equations</i>									LO-1, LO-2
2	The statement of financial position and income statement [9 Hrs] <i>LKAS 01, LKAS 02, LKAS 16, Preparing the Financial Statement of private and listed companies</i>									LO-1, LO-4
3	Reporting and interpreting cash flows [6 Hrs] <i>LKAS 07, Identify the operational, investing and financial activities, Preparing the cash flows on direct and indirect methods and interpretation</i>									LO-4
4	Accounting for manufacturing concerns [6 Hrs] <i>Different cost classifications, Analyze costs in allocating OH cost, Calculating the product cost, Preparing manufacturing accounts and statement of costs</i>									LO-3
5	Accounting for incomplete records [3 Hrs] <i>Converting the incomplete records into useful information, Accounting equation method and final accounts preparation method</i>									LO-2
6	Accounting in non-profit organizations [3 Hrs] <i>Types of non-profit organizations, Subscription account, Income and expenses account, Cash receipts and payments account</i>									LO-4
7	Cash flows and financial statement analysis [7 Hrs] <i>Interpreting the financial statements, Horizontal and vertical analysis, Ratio analysis, Net present value and payback period</i>									LO-1, LO-4
Assessments										
Assessment							Weight		Learning outcomes	
Continuous Assessments (CA)		In-class test - 01					20% [2 hrs]		LO-1, LO-2, LO-3	
		Take-home assignment					30%		LO-1, LO-2, LO-3	
Written examination (WE)							50% [3 hrs]		LO-1, LO-2, LO-3	
References										

Module Code	IM1641	Semester 1	Module Title	Microeconomics					
Credits	2	Hours/Week		C	E	O	Evaluation %		Pre-requisites
GPA/NGPA	GPA	Lectures	Lab / Tutes				CA	WE	None
		2					50	50	
Module Aim:	This is an introductory course which explores the concepts, terminologies and methodologies of microeconomics for decision making.								
Learning Outcomes									
After completing this module, the students should be able to:									
LO-1	identify the microeconomics concepts, tools of analysis and various frameworks, standards and norms.								
LO-2	describe price theory and grasp basic ingredients of market mechanism in terms of supply, demand, elasticity and equilibrium.								
LO-3	explain production, costs, revenue and profit maximization including consumer and producer behavior.								
LO-4	discuss the efficiency and equity implications of various market structures.								
Syllabus Outline									Learning Outcomes
1	Introduction to microeconomic concepts and tools of analysis [3 Hrs] <i>Microeconomics concepts and tools, Business cycles</i>								LO-1
2	Production analysis and consumer and producer behaviour [6 Hrs] <i>Basic concepts of demand, supply and equilibrium, Impact of change in demand or supply on equilibrium</i>								LO-1, LO-2
3	Costs, revenue and profits maximization [7 Hrs] <i>Major influences in consumer behavior, Relevance of consumer behavior theories and concepts for marketing decision making.</i>								LO-3
4	Market structures and analytical tools [7 Hrs] <i>Characteristics of market structures, Effect of market on firm behaviour, market structures in real world</i>								LO-4
5	Pricing and price discrimination [6 Hrs] <i>Market information, Market Failures and the role of government</i>								LO-4
Assessments									
Assessment						Weight		Learning outcomes	
Continuous Assessments (CA)		In-class tests				20% [1 Hr]		LO-1, LO-2, LO-3	
		Individual assignment				30%			
Written examination (WE)						50% [2 Hrs]		LO-1, LO-2, LO-3, LO-4	
References									

Module Code	DB1111	Semester 1	Module Title	Business Communication I					
Credits	2	Hours/Week		C	E	O	Evaluation %		Pre-requisites
GPA/NGPA	GPA	Lectures	Lab / Tutes				CA	WE	None
		2					50	50	
Module Aim:	This is an introductory course which explores the concepts, terminologies and methodologies of microeconomics for decision making.								
Learning Outcomes									
After completing this module, the students should be able to:									
LO-1	demonstrate the effective use of English grammar and writing skills								
LO-2	demonstrate professional communication etiquette required in business environments								
LO-3	demonstrate the overall understanding of making business presentations including the use of relevant software applications								
Syllabus Outline									Learning Outcomes
1	Business English for Professionals <i>Revisit key elements of English Grammar, Vocabulary, Reading Skills</i>								LO-1
2	Essentials of Business Writing Sentence building, Letter writing, General Punctuation Review, Summarizing, Paraphrasing								LO-1
3	Professional Communication Etiquette Telephone etiquette, E-mail etiquette, Meeting etiquette (virtual & physical), Making appointments, Minute taking, Formatting texts, Common business abbreviations and phrases								LO-2
4	Making Effective Business Presentations <i>Analyzing Audience, preparing for presentations, delivering presentations, shaping a presentation, software applications (i.e. PowerPoint, Keynote, Prezi)</i>								LO-3
Assessments									
Assessment						Weight		Learning outcomes	
Continuous Assessments (CA)	In-class test/quiz					30%		LO-1, LO-2, LO-3	
	Assignment					20%			
	Business Presentation Assignment					30%			
Written examination (WE)						20% [1 hrs]		LO-1, LO-2, LO-3	
References									

Module Code	DA1121	Semester 2	Module Title			Probability and Statistics for Business – II				
Credits	3	Hours/Week			C	E	O	Evaluation %		Prerequisites
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	WE	DA1111
		2	2	6				50	50	
Module Aim:	This module aims to provide knowledge of inferential statistics for solving business problems									
Learning Outcomes										
After completing this module, the students should be able to:										
LO-1	Formulate hypotheses based on different scenarios and apply appropriate parametric and non-parametric hypothesis testing techniques									
LO-2	Explain the concept of regression and use regression techniques to assist in decision making									
LO-3	Make use of statistical software to carry out analyses based on the above topics									
Syllabus Outline										Learning Outcomes
1	Two-sample tests [6 hrs] <i>Comparing two means from independent populations, paired t-test, F-test for ratio of two variances, z-test for difference in proportions</i>									LO-1, LO-3
2	ANOVA [12 hrs] <i>One-way ANOVA, two-way ANOVA, introduction to design-of-experiments</i>									LO-1, LO-3
3	Categorical data analysis [6 hrs] <i>Probability structure for contingency tables, relative risk and odds-ratios, Chi-square test for differences in proportions, tests of independence</i>									LO-1, LO-3
4	Non-parametric tests [6 hrs] <i>Wilcoxon rank sum test, Kruskal Wallis rank test, and other non-parametric tests</i>									LO1, LO3
5	Introduction to simple linear regression [6 hrs] <i>Ordinary least squares, measures of variation, linear regression assumptions</i>									LO2, LO-3
6	Multiple linear regression and model building [6 hrs] <i>Extending the simple bivariate model, testing portions of the model, dummy variables and interaction terms, modelling non-linearities</i>									LO1, LO2, LO-3
Assessments										
Assessment							Weight		Learning outcomes	
Continuous Assessments (CA)	In-class test - 01						15% [1.5 hrs]		LO-1, LO-2	
	Lab practical test - 01						15% (1.5 hrs)		LO-2, LO-3	
	Take-home assignment						20% (xx hrs)		LO-1, LO-2, LO-3	
Written examination (WE)							50% (3 hrs)		LO-1, LO-2	
References										

Module Code	DA1341	Semester 2	Module Title			Data Structures and Algorithms					
Credits	3	Hours/Week			C	E	O	Evaluation %		Prerequisites	
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	WE	DA1321	
		2	2	6				50	50		
Module Aim:	The aim of this module is to introduce database and program development techniques to the participants.										
Learning Outcomes											
After completing this module, the students should be able to:											
LO-1	Construct common data structures										
LO-2	Design appropriate data structures and algorithms for a given situation business problem										
LO-3	Analyse the complexity/performance of basic algorithms										
Syllabus Outline										Learning Outcomes	
1	Basic data structures and operations [8 hrs] <i>Arrays, Linked lists, Queues, Stacks and hash tables</i>										LO-1
2	Basic algorithms [12 hrs] <i>Recursions, searching and sorting</i>										LO-3
3	Basic algorithm design techniques [12 hrs] <i>Divide-and-conquer, greedy approach, dynamic programming</i>										LO-2, LO-3
4	Complexity analysis of algorithms [10 hrs] <i>Big O, Big Omega, and Big Theta analysis</i>										LO-3
Assessments											
Assessment							Weight		Learning outcomes		
Continuous Assessments (CA)		Lab programming tests – 01					20% [1.5 hrs]		LO-1, LO-2		
		Lab programming tests - 02					30% [1.5 hrs]		LO-2, LO-3		
Written examination (WE)							50% [2 hrs]		LO-1, LO-2, LO-3		
References											

Module Code	DA1421	Semester 2	Module Title			Business Calculus					
Credits	3	Hours/Week			C	E	O	Evaluation %		Prerequisites	
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	WE		
		2	2	6				50	50		
Module Aim:	This module aims to provide knowledge on advanced business calculus and its applications in business and finance.										
Learning Outcomes											
After completing this module, the students should be able to:											
LO-1	Solve definite and indefinite integrals of algebraic, trigonometric, exponential, logarithmic functions and solve related business application problems										
LO-2	Develop basic integration techniques to solve simple differential equations										
LO-3	Evaluate multivariable functions, compute limits and derivatives and find the local extrema for multivariable functions.										
Syllabus Outline										Learning Outcomes	
1	Integration [14 hrs] <i>Antiderivatives and rules of integration, area and the definite integral, the fundamental theorem of calculus, application of the definite integral to business, integration techniques, improper integrals</i>									LO -1, LO-2	
2	Differential Equations [12 hrs] <i>Differential equations, separable equations, Logistic differential equations, first order linear equations, Applications to business</i>									LO-1, LO -2	
3	Calculus of Several Variables [16 hrs] <i>Functions of several variables, limits and continuity, partial derivatives, chain rule, implicit differentiation, maxima and minima of functions of several variables, Lagrange Multipliers</i>									LO -2, LO -3	
Assessments											
Assessment							Weight		Learning outcomes		
Continuous Assessments (CA)	In-class test - 01						15% [1.5 hrs]		LO-1, LO-2		
	In-class test - 02						15% [1.5 hrs]		LO-2, LO-3		
	Quizzes [Take Home]						10% [3 hrs]		LO-2, LO-3		
	Homework [Tutorials]						10% [12 hrs]		LO-1, LO-2, LO-3		
Written examination (WE)							50% [3 hrs]		LO-1, LO-2, LO-3		
References											

Module Code	IM1631	Semester 2	Module Title	Macroeconomics					
Credits	2	Hours/Week		C	E	O	Evaluation %	Pre-requisites	
GPA/NGPA	GPA	Lectures	Lab / Tutes				CA	WE	IM1641
		2					50	50	
Module Aim:	The purpose of this course is to provide a basic understanding of the mechanisms that drive economic phenomena such as inflation, unemployment, balance of payments, interest rate, exchange rate, economic growth and stability.								
Learning Outcomes									
After completing this module, the students should be able to:									
LO-1	explain the basic macroeconomics concepts such as national income accounting, growth models and unemployment.								
LO-2	analyse the real economy by applying macro models.								
LO-3	discuss the causes and consequences of business cycles and long-term economic growth.								
LO-4	discuss the concept of international trade and contemporary issues								
Syllabus Outline								Learning Outcomes	
1	Introduction to Macroeconomics [4 Hrs] <i>Science and data of macroeconomics, Determinants, distribution and equilibrium in national income accounting and the related various concepts and measurements.</i>							LO-1	
2	Aggregate Demand and Supply & Inflation and Unemployment [10 Hrs] <i>IS-LM model and categories of inflation and unemployment and possible relationships between various macro-economic concepts</i>							LO-1, LO-2	
3	Exchange and interest rate regimes and determination [4 Hrs] <i>Fixed and floating regimes, Nominal and real exchange rate determinants</i>							LO-2, LO-3	
4	Monetary and Fiscal policies [4 Hrs] <i>Identification of various components of monetary and fiscal policies and their macroeconomic implications for growth and stability of the economy.</i>							LO-2, LO-3	
5	Balance of Payments, External Trade and development [4 Hrs] <i>Basic of BoP accounts and its macroeconomic importance and relationships with other macro variables, costs & benefits of external trade, modeling of external trade, role of international agencies / organizations</i>							LO-2, LO-3	
Assessments									
Assessment						Weight %		Learning outcomes	
Continuous Assessments (CA)	In-class test/quiz					20% [1 hrs]		LO-1, LO-2, LO-3	
	Report and Presentation					30%			
Written examination (WE)						50% [2 hrs]		LO-1, LO-2, LO-3	
References									

Module Code	IM1261	Semester 2	Module Title	Fundamentals of Finance					
Credits	2	Hours/Week		C	E	O	Evaluation %		Pre-requisites
GPA/NGPA	GPA	Lectures	Lab / Tutes				CA	WE	None
		2	0				50	50	
Module Aim:	This course aims to introduce fundamentals of finance.								
Learning Outcomes									
After completing this module, the students should be able to:									
LO-1 identify the role and the significance of finance for corporate, public and personal decision making.									
LO-2 apply the time value of money concept.									
LO-3 evaluate the investment options based on risk and return.									
Syllabus Outline									Learning Outcomes
1	Introduction [2 Hrs] <i>Introduction to finance, Financial system, Role of a finance manager</i>								LO -1
2	Time Value of money [10 Hrs] <i>Introduction, Present value, Future value, Annuities, Perpetuities, Amortization schedules</i>								LO -2
3	Risk and Return [6 Hrs] <i>Historical risk and returns, Expected risk and returns, Selection of assets, Investor behavior, Introduction to two asset portfolio risk and return, Systematic vs unsystematic risk</i>								LO -3
4	Role of financial markets and intermediaries [4 Hrs] <i>Financial markets, Financial institutions, Central Bank</i>								LO-1
5	Financial Statement Analysis [4 Hrs] <i>Ratio analysis, Horizontal analysis, Vertical analysis, Off-Balance-Sheet Assets and Liabilities</i>								LO-1
6	Personal Finance [2 Hrs] <i>Budgeting, taxes, making personal finance decisions (Buying a car, Getting a credit card, Selecting a checking and deposit accounts</i>								LO-1, LO-3
Assessments									
Assessment						Weight		Learning outcomes	
Continuous Assessments (CA)		Presentation				20%		LO-1	
		In-class quiz				30% [1 hrs]		LO-2, LO-3	
Written examination (WE)						50% [2 hrs]		LO-1, LO-2, LO-3	

Module Code	DB1111	Semester 2	Module Title	Business Communication II					
Credits	2	Hours/Week		C	E	O	Evaluation %		Pre-requisites
GPA/NGPA	GPA	Lectures	Lab / Tutes				CA	WE	None
		2					50	50	
Module Aim:	This is an introductory course which explores the concepts, terminologies and methodologies of microeconomics for decision making.								
Learning Outcomes									
After completing this module, the students should be able to:									
LO-1	explain the use of nonverbal communication methods and essential communication skills required in handling business negotiations and managing conflicts								
LO-2	develop business proposals, reports, and correspondence								
LO-3	develop academic reports and case study analysis								
LO-4	design of personal brands and professional resumes.								
Syllabus Outline									Learning Outcomes
1	Effective use of Nonverbal communication - Body Language, Emotional intelligence								LO-1
2	Handling Business Negotiations and Conflict management <i>Assertiveness, Negotiation techniques</i>								LO-1
3	Preparing Business Proposals, Reports and Correspondence Format, Style and Content, Writing Disclaimers, Use of Graphs and illustrations, Summarizing								LO-2
4	Introduction to Academic writing Structure of a Report, Academic Referencing (APA) – Use of referencing applications (e.g. Mendeley)								LO-3
5	Case Study Analysis – Analysis of critical elements, summarizing								LO-3
6	Preparing a compelling resume, cover letters and personal branding Use of social media platforms like LinkedIn								LO-4
Assessments									
Assessment						Weight		Learning outcomes	
Continuous Assessments (CA)	Role-play activity					25%		LO-1	
	Assignment – Business Proposal & Report					25%		LO-2	
	Academic Report					30%		LO-3	
	Case Study Analysis					15%		LO-3	
	Assignment - Professional Resume & Social Media Profile					15%		LO-4	
Written examination (WE)									
References									

Module Code	DA2421	Semester 3	Module Title			Introduction to Econometrics						
Credits	2	Hours/Week				C	E	O	Evaluation %		Prerequisites	
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	WE	DA1111		
		2	-	4.66				50	50			
Module Aim:	This module aims to provide the knowledge required for econometric modelling.											
Learning Outcomes												
After completing this module, the students should be able to:												
LO-1	Describe the properties of regression estimators and how to address violations of regression assumptions											
LO-2	Distinguish between cross-sectional, time series and panel data and describe the challenges associated with modelling these types of data											
LO-3	Interpret reported regression results											
LO-4	Examine relationships between variables using appropriate econometric models and diagnostic tests using statistical software											
Syllabus Outline										Learning Outcomes		
1	Properties of regression estimators [6 hrs] <i>Deriving OLS estimates, properties of the OLS estimators, violations of regression assumptions, diagnostic testing</i>										LO-1, LO-2, LO-3, LO-4	
2	Linear regression with regularization [6 hrs] <i>Introduction to over-fitting and regularization, Lasso & ridge regression</i>										LO1, LO-3, LO4	
3	Qualitative response models [6 hrs] <i>Introduction to maximum likelihood estimation, Linear Probability Model, Logit, Probit, Multinomial Logit</i>										LO-2, LO-3, LO-4	
4	Introduction to panel data [6 hrs] <i>Pooling independent cross sections, differences in differences, fixed effects and random effects models</i>										LO-2, LO-3, LO-4	
5	Simultaneous Equation Models [4 hrs] <i>Simultaneous equation bias, identification problem, IV estimation and 2SLS</i>										LO-1, LO-3, LO-4	
Assessments												
Assessment							Weight		Learning outcomes			
Continuous Assessments (CA)	In-class test - 01						20% [1 hrs]		LO-1, LO-2, LO-3			
	In-class test - 02						20% [1 hrs]		LO-1, LO-2, LO-3			
	Take-home assignment						10% [2 hrs]		LO-1, LO-2, LO-3, LO-4			
Written examination (WE)							50% [2 hrs]		LO-1, LO-2, LO-3			
References												

Module Code	DA2311	Semester 3	Module Title			Database Management					
Credits	3	Hours/Week			C	E	O	Evaluation %		Prerequisites	
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	WE	None	
		3	-	7				50	50		
Module Aim:	This module provides students with theoretical knowledge and practical skills required to design and work with databases.										
Learning Outcomes											
After completing this module, the students should be able to:											
LO-1	Make use of database processing concepts to solve the information requirements of organizations										
LO-2	Apply database theory to the design and implementation of relational databases										
LO-3	Apply SQL queries										
Syllabus Outline										Learning Outcomes	
1	Introduction [6 hrs] <i>Definition of a database, database management systems and their importance to business organizations</i>										LO-1
2	Database Design Process [10 hrs] <i>Entities and relationships, ER diagrams</i>										LO-1, LO-2
3	Relational Model [6 hrs] <i>Relational database model, tables, integrity constraints and foreign keys</i>										LO-1, LO-2
4	Normalization [8 hrs] <i>Boyce-Codd Normal forms, database optimization</i>										LO-2
5	SQL [12 hrs] <i>Querying databases, selection, insertion, updates, joins, groups and constructing complex queries to retrieve data</i>										LO-3
Assessments											
Assessment							Weight		Learning outcomes		
Continuous Assessments (CA)		Lab practical test - 01					25% [1.5 hrs]		LO-1, LO-2		
		Lab practical test - 02					25% [1.5 hrs]		LO-2, LO-3		
Written examination (WE)							50% [3 hrs]		LO-1, LO-2		
References											

Module Code	DA2321	Semester 3	Module Title			Systems Analysis & Design					
Credits	2	Hours/Week			C	E	O	Evaluation %		Prerequisites	
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	WE	None	
		2	-	4.66				50	50		
Module Aim:	The course aims to make the student competent to analyse a business process in an information systems perspective for developing a business model for computer-based implementation										
Learning Outcomes											
After completing this module, the students should be able to:											
LO-1	Explain data to analyze and specify the requirements of a system										
LO-2	Demonstrate business functions and processes using UML										
LO-3	Appraise design decisions depending on business scenarios										
LO-4	Propose appropriate strategies for system implementation, project management and deployment										
Syllabus Outline										Learning Outcomes	
1	Project Initiation [5 hrs] <i>Requirement determination, functional and non-functional requirements</i>									LO-1	
2	Modeling [6 hrs] <i>Functional, structural and behavioral modeling of requirements</i>									LO-1, LO-2	
3	Design [6 hrs] <i>Databases, human-computer interactions and physical architecture designs</i>									LO-3	
4	Construction [6 hrs] <i>Implementation, project management, installation, change management</i>									LO-3, LO-4	
5	Administration [6 hrs] <i>Operations, backups, configurations, user support</i>									LO-4	
Assessments											
Assessment							Weight		Learning outcomes		
Continuous Assessments (CA)		In-class test - 01					25% [1 hrs]		LO-1, LO-2		
		Individual Assessment (Take home)					25% [1 hrs]		LO-2, LO-3, LO4		
Written examination (WE)							50% [2 hrs]		LO-1, LO-2		
References											

Module Code	DA2411	Semester 3	Module Title			Linear Algebra					
Credits	3	Hours/Week			C	E	O	Evaluation %		Prerequisites	
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	W E	DA1421	
		2	2	6				50	50		
Module Aim:	This course aims to provide knowledge on multivariable calculus and linear algebra to solve business applications. It is intended to give the appropriate conceptual and computational mathematical background for future study in business.										
Learning Outcomes											
After completing this module, the students should be able to:											
LO-1	Define the concepts of sequence and series and determine limits of sequences and convergence of series										
LO-2	Solve eigenvalues and eigenvectors										
LO-3	Solve systems of linear equations using matrices and apply these methods in business applications										
LO-4	Make use of technological tools to solve linear algebra concepts										
Syllabus Outline										Learning Outcomes	
1	Introduction to vectors [3 hrs] <i>Introduction to vectors and vector functions, dot product, orthogonal vectors, linearly dependent/independent vectors, norm of vectors</i>									LO -3	
2	Systems of Linear equations and Matrices [15 hrs] <i>Systems of linear equations, matrix algebra, Gauss-Jordan elimination, Gaussian elimination, LU factorization, error in solving linear systems, iteration methods, Leontief Input-Output analysis, Solving linear systems using mathematical software</i>									LO -3, LO -4	
3	The Eigenvalue Problem [15 hrs] <i>Characteristic polynomial, determining eigenvalues and eigenvectors, QR algorithm, Singular value decomposition</i>									LO-2, LO-4	
4	Infinite Sequences and Series [9 hrs] <i>Infinite sequences, infinite series, ratio test & power series, Taylor and Maclaurin series and their applications</i>									LO -1	
Assessments											
Assessment							Weight		Learning outcomes		
Continuous Assessments (CA)		In-class test – 01					10% [1.5 hrs]		LO-3, LO-4		
		In-class test - 02					10% [1 .5hrs]		LO-2, LO-3, LO-4		
		Homework Quiz - 01					10% [1.5 hrs]		LO -3, LO-4		
		Tutorials/ Lab practical test					10% [1 .5hrs]		LO-1, LO -3, LO-4		
Written examination (WE)							50% [3 hrs]		LO-1, LO-2, LO-3, LO-4		
References											

Module Code	DA2921	Semester 3	Module Title		Operations Management					
Credits	3	Hours/Week			C	E	O	Evaluation %		Prerequisites
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	W E	None
		3	-	7				50	50	
Module Aim:	This module aims to enable students to investigate methods, systems and procedures for managing planned co-ordination of operations and the global impact on organizations.									
Learning Outcomes										
After completing this module, the students should be able to:										
LO-1	Identify key concepts and issues of operations management in both manufacturing and service organizations									
LO-2	Explain the strategic role of operations management in creating and enhancing an organization’s competitive advantages									
LO-3	Analyze tactical, managerial, and strategic roles that an operations manager has to engage in									
Syllabus Outline										Learning Outcomes
1	Introduction [8 hrs] <i>Operations Management, Operations Performance, Operations Strategy, Competitiveness, and Managing Change</i>									LO-1, LO-2
2	Product & Service Design and Process Selection [18 hrs] <i>Process Analysis, Product design and Process Selection for Manufacturing, Product design and Process Selection for Services, Location Planning and Analysis, Facility Layout Planning and Analysis, Work Design and Measurement</i>									LO-2, LO-3
3	Planning & Controlling Processes [16 hrs] <i>Forecasting, Strategic Capacity Planning for Products and Services, Aggregate Planning and Master Scheduling, Material Requirement Planning (MRP I), Manufacturing Requirement Planning (MRP II) and ERP, Inventory Management, Operations Scheduling</i>									LO-2, LO-3
Assessments										
Assessment							Weight		Learning outcomes	
Continuous Assessments (CA)		In-class test – 01					25% [1.5 hrs]		LO-1, LO-2	
		In-class test – 02					25% [1.5 hrs]		LO-3	
Written examination (WE)							50% [3 hrs]		LO-1, LO-2, LO-3	
References										

Module Code	IM2211	Semester 3	Module Title	Financial Management					
Credits	3	Hours/Week		C	E	O	Evaluation %		Pre-requisites
GPA/NGPA	GPA	Lectures	Lab / Tutes				CA	WE	IM1261
		2	2				50	50	
Module Aim:	The purpose of this unit is to provide an understanding of how organizations can be managed more effectively through efficient financial management.								
Learning Outcomes									
After completing this module, the students should be able to:									
LO-1 define and explain the decision-making role and tasks of a financial manager.									
LO-2 describe the importance of the concepts of risk and return in making financial decisions.									
LO-3 apply finance principles to the main categories of corporate financial decisions.									
Syllabus Outline									Learning Outcomes
1	Introduction to finance and financial environment [2 Hrs] <i>Objectives of profit and not-for-profit organizations, Stakeholder analysis and agency theory, Investment, financing and dividend decisions of a financial manager in the Sri Lankan financial market</i>								LO -1
2	Risk and return [8 Hrs] <i>Types of risk and return, Measuring and analyzing risk and return, Risk diversification, Capital Asset Pricing Model, Markowitz Portfolio Theory.</i>								LO -2
3	Valuation of Securities [4 Hrs] <i>Develop mathematical formulas for bond and stock valuation methods, The concept of yield to maturity</i>								LO-2, LO-3
4	Capital Budgeting [8 Hrs] <i>Apply mathematical formulas for investment appraisal techniques (NPV, IRR, Payback period, Capital rationing), Incremental cash flow analysis, Further issues in capital budgeting, Risk analysis.</i>								LO-3
5	Cost of Capital [4 Hrs] <i>Measurement of gearing, Cost of equity/debt/preference shares, WACC</i>								LO -3
6	Working Capital [8 Hrs] <i>Net working capital, Operating cycle, Working capital cycle, Determinants of working capital, Estimating working capital needs, Receivables management, Inventory management, Cash management, Working capital finance.</i>								LO-3
7	Introduction to Dividend Policy [8 Hrs] <i>Objectives of dividend policy, Practical considerations in dividends, Stability of dividends, Target payout ratio and dividend smoothing, Forms of dividends, Share buybacks, Chronology of dividend dates, Cum-dividend vs Ex-dividend prices.</i>								LO-3
Assessments									
Assessment						Weight		Learning outcomes	
Continuous Assessments (CA)		In-class tests				20% [2 hrs]		LO-1, LO2, LO-3	
		Group Assignment				30%		LO-2, LO-3	
Written examination (WE)						50% [3 hrs]		LO-1, LO-2, LO-3	
Reference									

Module Code	DA2111	Semester 4	Module Title			Statistical & Machine Learning					
Credits	3	Hours/Week			C	E	O	Evaluation %		Prerequisites	
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	WE	DA1121, DA2421	
		2	2	6				100	-		
Module Aim:	This course aims to provide theoretical and practical aspects of statistical and machine learning techniques for business analytics.										
Learning Outcomes											
After completing this module, the students should be able to:											
LO-1	Describe the fundamental concepts in problem-solving with intelligent systems										
LO-2	Explain the mathematical basis for the techniques used in statistical and machine learning										
LO-3	Apply the appropriate computational intelligence techniques for a given problem										
LO-4	Make use of machine learning tools in software to solve business-related problems										
Syllabus Outline										Learning Outcomes	
1	Introduction to Statistical Machine Learning [6 hrs] Empirical Risk Minimization, Bayes Optimal classifier, PAC learnability, Uniform Convergence, VC dimensions									LO-1, LO-2	
2	Supervised Learning Algorithms I: Regression Algorithms [7 hrs] <i>Review of Linear Regression, Model Selection and Regularization (Subset Selection, Stepwise Selection, Ridge Regression, LASSO), Model Comparisons</i>									LO-1, LO-3, LO-4	
3	Supervised Learning Algorithms II: Classification [6 hrs] <i>Logistic Regression (Binary, Multi-Class), Naive Bayes, KNN, Linear and Quadratic Discriminant Analysis, Decision Trees, Support Vector Machine</i>									LO-1, LO-3, LO-4	
4	Supervised Learning Algorithms III: Ensemble Techniques [6 hrs] <i>Bagging (Random Forests), Boosting (Gradient Tree Boosting, ADA Boost)</i>									LO-1, LO-3, LO-4	
5	Model Testing, Evaluation and Validation [6 hrs] <i>Overfitting and Underfitting, Bias-Variance Trade-off, Errors in Estimation (Training vs Test MSE, Mean Absolute Error, Root Mean Squared Error), Confusion Matrix, Sensitivity and Specificity, ROC Curve, Validation test Split, Cross validation</i>									LO-1, LO-2, LO-3	
6	Unsupervised Learning Algorithms [12 hrs] <i>Clustering, Dimensionality Reduction, Principal Component Analysis, Singular Value Decomposition</i>									LO-1, LO-3, LO-4	
Assessments											
Assessment							Weight		Learning outcomes		
Continuous Assessments (CA)	Group Assessment – 01 (Take home)						40% [3 hrs]		LO-1, LO-2		
	Individual Assessment – 01 (Take home)						30% [3 hrs]		LO-2, LO-3, LO-4		
	Lab practical test - 01						30% [2 hrs]		LO-1, LO-2, LO-3, LO-4		
References											

Module Code	DA2451	Semester 4	Module Title			Multivariate Methods in Business				
Credits	3	Hours/Week			C	E	O	Evaluation %		Prerequisites
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	W E	DA1121
		3	-	7				50	50	
Module Aim:	The aim of this module is to introduce common statistical methods for analyzing data with multiple variables per observation.									
Learning Outcomes										
After completing this module, the students should be able to:										
LO-1	Explain the use of multivariate data in business applications									
LO-2	Apply different techniques to visualise multivariate data and derive summary statistics									
LO-3	Select and apply appropriate multivariate techniques to real datasets in view of obtaining insights from the data									
LO-4	Discuss the limitations and assumptions underlying the analyses									
Syllabus Outline										Learning Outcomes
1	Aspects of multivariate analysis [6 hrs] <i>Organization of data, data displays, distance</i>									LO-1
2	Sample geometry and random sampling [6 hrs] <i>Geometry of the sample, random samples and expected values of the sample mean and covariance matrix, generalized variance, linear combinations of variables</i>									LO-2
3	Multivariate normal distribution [6 hrs] <i>Multivariate normal density, sampling from a multivariate normal distribution, sampling distribution and large sample properties, detecting outliers</i>									LO-2
4	Comparisons of several multivariate means [6 hrs] <i>Paired comparisons, one-way MANOVA, two-way MANOVA, profile analysis, repeated measures designs</i>									LO-3, LO-4
5	Multivariate linear regression [6 hrs] <i>Least squares estimation, inference, model checking, comparing two formulations</i>									LO-3, LO-4
6	Principle components and factor analysis [9 hrs] <i>Population principal components, summarizing sample variation, graphing principal components, orthogonal factor model</i>									LO-3, LO-4
7	Discriminant analysis [3 hrs] <i>The discriminant function and tests of significance for two groups</i>									LO-3
Assessments										
Assessment							Weight		Learning outcomes	
Continuous Assessments (CA)		In-class test – 01					25% [1.5 hrs]		LO-1, LO-2	
		Lab practical test – 01					25% [1.5 hrs]		LO-2, LO-3	
Written examination (WE)							50% [3 hrs]		LO-1, LO-2, LO-4	
References										

Module Code	DA2431	Semester 4	Module Title		Introduction to Operations Research					
Credits	3	Hours/Week			C	E	O	Evaluation %		Prerequisites
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	W E	DA1421
		3	-	7				50	50	
Module Aim:	This course aims to introduce fundamentals of operations research concepts.									
Learning Outcomes										
After completing this module, the students should be able to:										
LO-1	Identify the importance of operations research for business decisions									
LO-2	Explain operations research theories and models and their applications									
LO-3	Apply software and mathematical methods to obtain optimal solutions									
Syllabus Outline										Learning Outcomes
1	Introduction [6 hrs] <i>Origins of OR, Defining the problem, Formulate a mathematical model, Deriving solutions, Model testing and Application</i>									LO -1
2	Linear Programming [12 hrs] <i>Introduction, Simplex method, Duality theory and Sensitivity analysis, Other LP solution algorithms and Transportation & Assignment problems</i>									LO -2, LO -3
3	Integer Programming [12 hrs] <i>Use of binary variables in model formulation, Solutions methods of Integer Programming Problems, Branch-bound technique and Mixed Integer Programming</i>									LO -2, LO -3
4	Network Optimization Models [6 hrs] <i>Shortest-path problem, Minimum spanning tree problem, Maximum flow problem, Minimum cost flow problem and Network simplex problem</i>									LO-2, LO-3
5	Dynamic Programming [6 hrs] <i>Overview, Deterministic DP, and Stochastic DP</i>									LO-2, LO-3
Assessments										
Assessment							Weight		Learning outcomes	
Continuous Assessments (CA)		In-class test - 01					25% [1.5 hrs]		LO-1, LO-2	
		Individual Assessment (Take home)					25% [1.5 hrs]		LO-2, LO-3	
Written examination (WE)							50% [3 hrs]		LO-1, LO-2	
References										

Module Code	DA2121	Semester 4	Module Title		Data Management & Visualization					
Credits	2	Hours/Week			C	E	O	Evaluation %		Prerequisites
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	W E	None
		-	4	2.66				100	-	
Module Aim:	This course aims to help students to articulate ideas/stories behind big data and communicate findings in visual, oral and written contexts appropriate for various applications.									
Learning Outcomes										
After completing this module, the students should be able to:										
LO-1	Explain the need for data visualization and the data visualization process									
LO-2	Develop appropriate visualizations for given data									
LO-3	Develop business performance dashboards using data visualization software									
Syllabus Outline									Learning Outcomes	
1	Data search and acquisition [6 hrs]									LO -1
2	Data analysis using software tools [6 hrs] <i>Static charts, Reshaping data, Measure names and values</i>									LO -2, LO -3
3	Chart types and Chart selection [5 hrs]									LO -2, LO -3
4	Annotations and Maps [4 hrs]									LO-2, LO-3
5	Data stories and Interactive dashboards [6 hrs]									LO-2, LO-3
Assessments										
Assessment							Weight		Learning outcomes	
Continuous Assessments (CA)		Individual Assessment					30% [1.5 hrs]		LO-1, LO-2	
		Lab practical test					30% [1.5 hrs]		LO-1, LO-2	
		Group assignment (Take home)					40% [3 hrs]		LO-1, LO-2, LO-3	
References										

Module Code	DA2911	Semester 4	Module Title			Technical & Scientific Writing				
Credits	2	Hours/Week			C	E	O	Evaluation %		Prerequisites
GPA/NGPA	NGPA	Lectures	Lab / Tutorials	Self-study				CA	W E	None
		2	-	4.66				100	-	
Module Aim:	This course is designed to develop skills that will enable to produce clear and effective scientific and technical documents									
Learning Outcomes										
After completing this module, the students should be able to:										
LO-1	Identify online and other sources and methods of research and documentation on business and technology areas.									
LO-2	Demonstrate the understanding of writing and editing process and be able to produce a variety of technical documents in an acceptable level of Standard British / American English.									
LO-3	Discuss ethical considerations in technical and scientific writing.									
Syllabus Outline										Learning Outcomes
1	Activity Studio <i>Writing process, Analyzing audiences, Types and purposes of technical documents</i> <i>Writing technical/scientific documents, Word processing tools (MS Word, LaTeX), Basics of technical communications</i>									LO -1, LO-2, LO-3
Assessments										
Assessment							Weight		Learning outcomes	
Continuous Assessments (CA)		In-class activity – 01					30% [1.5 hrs]		LO-1, LO-2, LO-3	
		In-class activity – 02					30% (1.5 hrs]		LO-1, LO-2, LO-3	
		Individual Assessment (Take home)					40% [3 hrs]		LO-1, LO-2, LO-3	
References										

Module Code	IM 2221	Semester 4	Module Title	Corporate Finance					
Credits	3	Hours/Week		C	E	O	Evaluation %		Pre-requisites
GPA/NGPA	GPA	Lectures	Lab / Tutes				CA	W E	IM2211
		2					50	50	
Module Aim:	The purpose of this module is to provide a broader understanding on how corporate financial decision making is facilitated.								
Learning Outcomes									
After completing this module, the students should be able to:									
LO-1	demonstrate and understanding of finance strategy in creating shareholder value.								
LO-2	apply corporate finance theories.								
LO-3	discuss advanced asset valuation techniques in corporate decision making.								
Syllabus Outline									Learning Outcomes
1	Shareholder value and corporate governance [2 hrs] <i>Financial goals and strategy, Shareholder value creation, Corporate structure & governance, Behavioral issues.</i>								LO -1
2	Leasing and project finance [4 hrs] <i>Operating leases, Financial leases, Leveraged leases, Evaluation of leases, Hire purchase, Infrastructure project finance.</i>								LO-1, LO-2
3	Advanced capital budgeting techniques [8 hrs] <i>Decision tree analysis in finance, Types of real options, Option value calculations, Capital budgeting risk analysis techniques.</i>								LO -1, LO-2, LO-3
4	Capital structure theories [4 hrs] <i>The Modigliani–Miller theory, The static trade-off theory, The under-investment problem, Asymmetric information, The risk-shifting problem, Free cash-flow arguments, The pecking order theory, Debt overhang.</i>								LO-2
5	Capital raising methods [8 hrs] <i>Venture Capital, Initial Public Offerings, Alternative Issue Procedures, Private Placements, Private equity.</i>								LO-1, LO-2
6	Dividend theories [4 hrs] <i>Dividend relevance (Walter’s Model), Dividend relevance (Gordon’s Model), Dividend and uncertainty, Dividend irrelevance (Miller & Modigliani), Market imperfections and dividends, Information content of dividends, Taxes.</i>								LO-2
7	Valuation of corporations [4 hrs] <i>Asset-based, earnings-based, dividend-based and cash flow-based valuation techniques, Contingent valuation.</i>								LO-1, LO-3
8	Mergers and acquisitions [7 hrs] <i>Sensible motives, Dubious motives, Estimating merger gains and costs, Mechanics of a merger.</i>								LO-1, LO-3
9	Introduction to corporate risk management [2 hrs] <i>Different types of risks (systematic, non-systematic), Importance of risk, Probability of default, Value at risk, Insurance, Reducing risk with derivatives.</i>								LO-1, LO-2
Assessments									
Assessment						Weight		Learning outcomes	
Continuous Assessments (CA)		In-class tests				25% [1 hrs]		LO-1, LO-2, LO-3	
		Group assignment				25%		LO-1, LO-2, LO-3	
Written examination (WE)						50% [2 hrs]		LO-1, LO-2, LO-3	
Reference									

Module Code	DA3111	Semester 5	Module Title			Text Analytics					
Credits	2	Hours/Week			C	E	O	Evaluation %		Prerequisites	
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	WE	DA2111	
		-	4	2.66				100	-		
Module Aim:	This module aims to enable participants to get a hands-on experience on text mining.										
Learning Outcomes											
After completing this module, the students should be able to:											
LO-1	Identify the linguistic features of natural languages										
LO-2	Demonstrate the understanding of principles of various natural language processing and text retrieval techniques										
LO-3	Apply text analytics algorithms for real world problem solving										
Syllabus Outline										Learning Outcomes	
1	Overview [5 hrs] <i>What is NLP, basics linguistics, ambiguity and uncertainty in language</i>									LO-1	
2	Regular Expressions [5 hrs] <i>Regular languages, finite-state automata, morphology</i>									LO-2	
3	Basic Text Processing [5 hrs] <i>Tokenization and segmentation, normalization, morphological analysis</i>									LO-2, LO-3	
4	Semantics [5 hrs] <i>Representing meaning, semantic analysis, lexical semantics</i>									LO-2, LO-3	
5	Topic Modelling [5 hrs] <i>Probabilistic Semantic Indexing, Latent Dirichlet Allocation</i>									LO-2, LO-3	
6	Advanced Topics [5 hrs] <i>POS tagging, named entity recognition, machine translation</i>									LO-2, LO-3	
Assessments											
Assessment							Weight		Learning outcomes		
Continuous Assessments (CA)		Individual Assessment (Take home)					50% [4 hrs]		LO-1, LO-2		
		Group Assessment (Report & Presentation)					50% [3 hrs]		LO-2, LO-3		
References											

Module Code	DA3481	Semester 5	Module Title			GIS and Spatial Data Analysis				
Credits	3	Hours/Week			C	E	O	Evaluation %		Prerequisites
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	WE	None
		2	2	6				100	-	
Module Aim:	This module aims to introduce spatial data applications in the decision science domain in conjunction with applied geoinformatics concepts such as geo-statistics and modelling, geospatial data supply for geographic information systems: digital maps, digitizing, basic satellite remote sensing, and thematic classification of raster and vector data.									
Learning Outcomes										
After completing this module, the students should be able to:										
LO-1	Explain the basics of geographic information systems (GIS) and remote sensing									
LO-2	Select and acquire both primary and secondary spatial data for use in GIS									
LO-3	Analyze digital data in raster and vector formats to derive informed decisions									
Syllabus Outline										Learning Outcomes
1	Introduction [6 hrs] <i>Components of a GIS, Raster and Vector Data , GIS software Platforms</i>									LO-1
2	Remote Sensing and Acquisition of Spatial Data [6 hrs] <i>Introduction to Space Technology, Public Domain Satellite Imagery, GPS Applications</i>									LO-2, LO-3
3	Spatial Analysis and Modelling [12 hrs] <i>Vector Operations, Spatial Optimization Techniques, Spatial Data Models, Spatiotemporal Processes, Spatial Correlation, Proximity Analysis</i>									LO-2, LO-3
4	Digital Image Processing in GIS [6 hrs] <i>Raster Analysis, Image Classification Algorithms, Statistical and Machine Learning for spatial Analysis</i>									LO-2, LO-3
5	Business Applications of GIS Technologies [6 hrs] <i>Location-based Business, Spatial Planning and Policy Analysis, Consumer Analysis using GIS</i>									LO-2, LO-3
6	Spatial Big Data [6 hrs] <i>Overview, Types of Spatial and Spatiotemporal Big Data, Spatial Decision Support Systems</i>									LO-2, LO-3
Assessments										
Assessment							Weight		Learning outcomes	
Continuous Assessments (CA)	In-class test - 01						25% [1.5 hrs]		LO-1, LO-2	
	Lab practical test – 01						25% [1.5 hrs]		LO-2, LO-3	
	Group project (Take home)						50% [3 hrs]		LO-2, LO-3	
References										

Module Code	DA3411	Semester 5	Module Title			Business Valuation and Analysis					
Credits	3	Hours/Week			C	E	O	Evaluation %		Prerequisites	
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	WE	None	
		3	-	7				50	50		
Module Aim:	This module aims to help students develop business valuation and financial analysis skills.										
Learning Outcomes											
After completing this module, the students should be able to:											
LO-1	Apply financial information to value and analyse firms										
LO-2	Appraise and value projects based on discounted cash flow method										
LO-3	Develop business valuation models										
Syllabus Outline										Learning Outcomes	
1	Financial Statement Analysis [9 hrs] <i>Financial statements, Financial ratio analysis, Risk analysis, Analysis of growth potential, Comparative analysis of ratios</i>									LO-1	
2	Forecasting and Valuation of Free Cash Flows [9 hrs] <i>Free cash flows, Building financial models, Enterprise valuation, Continuation value, Cash flow to equity valuation,</i>									LO-2	
3	Equity and Cost of Capital [9 hrs] <i>Estimating cost of capital, Cost of equity and leverage, CAPM and beyond, Cost of debt, Equity securities & Markets, Equity Analysis</i>									LO-2	
4	Relative Valuation [9 hrs] <i>Equity multiples, Options strategies and pay-offs, Equity/debt valuation, Real option valuation</i>									LO-3	
5	Mergers, Acquisitions, Buyouts and Restructuring [6 hrs] <i>Mergers & acquisitions, Offer structures, and Leveraged buyouts</i>									LO-3	
Assessments											
Assessment							Weight		Learning outcomes		
Continuous Assessments (CA)		In-class test - 01					25% [1.5 hrs]		LO-1, LO-2		
		In-class test - 02					25% [1.5 hrs]		LO-2, LO-3		
Written examination (WE)							50% [3 hrs]		LO-1, LO-2		
References											

Module Code	DA3331	Semester 5	Module Title			Business Application Development						
Credits	3	Hours/Week				C	E	O	Evaluation %		Prerequisites	
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	WE	DA1321		
		1	4	5				100	-			
Module Aim:	The aim of this course is to introduce the concepts of object-oriented programming for business application development.											
Learning Outcomes												
After completing this module, the students should be able to:												
LO-1	Demonstrate Integrated Development Environments for efficient programming											
LO-2	Explain the understanding of the modern web technologies											
LO-3	Apply version controlling for development projects											
LO-4	Develop web applications with database access and GUI											
Syllabus Outline										Learning Outcomes		
1	Integrated Development Environments [10 hrs]										LO-1	
2	Web Applications [15 hrs] <i>Web servers, application frameworks, Web APIs, HTML and CSS</i>										LO-2, LO-4	
3	Version Controlling [10 hrs] <i>Version control systems, Git, GitHub</i>										LO-3	
4	Modern Trends [10 hrs] <i>No code development, Single page applications, Progressive web applications</i>										LO-3, LO-4	
Assessments												
Assessment							Weight			Learning outcomes		
Continuous Assessments (CA)		Group project (Take home)					50% [5 hrs]			LO-2, LO-3, LO-4		
		Individual Assessments (Take home)					50% [4 hrs]			LO-2, LO-3		
References												

Module Code	DA3451	Semester 5	Module Title			Numerical Methods				
Credits	2	Hours/Week			C	E	O	Evaluation %		Prerequisites
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	WE	None
		2	-	4.66				50	50	
Module Aim:	This course aims to equip the students with necessary knowledge and skills on numerical methods applicable for business									
Learning Outcomes										
After completing this module, the students should be able to:										
LO-1	Demonstrate the knowledge of common numerical techniques and how they are used to obtain approximate solutions to otherwise analytically intractable problems									
LO-2	Develop numerical techniques for various mathematical operations, such as interpolation, differentiation, integration, solutions of linear and non-linear equations, solution of differential equations & partial differential equations									
LO-3	Evaluate the accuracy of common numerical methods									
Syllabus Outline										Learning Outcomes
1	Basics of Numerical Methods [4 hrs] <i>Number representation, rounding, truncation, propagation of error, stability and Order of convergence</i>									LO-1
2	Solving Nonlinear Equations [4 hrs] <i>Bisection method, Newton’s method, Secant method, fixed point iteration</i>									LO-1, LO-2
3	Function Approximation and Interpolation [4 hrs] <i>Linear interpolation, quadratic interpolation, higher degree interpolation, Newton’s divided differences, The Weierstrass theorem, The Taylor’s theorem and minmax approximation problems</i>									LO-2, LO-3
4	Numerical Differentiation and Integration [6 hrs] <i>Errors in numerical differentiation, derivatives based on Newton’s forward and backward interpolation formulas, numerical integration using Trapezoidal rule and Simpson’s rule</i>									LO-2, LO-3
5	Numerical Solutions of Ordinary Differential Equations [5 hrs] <i>Existence, uniqueness, stability, Taylor series method, Euler’s method, Runge-Kutta method & Picard’s method of successive approximations</i>									LO-2, LO-3
6	Finite Difference methods for Partial Differential Equations [5 hrs] <i>Solving parabolic equations (Black- Scholes equation belongs to this class)</i>									LO-2, LO-3
Assessments										
Assessment							Weight		Learning outcomes	
Continuous Assessments (CA)	In-class test – 01						10% [1 hrs]		LO-1, LO-2	
	In-class test – 02						10% [1 hrs]		LO-2, LO-3	
	Lab (Take home)						30% [5 hrs]		LO-2, LO-3	
Written examination (WE)							50% [2 hrs]		LO-1, LO-2, LO-3	
References										

Module Code	DA3931	Semester 5	Module Title			Ethics and Professionalism						
Credits	2	Hours/Week				C	E	O	Evaluation %		Prerequisites	
GPA/NGPA	NGPA	Lectures	Lab / Tutorials	Self-study				CA	WE	None		
		2	-	4.66				50	50			
Module Aim:	This module aims to provide a holistic approach incorporating good practices and ethics.											
Learning Outcomes												
After completing this module, the students should be able to:												
LO-1	Describe the concepts of ethics and professionalism											
LO-2	Explain the effect of, and the source of, bias or discrimination in a data-intensive system											
LO-3	Analyze ethical issues related to											
Syllabus Outline										Learning Outcomes		
1	Why Ethics for Business Analytics Professionals [6 hrs] <i>Moral theory and ethical principles, Moral and philosophical claims, arguments and goals frequently found in ethics</i>										LO -1	
2	Ethics & Technology [6 hrs]										LO -1	
3	Ethics & Professionalism: Guidelines [6 hrs] <i>Ethical foundations of the delivery of organizations, developing a unique ethics code, Contemporary ethical issues in the business environment and possible solutions</i>										LO -2, LO -3	
4	Accountability and Responsibility [6 hrs] <i>Level of autonomy, Influence, Complexity and Risk management</i>										LO-2, LO-3	
5	Review of Code of Conduct of CFA [6 hrs]										LO-2, LO-3	
Assessments												
Assessment								Weight		Learning outcomes		
Continuous Assessments (CA)		Individual Assessment (Take home, Portfolio)						50% [10 hrs]		LO-1, LO-2, LO-3		
Written examination (WE)								50% [2 hrs]		LO-1, LO-2, LO-3		
References												

Module Code	DA3941	Semester 5	Module Title			Supply Chain Management						
Credits	2	Hours/Week				C	E	O	Evaluation %		Prerequisites	
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	WE	None		
		2	-	4.66				50	50			
Module Aim:	The module aims to develop skills of the participants to contribute to key decisions in supply chain management in an organization.											
Learning Outcomes												
After completing this module, the students should be able to:												
LO-1	Analyze the combination of customer accommodation, market distribution, procurement, and manufacturing that represents the supply chain areas											
LO-2	Discuss models for integrative logistics and supply chain in a theoretical framework											
LO-3	Design and provide a practical approach to support the business' decision making within the context of supply chain management and the real world											
Syllabus Outline										Learning Outcomes		
1	Introduction, Process and Results in SCM [4 hrs] <i>Introduction to concepts of SCM, SCM Overview, CRM, Market Distribution Strategy, Procurement, Manufacturing and Logistics</i>										LO-1	
2	Integrating the Supply Chain and Global Supply Chains [8 hrs] <i>Integrated Operations Planning, Global Supply Chains</i>										LO-2	
3	Supply Chain Design and Collaboration [8 hrs] <i>Network Design, Collaboration</i>										LO-2, LO-3	
4	Strategies and Results in SCM [8 hrs] <i>Converting Performance Measurement, Risk and Sustainability, Project Presentations</i>										LO-3	
Assessments												
Assessment							Weight		Learning outcomes			
Continuous Assessments (CA)		In-class test - 01					25% [1 hrs]		LO-1			
		Case study – 01					25% [1 hrs]		LO-2			
Written examination (WE)							50% [2 hrs]		LO-1, LO-2, LO-3			
References												

Module Code	DA3221	Semester 5	Module Title			Digital Transformation in Practice				
Credits	2	Hours/Week			C	E	O	Evaluation %		Prerequisites
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	WE	None
		2	-	5				100		
Module Aim:	This course aims to provide students with an overview of key aspects of Digital Transformation in an organization, how to measure the digital maturity of an organizations as well as explore use cases and key considerations in Digital Transformation Program implementation in a business environment.									
Learning Outcomes										
After completing this module, the students should be able to:										
LO-1	Identify the key aspects that organizations consider in their digital transformation journey									
LO-2	Explain key dimensions considered in digital maturity and the business impacts of achieving a higher digital maturity.									
LO-3	Describe basic principles and common misconceptions related to developing a digital transformation strategy and a roadmap.									
LO-4	Evaluate the benefits and challenges of achieving a successful digital transformation programme									
LO-5	Develop digital skills and competencies for today’s digital era									
Syllabus Outline									Learning Outcomes	
1	Introduction to digital transformation [3hrs]									LO-1
2	Digital maturity [3 hrs] <i>Assessing the digital maturity of an organization and different digital maturity models used in assessing organization</i>									LO-2, LO-5
3	Key dimensions used in digital maturity models [15 hrs]									LO-2, LO-5
4	Developing a digital strategy and digital transformation roadmap [6 hrs]									LO-3, LO-5
5	Phases of implementing a digital transformation programme, key challenges and how to overcome them [6 hrs]									LO-3, LO-5
6	Sustaining a successful digital transformation programme implementation – principles of change management [6 hrs]									LO-3, LO-4, LO-5
7	Case studies of successful digital transformation programmes [3 hrs]									LO-2, LO-3, LO-4, LO-5
Assessments										
Assessment							Weight		Learning outcomes	
Continuous Assessments (CA)	In class Test - 01						50% [1 hrs]		LO-1, LO-2, LO-3, LO-4, LO-5	
	Group Assignment - 01						30% [4 hrs]		LO-3, LO-4, LO-5	
	Expert session Q&A						20% [3 hrs]		LO-2, LO-3, LO-4, LO-5	
References										

Module Code	DA3101	Semester 5	Module Title			Innovation by Design Thinking					
Credits	2	Hours/Week			C	E	O	Evaluation %		Prerequisites	
GPA/NGPA	NGPA	Lectures	Lab / Tutorials	Self-study				CA	WE	None	
			4	3				100			
Module Aim:	This module aims to impart creativity and innovation skills for problem solving using design thinking approaches										
Learning Outcomes											
After completing this module, the students should be able to:											
LO-1	Demonstrate the understanding of the needs of a group of stakeholders using ethnographic and other methods.										
LO-2	Define innovation challenges by directing questions to relevant individuals and groups										
LO-3	Develop multiple creative ideas following structured approaches.										
LO-4	Develop simple rapid prototypes to make their ideas into a reality.										
Syllabus Outline									Learning Outcomes		
1	Listening [10 hrs]									LO-1	
2	Problem Setting [10 hrs]									LO – 1, LO-2	
3	Ideating [10 hrs]									LO-3	
4	Iterating [10 hrs]									LO-4	
Assessments											
Assessment							Weight		Learning outcomes		
Continuous Assessments (CA)		Individual Assignment – 01					40% [2 hrs]		LO-1, LO-2, LO-3, LO-4		
		Group Assignments – 02					60% [4 hrs]		LO-1, LO-2, LO-3, LO-4		
References											

Module Code	DA3211	Semester 6	Module Title		Agile Business Analysis					
Credits	2	Hours/Week			C	E	O	Evaluation %		Prerequisites
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	WE	DA2321
		2	-	4.66				100	-	
Module Aim:	This course aims to show how agile values can affect the traditional business analysis approach.									
Learning Outcomes										
After completing this module, the students should be able to:										
LO-1	Demonstrate an understanding of the scope, application and practices of business analysis principles and techniques									
LO-2	Discuss agile approach and its relevance to business analysis.									
Syllabus Outline										Learning Outcomes
1	Business Analysis & Strategic Context of Business Analysis [6 hrs] <i>Business change lifecycle, Internal & external environment analysis, Situational analysis, Market & competitor analysis, Critical success factors, Key performance indicators, Performance target, Balance scorecard approach, Stakeholder analysis</i>									LO -1
2	Analysis and modelling of Business Processes [8 hrs]									LO -1
3	Agile for Business Analysis [10 hrs] <i>Philosophy, principles, methods, models, requirements</i>									LO -2
4	Role of Agile Business Analyst [4 hrs] <i>Managing requirements & iterations, analysis and adoption</i>									LO-1, LO-2
Assessments										
Assessment							Weight		Learning outcomes	
Continuous Assessments (CA)	Individual Assessment – 01 (Take home)						25% [2 hrs]		LO-1	
	Individual Assessment – 02 (Take home)						25% [2 hrs]		LO-1, LO-2	
	In class test – 01						25% [1 hrs]		LO-1, LO-2	
	In class test – 02						25% [1 hrs]		LO-1, LO-2	
References										

Module Code	DA3131	Semester 6	Module Title			Data Mining					
Credits	2	Hours/Week			C	E	O	Evaluation %		Prerequisites	
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	WE	DA2111	
		1	2	3.66				50	50		
Module Aim:	This course aims to provide both theoretical and practical knowledge on finding useful patterns for business applications in large databases.										
Learning Outcomes											
After completing this module, the students should be able to:											
LO-1	Describe the fundamental concepts involved in the process of discovering useful, possibly unexpected, patterns in large data sets										
LO-2	Explain the various stages involved in the data mining and information retrieval process										
LO-3	Apply various data mining tools to extract useful patterns and information from a data set										
Syllabus Outline										Learning Outcomes	
1	Introduction [4 hrs] <i>Descriptive, Predictive and Prescriptive models</i>										LO-1
2	Data Preprocessing [5 hrs] <i>Missing value handling, Data cleaning, Data integration and transformation, Data reduction, Data discretization and concept hierarchy generation</i>										LO-2, LO-3
3	Mining Frequent Patterns, Associations, and Correlations [6 hrs] <i>Apriori algorithm: Finding frequent itemsets using candidate generation, Generating association rules from frequent itemsets, FP Growth Algorithm: Mining frequent itemsets without candidate generation</i>										LO-2, LO-3
4	Clustering [4 hrs] <i>Similarity measures, hierarchical clustering, non-hierarchical clustering, clustering based on statistical models</i>										LO-2, LO-3
5	Data mining applications [4 hrs] <i>Affinity, Churn</i>										LO-2, LO-3
6	Applications of ML platforms [4 hrs] <i>MS Azure ML, AWS ML</i>										LO-3
Assessments											
Assessment							Weight		Learning outcomes		
Continuous Assessments (CA)		In-class test - 01					25% [1.5 hrs]		LO-1, LO-2		
		In-class test - 02					25% [1.5 hrs]		LO-2, LO-3		
Written examination (WE)							50% [2 hrs]		LO-1, LO-2, LO-3		
References											

Module Code	DA3311	Semester 6	Module Title			Enterprise Resource Planning (ERP) Systems				
Credits	2	Hours/Week			C	E	O	Evaluation %		Prerequisites
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	WE	None
		1	2	3.66				50	50	
Module Aim:	This course aims to impart technical know-how to students for applying ERP in a practical context.									
Learning Outcomes										
After completing this module, the students should be able to:										
LO-1	Model uncertainties in business decision making									
LO-2	Assess the impact of uncertainties on the decision-making process									
LO-3	Evaluate difficulties of incorporating uncertainties into optimization models									
Syllabus Outline										Learning Outcomes
1	Introduction [3 hrs] Introduction to ERP, Market, Reasons for the Failure of ERP Implementation: Roadmap for successful ERP implementation									LO-1
2	ERP and Related Technologies [5 hrs] Product Life Cycle Management, Supply Chain Management, ERP Security									LO-1
3	ERP Implementation [5 hrs] Life Cycle ERP Tools and Software, ERP Selection Methods and Criteria, ERP Selection Process, ERP Vendor Selection, ERP Implementation Lifecycle, Pros and cons of ERP implementation, Factors for the Success of an ERP Implementation									LO-1, LO-2
4	ERP Modules [5 hrs] Structure Finance, Sales and Distribution, Manufacturing and Production, Planning, Quality Management; Cost Management, Human Resource, Quality Management, Purchasing; Vendor Evaluation; Inventory Management and Invoice Verification and Material Inspection									LO-2, LO-3
5	ERP Vendors, Consultants, and Employees [5 hrs] Vendors- Role of the Vendor; Consultant Types of consultants; Role of a Consultant, Employees- Role of employees, Different ERP Vendors - ERP Vendors									LO-3
6	Future Directions in ERP [5 hrs] New Trends in ERP, ERP to ERP II, Implementation of Organization-Wide ERP, Development of New Markets and Channels, Latest ERP Implementation Methodologies, ERP and e-business, Market Snapshot, The SOA Factor									LO-2
Assessments										
Assessment							Weight		Learning outcomes	
Continuous Assessments (CA)		Lab Test– 01					25% [1 hrs]		LO-1, LO-2	
		Case study – 01					25% [1 hrs]		LO-2, LO-3	
Written Examination (WE)							50% [2 hrs]		LO-1, LO-2, LO-3	
References										

Module Code	DA3461	Semester 6	Module Title			Advanced Operations Research				
Credits	3	Hours/Week			C	E	O	Evaluation %		Prerequisites
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	WE	DA2431
		3	-	7				50	50	
Module Aim:	This course aims to provide students with knowledge and skills in advanced optimization techniques.									
Learning Outcomes										
After completing this module, the students should be able to:										
LO-1	Construct mathematical models for managerial decision problems									
LO-2	Evaluate limitations in mathematical programming models									
LO-3	Apply OR models to find acceptable solutions for real-life decision-making problems									
Syllabus Outline										Learning Outcomes
1	Decomposition methods [6 hrs] <i>Primal and Dual models</i>									LO -1, LO -2
2	Nonlinear Programming [12 hrs] <i>Graphical illustrations, One-variable unconstrained optimization, Multivariable unconstrained optimization, KKT conditions, Quadratic programming, Convex and Nonconvex Programming</i>									LO-1, LO -2, LO – 3
3	Multi-objective optimization [6 hrs] <i>Goal Programming and Heuristic techniques</i>									LO -1, LO -2, LO – 3
4	Applications of Queuing theory [6 hrs] <i>Basic structure, Real world examples, Queuing models based on Birth-and-Death process and Queuing networks</i>									LO-2, LO-3
5	Inventory theory [6 hrs] <i>Components, Deterministic continuous-review models, Deterministic periodic-review model, Stochastic continuous-review model, Stochastic single-period model for perishable goods and Stochastic periodic-review model</i>									LO-2, LO-3
6	Markov decision process [8 hrs] <i>Markov decision processes, LP and optimal policies and Algorithms for policy improvements</i>									LO -1, LO -2, LO – 3
Assessments										
Assessment							Weight		Learning outcomes	
Continuous Assessments (CA)	In-class test - 01						25% [1 hrs]		LO-1, LO-2	
	Individual Assessment (Take home)						25% [3 hrs]		LO-2, LO-3	
Written examination (WE)							50% [3 hrs]		LO-1, LO-2, LO-3	
References										

Module Code	DA3121	Semester 6	Module Title			Business Workflow Automation					
Credits	2	Hours/Week			C	E	O	Evaluation %		Prerequisites	
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	WE	None	
		-	4	2.66				100	-		
Module Aim:	This course aims to impart some foundation knowledge and skills on Business Process Analysis, Re-design, Automation and relevant IoT applications.										
Learning Outcomes											
After completing this module, the students should be able to:											
LO-1	Explain an as-is model of a business process using process analysis techniques and develop a process re-design										
LO-2	Appraise theoretical concepts in developing IoT applications and demonstrate the use of components, devices and data management in IoT										
LO-3	Construct business process models into executable workflows.										
Syllabus Outline									Learning Outcomes		
1	The Concept of Process Approach [6 hrs] <i>BPM lifecycle, Pocess modeling, Descriptions & representations, Modeling standards & notations such as BPMN, UML, IDEF</i>									LO -1	
2	Process Analysis [8 hrs] <i>Decomposition, reuse, rework and repetition, events & exceptions handling</i>									LO -1	
3	IoT and Edge Computing Fundamentals [8 hrs] <i>IoT hardware & software, IoT programming, Data analytics in IoT, IoT commercial platforms / environments</i>									LO -2	
4	Automation [8 hrs] <i>Workflow patterns, Process automation environments such as MS Power Platform</i>									LO-1, LO-3	
Assessments											
Assessment							Weight		Learning outcomes		
Continuous Assessments (CA)		Individual Assessment (Mini project, take home)					50% [5 hrs]		LO-2		
		Group Assessment (Report writing & Presentation)					50% [4 hrs]		LO-1, LO-2, LO-3		
References											

Module Code	DA3441	Semester 6	Module Title			Investment and Portfolio Management				
Credits	3	Hours/Week			C	E	O	Evaluation %		Prerequisites
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	WE	None
		3	-	7				50	50	
Module Aim:	This course aims to impart knowledge, skills and techniques required to analyze investments and manage financial asset portfolios.									
Learning Outcomes										
After completing this module, the students should be able to:										
LO-1	Explain risk and return in view of capital asset pricing and arbitrage pricing theory									
LO-2	Describe important concepts of diversification, efficient frontiers									
LO-3	Describe the importance of Behavioral Finance, ESG investing, Fixed Income Securities & alternative investments.									
LO-4	Apply techniques of stock, bond and other tradable investment portfolio management for different Individual/family and Institutional portfolios									
Syllabus Outline										Learning Outcomes
1	Investment and Asset Allocations [5 hrs] <i>Return and Risk, Portfolio Management Process, Selecting Investments</i>									LO-1
2	Security Markets and Market Indicators [5 hrs] <i>Market structure, Primary and Secondary Capital Markets, Exchange & OTC Market, Constructing market indexes, Stock and Bond market indicators</i>									LO-1, LO-2
3	Behavioral Finance & ESG Investing [5 hrs] <i>Cognitive errors and emotional biases, classifying investors into personality types, Impact of behavioral finance on investments, ESG investing and implications</i>									LO-3
4	Investment Theory [5 hrs] <i>Efficient market hypothesis and its implications, Markowitz portfolio theory, Asset pricing models and Multifactor models of risk and return</i>									LO-1, LO-2, LO-4
5	Portfolio Management [4 hrs] <i>Other Investments, Management of Individual/Family Investor Portfolios, Management of Institutional Investor Portfolios, Performance appraisal/evaluation, Performance measures (types of returns, measures of risk (downside, stochastic dominance, VAR, C-VAR), Concept of alpha.</i>									LO-1, LO-2, LO-3, LO-4
6	Fixed-Income Securities [6 hrs] <i>Types and structures of debt instruments, Different types of bond issuers, Risk-return characteristics of fixed income securities</i>									LO-1, LO-2, LO-3
7	Bond Valuation [6 hrs] <i>Term structures, Spot rates, Matrix pricing, Yield spread Measures, arbitrage-free valuation, callable or puttable bond, convertible bonds, interest rate volatility affects option-adjusted spreads</i>									LO-4
8	Alternative Investments [6 hrs] <i>Real estate [private vs public], Hedge funds, commodities, Private capital and other</i>									LO-3
Assessments										
Assessment							Weight		Learning outcomes	
Continuous Assessments (CA)		In-class test - 01					25% [1 .5 hrs]		LO-1, LO-2	
		In-class test - 02					25% [1.5 hrs]		LO-2, LO-3	
Written examination (WE)							50% [2 hrs]		LO-1, LO-2	
References										

Module Code	DA3951	Semester 6	Module Title			Principles of Marketing					
Credits	2	Hours/Week			C	E	O	Evaluation %		Prerequisites	
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	WE	None	
		2	-	4.66				50	50		
Module Aim:	This course aims to provide an introduction to basic marketing concepts to understand factors that influence marketing decisions in the global market.										
Learning Outcomes											
After completing this module, the students should be able to:											
LO-1	Demonstrate an understanding of marketing concepts and marketing orientations.										
LO-2	Explain consumer behavior and its application in different contexts.										
LO-3	Explain the process of product development, brand management.										
LO-4	Describe the role of pricing in the firm’s decision-making process and common pricing practices and evaluate common models of distribution and retailing.										
LO-5	Analyze different marketing communication tactics.										
Syllabus Outline									Learning Outcomes		
1	Principles of Marketing Management [4 hrs] <i>Basic concepts of marketing management and its applications</i>									LO-1, LO-3	
2	Paradigms of Marketing [4 hrs] <i>History and philosophies of marketing management</i>									LO-2	
3	Environment Scanning & Marketing Planning [4 hrs] <i>Marketing audit, opportunity identification and strategic planning for marketing</i>									LO-2, LO-3	
4	Dynamics of consumer behavior [4 hrs] <i>Identify consumer market, influencing factors, buyer decision behaviour, application of the concepts in Sri Lankan and Global Markets</i>									LO-2	
5	Customer-driven marketing strategy (STP) [4 hrs] <i>Segmenting bases, segmenting, targeting, differentiating and positioning the opportunities</i>									LO-1, LO-2	
6	Marketing research [4 hrs] <i>The importance of information, how to analyse and distribute information for marketing decision making</i>									LO-3	
7	Marketing mix strategies [4 hrs] <i>Product and brand strategies, pricing strategies, marketing communication strategies and distribution strategies</i>									LO-4, LO-5	
Assessments											
Assessment							Weight		Learning outcomes		
Continuous Assessments (CA)		Individual Assessment (Take home)					25% [4 hrs]		LO-1, LO-2		
		Case study					25% (2 hrs]		LO-1, LO-2, LO-3, LO-4		
Written examination (WE)							50% [2 hrs]		LO-1, LO-2, LO-3, LO-4, LO-5		
References											

Module Code	DA3921	Semester 6	Module Title			Organization Behaviour & Management				
Credits	2	Hours/Week			C	E	O	Evaluation %		Prerequisites
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	WE	None
		2	-	4.66				50	50	
Module Aim:	To explain the basic concepts and theories of organizational management. To apply these concepts and theories to modern organizations.									
Learning Outcomes										
After completing this module, the students should be able to:										
LO-1	Explain the basic concepts and theories of organizational behaviour and applications.									
LO-2	Apply organizational management theories to modern organizations									
Syllabus Outline										Learning Outcomes
1	Principles of Management [15 hrs] <i>Introduction to management, Systems theory, Organizational theory, Stakeholder analysis, Organizational vision, Mission and Objectives. Types of organizations, Organizational strategy, Structures of modern organization, Concept of learning organization. Different roles of manager, Manager and leader, , Modern management techniques, Management styles, Decision making and planning function, Organizing staffing, Directing and controlling</i>									LO -1
2	Organization Behaviour [12 hrs] <i>Basic human process and characteristics, Group behavior, Power and leadership, Communication and motivation, Individual and organizational effectiveness. Organizational culture and control, concepts of authority, Power, Responsibility and their applications, Management of conflict. Management of change, Importance of change management and Conflict management</i>									LO -2
Assessments										
Assessment							Weight		Learning outcomes	
Continuous Assessments (CA)		In-class test – 01					25% [1.5 hrs]		LO-1	
		In-class test - 02					25% [1.5 hrs]		LO-2	
Written examination (WE)							50% [2 hrs]		LO-1, LO-2	
References										

Module Code	DA4421	Semester 7	Module Title			Time Series Econometrics				
Credits	3	Hours/Week			C	E	O	Evaluation %		Prerequisites
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	WE	DA2421
		2	2	6				50	50	
Module Aim:	This course aims to familiarize the student with the time-series econometrics models.									
Learning Outcomes										
After completing this module, the students should be able to:										
LO-1	Explain the concepts and properties of stationary and integrated univariate time series									
LO-2	Describe the properties of different time series models and identify appropriate univariate and multivariate time series models based on the data									
LO-3	Experiment with parametric variance models									
LO-4	Apply the basic methodology of identification, estimation, diagnostic checking and model selection to time series model building									
Syllabus Outline										Learning Outcomes
1	Introduction [8 hrs] <i>Components of time series, basic time series models, ACF and correlogram, tests of serial correlation</i>									LO-1
2	Stationary processes [8 hrs] <i>AR, MA, ARMA, Box-Jenkins methodology</i>									LO-2, LO-4
3	Non-stationary processes [8 hrs] <i>Tests of stationarity, ARIMA models, cointegration and error correction models</i>									LO-2, LO-4
4	Multivariate models [8 hrs] <i>Simultaneous equation bias, triangular systems, VAR models</i>									LO-2, LO-4
5	Modelling volatility [12 hrs] <i>ARCH, GARCH models</i>									LO-3, LO-4
Assessments										
Assessment							Weight		Learning outcomes	
Continuous Assessments (CA)		In-class test - 01					15% [1 hrs]		LO-1, LO-2	
		Take-home assignment					35% [3 hrs]		LO-2, LO-3, LO-4	
Written examination (WE)							50% [3 hrs]		LO-1, LO-2, LO-4	
References										

Module Code	DA4321	Semester 7	Module Title			Data Privacy & Security					
Credits	2	Hours/Week			C	E	O	Evaluation %		Prerequisites	
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	WE	None	
		2	-	4.66				100	-		
Module Aim:	This course aims to introduce information security principles and privacy, legal and ethical issues related to data.										
Learning Outcomes											
After completing this module, the students should be able to:											
LO-1	Demonstrate the understanding of vulnerability in a computer system										
LO-2	Demonstrate the knowledge of fundamentals of computer and data security										
LO-3	Apply information security principles to protect of security of data										
LO-4	Discuss the legal, privacy and ethical issues around data and their impact										
Syllabus Outline										Learning Outcomes	
1	Threats and Attacks [6 hrs] <i>Viruses, Spyware, Phishing, Spoofing, Social engineering, Denial of service attacks</i>										LO -1
2	Information Security [6 hrs] <i>What is Information Security, Goals of information security, CIA triad</i>										LO -2
3	Introduction to Cryptography [10 hrs] <i>Ciphers, Symmetric and asymmetric key algorithms, Public-Private key encryption, Digital signatures</i>										LO-2, LO-3
4	Data Privacy and Ethics [6 hrs] <i>Privacy Issues, Privacy Laws and Ethics</i>										LO-4
Assessments											
Assessment							Weight		Learning outcomes		
Continuous Assessments (CA)	In-class test - 01						25% [1 hrs]		LO-1		
	In-class test - 02						25% [1 hrs]		LO-2, LO-3		
	Individual Assessment / Portfolio						50% [5 hrs]		LO-4		
References											

Module Code	DA4131	Semester 7	Module Title			Advanced ML Applications for Business					
Credits	3	Hours/Week			C	E	O	Evaluation %		Prerequisites	
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	WE	DA2111	
		2	2	6				100	-		
Module Aim:	This course aims to give hands-on experiences to students in deep learning and reinforcement learning which are most revolutionary advances in machine learning.										
Learning Outcomes											
After completing this module, the students should be able to:											
LO-1 Identify the principles of deep learning neural networks											
LO-2 Explain common methods for deep learning											
LO-3 Demonstrate the understanding of reinforcement learning											
Syllabus Outline										Learning Outcomes	
1	Introduction to Neural Networks [3 hrs] Overview/Recap of Machine Learning, A Brief History of Neural Networks, The Basic Idea and layered architecture, Applications of DL, Challenges of DL									LO -1	
2	Training Neural Networks [5 hrs] Multilayer perceptron, Regularization, Parameter Norm Penalties, Weight Decay, Early Stopping, Dropout, Data-set Augmentation and Artificial Noise									LO -1	
3	Optimization of Neural Networks [5 hrs] Gradient Descent and Stochastic Gradient Descent, Chain rule and Computational graphs, Back-propagation, Cost functions									LO -1	
4	Convolutional Neural Networks (CNNs) [5 hrs] Convolutional operator, Convolution layer, CNN Architecture, Implementation									LO -2	
5	Applications of CNN [3 hrs] Classification using CNN, Neuro-style transfer, Siamese networks, Computer vision									LO -2	
6	Recurrent Neural Networks (RNNs) [5 hrs] Motivation and idea for RNNs, RNN Architecture, Long Short-Term Memory (LSTM), Exponential Smoothing RNN (ES-RNN)									LO -2	
7	Applications of RNN [3 hrs] Classification and Prediction, Language Modelling and Generating Text, Machine Translation. Speech Recognition, Word/Sentence embedding									LO -2	
8	Unsupervised Deep Learning [5 hrs] Autoencoders, Generative Adversarial Networks									LO -2	
9	Deep Reinforcement learning [5 hrs] Types of Deep RL algorithms, Deep Q learning									LO -3	
10	Model Selection, Architecture Search and Research Areas in DL [6 hrs] Sequential model-based optimization, Hyperband, Neural Architecture Search, Transfer learning, Explainability									LO -1, LO-2	
Assessments											
Assessment							Weight		Learning outcomes		
Continuous Assessments (CA)		Individual Assessment – 01 (Take home)					50% [5 hrs]		LO-1, LO-2		
		Individual Assessment – 02 (Take home)					50% [5 hrs]		LO-2, LO-3		
References											

Module Code	DA4481	Semester 7	Module Title			Spatial Data Analytics				
Credits	2	Hours/Week			C	E	O	Evaluation %		Prerequisites
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	WE	DA3481
		-	4	2.66				100	-	
Module Aim:	This module aims to introduce geospatial data science concepts with practical introduction to cloud based geoinformatics.									
Learning Outcomes										
After completing this module, the students should be able to:										
LO-1		Explain the basics of spatial data science								
LO-2		Examine geospatial data using data science approaches and cloud-based GIS services								
LO-3		Develop decision making intelligence using geospatial data								
Syllabus Outline										Learning Outcomes
1	Introduction [4 hrs] <i>Data science vs spatial data science, Python spatial data science ecosystem</i>									LO-1
2	Geospatial data science [8 hrs] <i>Machine learning in geospatial data science, Open source GIS software, GeoPandas</i>									LO-2, LO-3
3	Cloud-based GIS services [8 hrs] <i>Web GIS technology, Google earth engine, Map visualization</i>									LO-2, LO-3
4	Spatial databases [4 hrs] <i>PostGIS, Spatial SQL</i>									LO-2, LO-3
5	Automated GIS analysis [4 hrs] <i>Custom SQL functions, Deploying spatial databases</i>									LO-2, LO-3
Assessments										
Assessment							Weight		Learning outcomes	
Continuous Assessments (CA)		Lab test - 01					25% [1 hrs]		LO-1, LO-2	
		Lab test - 02					25% [1 hrs]		LO-2, LO-3	
		Group project (Take home)					50% [4 hrs]		LO-2, LO-3	
References										

Module Code	DA4411	Semester 7	Module Title			Financial Derivatives				
Credits	2	Hours/Week			C	E	O	Evaluation %		Prerequisites
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	WE	None
		2	-	4.6				50	50	
Module Aim:	This course aims to impart fundamental understanding of tradable financial derivatives.									
Learning Outcomes										
After completing this module, the students should be able to:										
LO-1	Demonstrate knowledge of how different types of derivatives operate, and how they are applied and priced in the markets									
LO-2	Explain the attributes of main financial derivatives									
LO-3	Decide the type of security to be used for hedging and speculative purposes									
Syllabus Outline										Learning Outcomes
1	Derivative markets and Securities [8 hrs] <i>Structure of Forward, Futures and Option markets, Basic payoff diagrams, Relationship between Forward and Option contracts, Derivative portfolio management</i>									LO-1
2	Forward and Futures contracts [6 hrs] <i>Contract mechanisms, hedging, valuation and strategies</i>									LO-1, LO-2
3	Option contracts [6 hrs] <i>Option markets, valuation and trading strategies</i>									LO-1, LO-2, LO-3
4	Swap and other derivatives [7 hrs] <i>Swap contracts, warrants and convertible securities and other embedded derivatives</i>									LO-1, LO-2, LO-3
Assessments										
Assessment							Weight		Learning outcomes	
Continuous Assessments (CA)	In-class test - 01						20% [1.5 hrs]		LO-1, LO-2	
	In-class test - 02						20% [1.5 hrs]		LO-2, LO-3	
	Quizzes, Homework, pop-Quizzes [Take-Home]						10%		LO-1, LO-2, LO-3	
Written examination (WE)							50% [2 hrs]		LO-1, LO-2, LO-3	
References										

Module Code	DA4471	Semester 7	Module Title		Stochastic Finance					
Credits	2	Hours/Week			C	E	O	Evaluation %		Prerequisites
GPA/NGPA	GPA	Lectures	Lab /Tutorials	Self-study				CA	WE	None
		2	-	4.6				50	50	
Module Aim:	This module aims to provide knowledge in the area of stochastic finance and its applications.									
Learning Outcomes										
After completing this module, the students should be able to:										
LO-1	Recognize different derivative instruments									
LO-2	Explain the concept of arbitrage and arbitrage free pricing in the discrete time-setting									
LO-3	Apply skills to formulate continuous-time stochastic models									
LO-4	Make use of software tools to solve stochastic finance problems									
LO-5	Evaluate market securities using continuous-time stochastic models									
Syllabus Outline										Learning Outcomes
1	Introduction to Financial Calculus [8 hrs] <i>Derivative security and types of derivatives, Expectation pricing, Arbitrage pricing and Expectation versus Arbitrage</i>									LO-1, LO2
2	Discrete process [6 hrs] <i>Binomial branch model, Binomial tree model and Binomial representation theorem</i>									LO-2, LO-4
3	Continuous process [7 hrs] <i>Continuous process, Stochastic calculus, Ito calculus, Change of measure, Martingale representation theorem, Construction strategies and Black-Scholes model</i>									LO-3, LO-4
4	Pricing market securities [7 hrs] <i>Equity and Dividends, Forex and Bonds</i>									LO-4, LO-5
Assessments										
Assessment							Weight		Learning outcomes	
Continuous Assessments (CA)		In-class test – 01 (based on python)					20% [2 hrs]		LO-1, LO-2, LO-3, LO-4	
		In-class test – 02					20% [1 hrs]		LO-3, LO-5	
		Quizzes/ Homework					10% [Take Home]		LO-1, LO-2, LO-3, LO-5	
Written examination (WE)							50% [2 hrs]		LO-1, LO-2, LO-3, LO-5	
References										

Module Code	DA4431	Semester 7	Module Title			Statistical Simulation					
Credits	2	Hours/Week			C	E	O	Evaluation %		Prerequisites	
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	WE	None	
		1	2	3.6				50	50		
Module Aim:	The aim of this course is to understand different types of simulation techniques and develop the ability to solve practical problems										
Learning Outcomes											
After completing this module, the students should be able to:											
LO-1	Describe statistical simulations methods to analyze, design, and solve problems										
LO-2	Apply different techniques to generates random variates and numbers										
LO-3	Discuss simulation modeling techniques and applications										
Syllabus Outline									Learning Outcomes		
1	Overview of Simulation [3 hrs] <i>Introduction, Simulation examples, Steps in a simulation study</i>									LO-1	
2	Generating Random Variates and Numbers [6 hrs] <i>General approaches to generating random numbers and variates, Generating continuous and discrete random variates, Generating arrival processes</i>									LO-2	
3	Simulation Modeling [6 hrs] <i>Simulation of Queueing system, Simulation of an inventory system, Agent-based modeling, Practical simulation models using case studies</i>									LO-1, LO-3	
4	Resampling Methods for Simulations [6 hrs] <i>Jack-knife, Cross validation, Bootstrap, Permutation tests</i>									LO-1	
5	More Topics in Simulation Modeling and Analysis [6 hrs] <i>Monte Carlo Simulation, Variance Reduction Techniques, Experimental designs, and optimization</i>									LO-1, LO-3	
Assessments											
Assessment							Weight		Learning outcomes		
Continuous Assessments (CA)		In-class test - 01					25% [1.5 hrs]		LO-1, LO-2		
		Lab test – 01					25% [1.5 hrs]		LO-3		
Written examination (WE)							50% [2 hrs]		LO-1, LO-2, LO-3		
References											

Module Code	DA4211	Semester 7	Module Title			ERP: Financial, Supply-side and Demand-side Business Processes					
Credits	2	Hours/Week			C	E	O	Evaluation %		Prerequisites	
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	WE	None	
		-	4	3				100			
Module Aim:	The aims of this course are to gain understanding of Financial and Supply-side Business Processes modules of Enterprise Systems and how they can be applied in a business context.										
Learning Outcomes											
After completing this module, the students should be able to:											
LO-1	Explain the concepts of financial, supply-side and demand-side business processes.										
LO-2	Demonstrate the functional capabilities of enterprise systems for financial, supply-side and demand-side business processes.										
LO-3	Demonstrate the understanding of the role of an ERP functional consultant facing real business scenarios										
Syllabus Outline									Learning Outcomes		
1	Financial processes <i>Payment management, financial analysis, balance sheet, and income statement, Chart of Accounts, General Ledger, Month end closing, Banking Integrations, Costing, Inventory valuations, Depreciation [15 hrs]</i>									LO-1, LO-2	
2	Supply-side business processes (procure-to-pay) <i>Strategic sourcing, Operational procurement Supplier and procurement analysis (Procure to Pay Process, Order to cash Process, Warehousing) [15 hrs]</i>									LO-1, LO-2	
3	Demand-side processes for products (market-to-order, order-to-cash) <i>Manufacturing Business Processes (Discrete Manufacturing Processes, Process Manufacturing Processes, Repetitive Manufacturing Processes), Customer account management, marketing and sales Customer order fulfilment for products [15 hrs]</i>									LO-1, LO-3	
4	Demand-side processes for services (quote-to-cash) <i>Service Business Processes (Reactive Maintenance Processes, Preventative maintenance Processes, Work Orders, Operations, Labor, Field Services), Service Customer order fulfilment for products, Customer project management, Customer project execution [15 hrs]</i>									LO-1, LO-3	
Assessments											
Assessment							Weight		Learning outcomes		
Continuous Assessments (CA)	Assignment - 01						20% [2 hrs]		LO-1		
	Lab Assignment - 02						40% [2 hrs]		LO-2		
	Lab Assignment - 03						40% [3 hrs]		LO-3		
References											

Module Code	DA4231	Semester 7	Module Title			Advanced Business Analysis				
Credits	2	Hours/Week			C	E	O	Evaluation %		Prerequisites
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	WE	None
			4	3				100		
Module Aim:	This course aims to develop the skills and competencies required to become a successful business analyst. It covers analyzing and managing enterprise requirements, understanding basic principles and techniques for effective business analysis, and developing communication and other competencies required to meet industry expectations.									
Learning Outcomes										
After completing this module, the students should be able to:										
LO-1	Identify and understand the role of a business analyst and the industry expectation									
LO-2	Develop skills and competencies to analyze and manage day to day enterprise requirements									
LO-3	Demonstrate an understanding of basic principles and useful techniques to successfully play the role of a business analyst.									
LO-4	Discuss how to perform business analysis tasks in a variety of project domains & enterprises.									
LO-5	Develop effective communication skills and other competencies to successfully manage business analysis responsibilities in the industry									
Syllabus Outline									Learning Outcomes	
1	Introduction to Business Analysis <i>Understanding what business is, the need for business analysis in the industry, differentiate analysis and analytics, Job roles, Business Analyst’s role in the IT industry, Industry Expectation, The career journey of a business analyst, Skills needed for the job role</i> [2hrs]								LO-1	
2	Requirement analysis and management <i>Requirement types, Requirement elicitation methods, Requirement analysis methods and tools, Requirement specification methods, Requirement validation, Requirement management and Case study</i> [10 hrs]								LO-2, LO-3, LO-4, LO-5	
3	Change Management <i>CR process, Impact Analysis, Requirements in life cycle management (trace, maintain, prioritize, assess and approve) (Including tools and techniques), Product change case study</i> [4 hrs]								LO-2, LO-3, LO-4	
4	Business analysis with Agile Principles <i>SDLC life cycle, Introduction to Agile methodology understanding values and principles, Agile frameworks, Scrum and scrum ceremonies, applying agile principles into business analysis, Roles and activities of a business analyst in Agile, understanding challenges and skills to improve as a business analyst in Agile and case study with hands on sessions</i> [4 hrs]								LO-2, LO-3, LO-4, LO-5	
5	Skill development and making industry ready. <i>Industry visit (Client communication, Engagement with team, Conflict management, Issue management, Interaction skills)</i> [2 hrs]								LO-2, LO-3, LO-5	
Assessments										
Assessment							Weight		Learning outcomes	
Continuous Assessments (CA)		In Class Assignment – 01					50% [2 hrs]		LO-1, LO-2, LO-3, LO-4, LO-5	
		Group Assignments - 02					50% [4 hrs]		LO-3, LO-4, LO-5	
References										

Module Code	DA4311	Semester 8	Module Title		Advanced Database Management					
Credits	2	Hours/Week			C	E	O	Evaluation %		Prerequisites
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	WE	DA2311
		1	2	3.6				100	-	
Module Aim:	This module aims to explore advanced database systems management and their role in a business organization.									
Learning Outcomes										
After completing this module, the students should be able to:										
LO-1	Explain techniques to optimize databases and queries									
LO-2	Apply transaction management concepts for databases									
LO-3	Discuss the use of advanced data storage and manipulation techniques for complex business problems									
Syllabus Outline									Learning Outcomes	
1	Optimization [4 hrs] <i>Database optimization, query optimization, indexing</i>									LO-1
2	Transaction Management in Databases [6 hrs] <i>Database transactions, atomicity, consistency, isolation and durability</i>									LO-2
3	NoSQL Databases [6 hrs] <i>Non-relational databases, object databases</i>									LO-3
4	Big data [6 hrs] <i>Storage, analysis and processing of complex and large data sets</i>									LO-3, LO-3
5	Distributed Databases [6 hrs] <i>Replication, transparency, consistency</i>									LO-3
Assessments										
Assessment							Weight		Learning outcomes	
Continuous Assessments (CA)	Lab test – 01						25% [1 hrs]		LO-1	
	Lab test – 02						25% [1 hrs]		LO-1, LO-2	
	Individual Assessment – 01 (Take home)						50% [3 hrs]		LO-1, LO-2	
	Individual Assessment – 02 (Take home)						50% [3 hrs]		LO-2, LO-3	
References										

Module Code	DA4621	Semester 8	Module Title			Big Data Technology Principles				
Credits	2	Hours/Week			C	E	O	Evaluation %		Prerequisites
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	WE	None
		-	4	2.6				100	-	
Module Aim:	This module aims to provide a fundamental understanding of big data technology and analytics, inspiring the capacity of thinking and dealing with big data problems in business applications.									
Learning Outcomes										
After completing this module, the students should be able to:										
LO-1	Explain the need for the big data technology and analytics									
LO-2	Demonstrate the understanding of appropriate big data computing systems including NoSQL databases									
LO-3	Develop business intelligence using big data technology applications									
Syllabus Outline										Learning Outcomes
1	Introduction to big data analysis [3 hrs] <i>Drivers of Big Data, What is big data? Key concepts, Big Data Systems & characteristics, Technologies for Big Data Systems, Big Data Analytics</i>									LO-1
2	Big data structures [4 hrs] <i>Peculiarities and principles of big data structure, Principles of bloom filter, MinHash clustering</i>									LO-2
3	Data Warehousing [3 hrs] <i>Introduction to DW, OLTP vs DW (OLAP), Data Warehousing Architectures, Data Warehouse Designs & Concepts (Dimensional Data Modelling), ETL/ELT Process (Data Ingestion Flows), OLAP Cubes and Related Concepts</i>									LO-2, LO-3
4	NoSQL databases [3 hrs] <i>Basics of relational database systems (SQL databases), History of NoSQL systems, Concepts- ACID, BASE, CAP, Data Models- Key-Value, Document, Column-based, Graph</i>									LO-2
5	Batch Processing Systems [3 hrs] <i>Distributed File Systems, HDFS and YARN, MapReduce Algorithm, Hive</i>									LO-2
6	Distributed Analytics with Spark [3 hrs] <i>Introduction to Spark, Spark RDDs, Spark Components, Spark Streaming</i>									LO-2
7	Software support for big data applications [4 hrs] <i>Hadoop ecocluster, MapReduce method, Graph parallel computing, Data cleaning, processing, analysis technology</i>									LO-2, LO-3
8	Big data distributed storage and computing architectures [3 hrs] <i>Hadoop database, NoSQL database, Cloud database, Data warehouse Hive, Spark, Stream analytics, Flink</i>									LO-2, LO-3
9	Real-world big data analytics [3 hrs] <i>Cluster analysis, Association analysis, Big data dimensionality reduction, Social network service, Recommender system</i>									LO-2, LO-3
Assessments										
Assessment							Weight		Learning outcomes	
Continuous Assessments (CA)		Lab test - 01					30% [1 hrs]		LO-1, LO-2	
		Design project (Take home)					50% [3 hrs]		LO-1, LO-2, LO-3	
		Individual Assignment (Take home)					20% [3 hrs]		LO-2, LO-3	
References										

Module Code	DA4621	Semester 8	Module Title		Project Management					
Credits	2	Hours/Week			C	E	O	Evaluation %		Prerequisites
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	WE	None
		2	-	4.6				50	50	
Module Aim:	The module aims to develop skills of the participants to enable them to contribute to key decisions in project management in an organization.									
Learning Outcomes										
After completing this module, the students should be able to:										
LO-1	Recognize the project management process.									
LO-2	Outline the key challenges faced by project managers.									
LO-3	Demonstrate skills on a range of project management tasks including planning for risks, estimating time & costs, procurement and overall quality.									
Syllabus Outline										Learning Outcomes
1	Development of Project Management as a Discipline [4 hrs] Basic Principles, the Project 'Life Cycle', Project Management Terminology									LO-1
2	Project Initiation & Planning [6 hrs] Strategic and Operations Planning Frameworks, Establishing Project Goals and Objectives, Deliverables, Process Models, Scoping, Basic Feasibility Models, Resourcing, Costing, Scheduling, Presentation and Outcomes, Work Breakdown Structures, Gantt charts, Project Management Software									LO-1, LO-2
3	Monitoring & Control [6 hrs] Project control life cycle, Progress evaluation, Reporting and Corrective actions									LO-2, LO-3
4	Communication & Organization [2 hrs]									LO-2
5	Quality [4 hrs] Quality control & assurance, quality measurements & procedures, Quality management systems,									LO-3
6	Estimating & Risk [6 hrs] Overestimates/underestimates, Estimates & targets, Estimating methods, Risk categorization, Identifying and prioritizing risk, Assessment of risk exposure, Risk response strategies									LO-3
Assessments										
Assessment							Weight		Learning outcomes	
Continuous Assessments (CA)		In-class test – 01					25% [1 hrs]		LO-1, LO-2	
		In-class test – 02					25% [1 hrs]		LO-2, LO-3	
Written examination (WE)							50% (2 hrs)		LO-1, LO-2	
References										

Module Code	DA4461	Semester 8	Module Title			Technical Analysis				
Credits	2	Hours/Week			C	E	O	Evaluation %		Prerequisites
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	WE	None
		2	-	4.6				50	50	
Module Aim:	This course provides the principles of technical analysis and its applications.									
Learning Outcomes										
After completing this module, the students should be able to:										
LO-1 Describe various tools and techniques in Technical Analysis										
LO-2 Apply Technical Analysis when making trading decisions										
Syllabus Outline										Learning Outcomes
1	Principles of Technical Analysis and Basics of Trend [5 hrs] <i>Primary, secondary, short-term and intraday trends, uptrend, downward trend, support & resistance</i>									LO -1
2	Concept of Moving Averages [5 hrs] <i>Simple, Exponential</i>									LO -1, LO -2
3	Patterns [4 hrs] <i>Reversals & short-term patterns, common candlestick patterns and how to use interpret them within a trend,</i>									LO -1, LO -2
4	Wave Principle [4 hrs] <i>Basic operation of the Wave principle, Label waves using standard Elliot Wave notation</i>									LO -1, LO -2
5	Conformation [6 hrs] <i>Major indexes & oscillators designed to use volume as a confirmation, concept of momentum in price action, application of indexes & oscillators such as MACD, RSI and stochastics</i>									LO -1, LO -2
6	Fibonacci Relationships for Stock Trading [6 hrs] <i>Fibonacci ratio, Golden ratio and Phi can be used for stock price pattern analysis</i>									LO -1, LO -2
Assessments										
Assessment							Weight		Learning outcomes	
Continuous Assessments (CA)		Individual Assessment – 01 (Take home)					25% [4 hrs]		LO-1, LO-2	
		Individual Assessment – 02 (Take home)					25% [4 hrs]		LO-1, LO-2	
Written examination (WE)							50% [2 hrs]		LO-1, LO-2	
References										

Module Code	DA4441	Semester 8	Module Title			Financial Risk Management				
Credits	2	Hours/Week			C	E	O	Evaluation %		Prerequisites
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	WE	None
		2	-	4.6				50	50	
Module Aim:	This course aims to provide the concepts, processes and techniques of risk management.									
Learning Outcomes										
After completing this module, the students should be able to:										
LO-1	Explain the nature of risk management practices in the world of business									
LO-2	Make use of tools and techniques required for financial risk assessment and evaluations									
LO-3	Formulate risk management reporting									
Syllabus Outline										Learning Outcomes
1	Risk Finance Theory [6 hrs] <i>Risk and types of risks, Risk management, risk management process & functions, Costs / benefits of risk management</i>									LO-1
2	Classification of Risks [6 hrs] Operational risk, Compliance risk & Investment risks									LO-2
3	Risk Measures [4 hrs] Downside risk, Stochastic dominance, Value at Risk (VaR), Conditional Value at Risk (C-VaR), Filtered C-VaR									LO-2, LO-3
4	[6 hrs]									LO-2
5	[4 hrs]									LO-2, LO-3
6	Risks in Fixed income [4 hrs] <i>Probability and loss severity as components of credit risk, credit scores and credit ratings, impact of interest rate risk</i>									LO-2, LO-3
Assessments										
Assessment							Weight		Learning outcomes	
Continuous Assessments (CA)		In-class test - 01					25% [1.5 hrs]		LO-1	
		Lab Test – 01					25% [1.5 hrs]		LO-2	
Written examination (WE)							50% [2 hrs]		LO-1, LO-2, LO-3	
References										

Module Code	DA4451	Semester 8	Module Title			Stochastic Programming				
Credits	2	Hours/Week			C	E	O	Evaluation %		Prerequisites
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	WE	DA3461
		2	-	4.6				100	-	
Module Aim:	This course provides an introduction to modelling and solution methods for problems of decision-making under uncertainty.									
Learning Outcomes										
After completing this module, the students should be able to:										
LO-1 Model uncertainties in business decision making										
LO-2 Assess the impact of uncertainties on the decision-making process										
LO-3 Evaluate difficulties of incorporating uncertainties into optimization models										
Syllabus Outline										Learning Outcomes
1	Introduction to stochastic programming models [6 hrs]									LO-1
2	Use of sensitivity analysis [6 hrs]									LO-2, LO-3
3	Sensitivity analysis and uncertainty [6 hrs]									LO-2, LO-3
4	Multi-stage models and scenario trees [6 hrs]									LO-2, LO-3
5	Stochastic programming algorithms [6 hrs]									LO-2, LO-3
Assessments										
Assessment							Weight		Learning outcomes	
Continuous Assessments (CA)		Individual Assessment (Take home)					50% [4 hrs]		LO-1, LO-2	
		Group Assessment (Take home, presentation)					50% (4 hrs]		LO-2, LO-3	
References										

Module Code	DA4511	Semester 8	Module Title			Statistical Quality Control				
Credits	2	Hours/Week			C	E	O	Evaluation %		Prerequisites
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	WE	None
		2	-	4.6				50	50	
Module Aim:	The aim of this course is to familiarize students with statistical tools and methods for quality control and improvement by applying them in a variety of situations.									
Learning Outcomes										
After completing this module, the students should be able to:										
LO-1	Demonstrate the understanding of the necessity of using quality control in industries									
LO-2	Describe the principles of quality control analysis to improve the quality of the industrial processes									
LO-3	Apply quality control techniques to improve processes in industrial environments									
Syllabus Outline										Learning Outcomes
1	Introduction and overview of statistical quality control [4 hrs] <i>Quality improvement in the modern business environment, Overview of DMAIC process, Statistical methods for quality control and improvement.</i>									LO-1
2	Statistical Process Control [6 hrs] <i>The magnificent seven, control charts and limits, choice of control limits and interpretation of control charts.</i>									LO-1, LO-2
3	Control Charts for Variables [6 hrs] <i>Control charts for sample mean (\bar{x}), range (R), and variance (s^2), Estimating process capability, Changing sample size, Average run length, Control charts with variable sample size, OC curves</i>									LO-2, LO-3
4	Control Charts for Attribute Data [6 hrs] <i>Fraction nonconforming control charts (p-chart), Control charts for nonconformities (c-chart, and u-chart (per-unit chart)), Guidelines for implementing control charts</i>									LO-2, LO-3
5	Acceptance Sampling for Attributes [3 hrs] <i>Single and multiple sampling plan, Acceptance number, Acceptable quality level, Lot tolerance percent defective</i>									LO-2, LO-3
6	Overview of six-sigma [3 hrs]									LO-3
Assessments										
Assessment							Weight		Learning outcomes	
Continuous Assessments (CA)		In-class test - 01					25% [1 hrs]		LO-1, LO-2	
		Lab test - 02					25% [1 hrs]		LO-3	
Written examination (WE)							50% [2 hrs]		LO-1, LO-2, LO-3	
References										

Module Code	DA4641	Semester 8	Module Title			Introduction to FinTech					
Credits	2	Hours/Week			C	E	O	Evaluation %		Prerequisites	
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	WE	None	
		2	-	4.6				50	50		
Module Aim:	The module aims to provide an understanding of how the FinTech innovations can be used to transform organizations.										
Learning Outcomes											
After completing this module, the students should be able to:											
LO-1	Identify main FinTech innovations in Financial Services Industry										
LO-2	Explain emerging applications in FinTech										
LO-3	Discuss the risks and challenges of using FinTech										
Syllabus Outline										Learning Outcomes	
1	Introduction & Overview [4 hrs]										LO-1
2	FinTech Innovations [6 hrs] <i>Cryptocurrencies, Smart contracts, Stablecoins & Enterprise Blockchain,</i>										LO-2
3	ML and AI Strategies [6 hrs]										LO-2, LO-3
4	Alternative Lending and Payment Platforms [6 hrs]										LO-2, LO-3
5	Opportunities, Risk, Challenges & Regulations [6 hrs]										LO-3
Assessments											
Assessment							Weight		Learning outcomes		
Continuous Assessments (CA)		Case study – 01					25% [1 hrs]		LO-1, LO-2, LO3		
		Case study – 02					25% [1 hrs]		LO-1, LO-2, LO-3		
Written examination (WE)							50% [2 hrs]		LO-1, LO-2, LO-3		
References											

Module Code	DA4901	Semester 7,8	Module Title		Analytics Practicum						
Credits	8	Hours/Week			C	E	O	Evaluation %		Prerequisites	
GPA/NGPA	GPA	Lectures	Lab / Tutorials	Self-study				CA	WE	None	
		-	-	400				100	-		
Module Aim:	This module aims to requires students to demonstrate both theoretical and practical knowledge, analytical skills and personal characteristics at levels which are appropriate with professional business practice.										
Learning Outcomes											
After completing this module, the students should be able to:											
LO-1	Formulate the business problem into a viable project proposal under individual supervision										
LO-2	Review relevant literature and critique the impact of the proposed project to evaluate the suitability of alternative research methods applicable to the chosen business problem										
LO-3	Recommend courses of action by debating the effectiveness of the proposed business solution										
LO-4	Defend project results to peers and supervisors										
Syllabus Outline										Learning Outcomes	
1	Problem identification & Proposal development										LO -1
2	Research methodology and Research design										LO -2
3	Analysis, discussion and recommendations										LO -2, LO -3
4	Project presentation										LO-4
Assessments											
Assessment							Weight		Learning outcomes		
Continuous Assessments (CA)		Proposal presentation					20%		LO-1		
		Publishable research paper / article					30%		LO-2, LO-3		
		Research Report, Oral presentation and viva					50%		LO-2, LO-3, LO-4		
References											

Module Code	DA4801	Semester 8	Module Title	Internship					
Credits	6	Hours/Week		C	E	O	Evaluation %		Prerequisites
GPA/NGPA	NGPA	Lectures	Training				CA	WE	None
		-	600				100	-	
Module Aim:	This module aims to enable the participants to acquire transferable skills in the area of business and finance analytics by offering them the chance to gain practical exposure. .								
Learning Outcomes									
After completing this module, the students should be able to:									
LO-1 Compare academic and industrial environments									
LO-2 Relate the knowledge gained via training to the R & D project									
LO-3 Appraise professional ethics and business practices									
LO-4 Discuss the findings in a training report									
Syllabus Outline									Learning Outcomes
1	Induction <i>This is an initial period to help the student in the transition from academic to industrial life. The students should meet his/her Mentor to discuss the contents and the objectives of training. He/She should also receive information about the training organization, its products or services and the terms and conditions of employment</i>								LO -1
2	General Training <i>In a large organization, this should include an introduction to the work done in a number of departments. Under these circumstances, the student may eventually be working as a member of a team in the organization. The student should be made aware of the management and administration sectors of the organization</i>								LO – 1, LO -2
3	Practical Skills <i>During this period, the student should receive instructions in the practical skills essential for his/her future employment. It should also include an appreciation of the business processes.</i>								LO -2, LO -3
4	Directed Objective Training <i>The major part of the training should have directed application to the activity which the student intends to follow after the training program (activities should be relevant to the specialisation in which the student will be graduating in). At this stage, the student should be encouraged to work on a real project and be given increasing responsibility for independent work to establish interest and confidence in his/her work</i>								LO – 3, LO-4
Assessments									
Assessment						Weight		Learning outcomes	
Continuous Assessments (CA)		Training report				50%		LO-1, LO-2, LO-3, LO-4	
		Final presentation and viva				50%			
References									