UNIVERSITY OF MADRAS
MASTER OF BUSINESS ADMINISTRATION (MBA) DEGREE PROGRAMME
SYLLABUS WITH EFFECT FROM 2023-2024

934E917: Specialization Courses in Technology Management

Subject Code	Subject Name	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
934E917A	Technology Forecasting and Assessment	Elective	3	-	-	-	3	3	25	75	100
934E917B	Technology Commercialization and Transfer	Elective	3	-	-	-	3	3	25	75	100
934E917C	Research and Development Management	Elective	3	-	-	-	3	3	25	75	100
934E917D	Intellectual Property Rights	Elective	3	-	-	-	3	3	25	75	100
934E917E	Managing Technological Innovation	Elective	3	-	-	-	3	3	25	75	100
934E917F	E - Business Management	Elective	3	-	-	-	3	3	25	75	100
934E917G	Software Project and Quality Management	Elective	3	-	-	-	3	3	25	75	100
934E917H	Data Mining & Business Intelligence	Elective	3	-	-	-	3	3	25	75	100

UNIVERSITY OF MADRAS
MASTER OF BUSINESS ADMINISTRATION (MBA) DEGREE PROGRAMME
SYLLABUS WITH EFFECT FROM 2023-2024

Subject Code	Subject Name	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
934E917A	**Technology Forecasting and Assessment**	Elective	4	-	-	-	4	4	25	75	100

Course Objectives	
C1	To provide an in-depth understanding of industrial requirements for technology planning
C2	To analyze and evaluate the activities of technological change
C3	To examine the dimensions of technological forecasting
C4	To appraise on the overview of strategic planning and evaluation methods in technological assessment
C5	To appraise the various elements to gain knowledge on technological competitiveness in countries

UNIT	Details	No. of Hours	Course Objectives
I	**Introduction** - Technology origin and evolution – Tailoring technology to fitspecific industry requirements – Organization redesign – Organizational re-engineering – Financial considerations for technology Planning	9	C1
II	**Technology Cycle** - Technology cycle and understanding technologies change - Responding to technological changes - Adoption of technology - Overcoming resistance - different approaches.	9	C2
III	**Technology Forecasting** - Technology Forecasting – Need – Methodologies: - Trend Analysis, Analogy, Delphi, Soft System Methodology, Mathematical Models, Simulation, System dynamic, S-curve, Role of Technology Information Forecasting and Assessment Council (TIFAC).	9	C3
IV	**Technology Assessment** - Dissemination of technology information and strategic planning - Technology choice and evaluation methods – Analysis of alternative technologies - Implementing technology programmes.	9	C4
V	**Technological Competitiveness in Countries** - Factory and office automation - Business Process Reengineering - Quality Management –Use of Transferred Technology - Collaborative innovation environment - Collaborative knowledge-intensive industry environment – Business and government relations – Technological competitiveness in	9	C5

	some of the developing and developed countries.		
	Total	**45**	

Course Outcomes

Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Be able to understand the broad concepts of requirements for technology planning	PO2, PO5
CO2	Be able to apprehend, analyze and evaluate the basic principles and different approaches to technological change	PO1, PO2
CO3	Be able to learn and examine the process and functions and methodologies of technological forecasting	PO6, PO7
CO4	Be able to classify, appraise and assess the strategic planning and evaluation methods in technological assessment	PO2, PO5
CO5	Be able to appraise, and evaluate on the various elements of technological competitiveness in countries	PO2, PO4

Reading List

1.	https://www.bain.com/insights/management-tools-business-process-reengineering/
2.	https://archive.unu.edu/hq/library/Collection/PDF_files/INTECH/INTECHwp12.pdf
3.	https://nap.nationalacademies.org/read/12557/chapter/4
4.	https://www.energy.gov/eere/analysis/strategic-evaluation-planning

References Books

1.	Robert Szakonyl, Handbook of Technology Management, Viva Books Private Limited, 2008.
2.	Gerard H. Gaynor, Handbook of Technology Management, McGraw Hill, 1996.
3.	Betz, Frederic, Strategic Technology Management, New Delhi, McGraw Hill, 1996.
4.	Tarek M. Khalil, Management of Technology, McGraw Hill, 2003.
5.	Vijay Kumar Khurana, Management of Technology and Innovation, Ane books India, Chennai,2007.
6.	Gerard H. Gaynor, Handbook of Technology Management, McGraw Hill, 1996.

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1		3			2			
CO 2	2	3						
CO 3						2	3	
CO 4		2			3			
CO 5		3		2				

3 - Strong   2 - Medium   1 - Low

Subject Code	Subject Name	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
934E917B	**Technology Commercialization and Transfer**	Elective	3	-	-	-	3	3	25	75	100

	Course Objectives										
C1	To provide an in-depth understanding on types, process, opportunities of technology										
C2	To analyze and evaluate the activities of technological negotiation and diffusion										
C3	To examine the dimensions of technological transfer mechanisms										
C4	To appraise on the overview of strategic technological licensing and partnering										
C5	To appraise the various elements to gain knowledge on technological supportive services										

UNIT	Details	No. of Hours	Course Objectives
I	**Introduction** - Technology as asset - Competitive technology strategic options -Types of commercialization – Commercialization Process. Technology opportunities - Technology scale up - Transfer decision making - Choice of technology - Technology Transfer Categories: - International - Cross industry – Inter-firm – Intra-firm.	9	C1
II	**Technology Negotiation and Diffusion** - Technology Negotiation - Preparation and conduct of negotiations - Technology outsourcing - Socio, economic, political, legal and cultural considerations. Technology diffusion - Technology transfer modes - Technology up-gradation - Technology modernization - Adoption of new technologies - Absorption of new technologies - Absorption process - Relocation issues.	9	C2
III	**Transfer Mechanisms** - Technology Transfer Services - Matching and pre- selection of prospective business partners - Commercializing innovations –Technology transfer negotiations - Technology transfer Offices: - databank - periodicals – web basedservices - - technology transfer agreements - Material Transfer	9	C3

	Agreements (MTA s) - Business meets, workshops, training programmes, press release.		
IV	**Technology Licensing and Partnering** - In-house development - Partnerships with intermediaries - Sponsored development - Joint development - Collaborative development - International networks of technology brokers. Technology Licensing - Rights of license holders- Financial terms – documentation - cross licenses - Collaboration and public policy	9	C4
V	**Support Services** - Assistance in implementing technologies - Intellectual property related issues: – rights - litigations – royalty audits – auctions- Market/feasibility studies - Product marketing - Technology valuation: - methods - Contract negotiation – Subcontracting – sublicense - Technology investment practices - Arranging financial assistance: – sources - option fund – angel investment-Finance syndication – loan - venture capital and debts– grants – incentives.	9	C5
	Total	**45**	

Course Outcomes

Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Be able to understand the broad concepts of the basic concepts of strategic options, opportunities available in technology	PO2, PO5
CO2	Be able to apprehend, analyze and evaluate the basic principles and different approaches of technology negotiation and diffusion	PO1, PO2
CO3	Be able to learn and examine the process of the functions and methodologies of technological transfer mechanisms	PO6, PO7
CO4	Be able to classify, appraise and assess the networks in technological licensing and partnering	PO2, PO5
CO5	Be able to appraise, and evaluate on the various elements of valuation, negotiation procedures in supportive services	PO2, PO4

Reading List

1.	https://www.osibeyond.com/resources/technology-strategy-101/
2.	https://www.oecd.org/env/cc/2956490.pdf

3.	https://www.origiin.com/2020/09/13/technology-transfer-meaning-types-and-steps/
4.	https://hbr.org/2020/06/when-licensing-new-tech-is-better-than-building-it-in-house
References Books	
1.	Zeans Block & Lan C. Macmillan, Corporate Venturing, Harvard Business School Press, 2003.
2.	A Innovation Management, Strategies, Implementation and Profit by Afuah Oxford UniversityPress 2nd edition, 2012.
3.	Robert Szakonyl, Handbook of Technology Management, Viva Books Private Limited, 2006.
4.	Gerard H. Gaynor, Handbook of Technology Management, McGraw Hill, 1996.
5.	Tarek M. Khalil, Management of Technology, McGraw Hill, 2003.
6.	A Innovation Management, Strategies, Implementation and Profit by Afuah Oxford UniversityPress 2nd edition, 2012.

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1		3			2			
CO 2	2	3						
CO 3						2	3	
CO 4		2			3			
CO 5		3		2				

3 - Strong   2 - Medium   1 - Low

UNIVERSITY OF MADRAS
MASTER OF BUSINESS ADMINISTRATION (MBA) DEGREE PROGRAMME
SYLLABUS WITH EFFECT FROM 2023-2024

Subject Code	Subject Name	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
934E917C	**Research and Development Management**	Elective	3	-	-	-	3	3	25	75	100

	Course Objectives										
C1	To provide an in-depth understanding of various frameworks on social determinants of knowledge on vision, mission, types of research										
C2	To analyze and evaluate the activities, components, functions, climate, techniques of innovative environment										
C3	To examine the dimensions of the procedures, techniques of R & D quality Management										
C4	To appraise on the overview on the skill requirements, reviewing, monitoring, appraisal schemes of R& D										
C5	To appraise the various elements to gain knowledge on R & D supportive services										

UNIT	Details	No. of Hours	Course Objectives
I	**Introduction** - Introduction – historical perspective – validation and evaluation –basic research – applied research – technology in R&D – successful R&D management – basic condition – Elements – vision, mission, strategy – Deming cycle (PDCA), hypothetico deductive approach, competency matrices, thematic clustering	9	C1
II	**Innovative Environment** - Structural Components – Organizational Environment, Functional Organization, organization structure for innovation, Corporate R & D, Global R & D, Outsourcing R & D, Virtual R & D. Creativity – Tools –Climate - MBTI Creativity Index. Innovation – Pathways, sources, business analysis techniques	9	C2
III	**R & D Quality Management** - Quality management system, Good laboratory practices, Good management practice, Quality environmental management system- Data recording. TQM in R & D – Quality procedures, Continuous improvement, measurement techniques, Benchmarking.	9	C3

IV	**People and R&D** - Building scientific skills base - Skill audit process, skill requirements, skills gap assessment, selection & induction, Developing people – Performance management , reviewing and monitoring, appraisal schemes, T & D, Career Management & Development - Succession planning. R & D team Manager – Leadership, Creative groups.	9	C4
V	**R & D Support** - Support Services – Analytical, Manufacturing, Library service, IT & Telecommunication, legal. Laboratory Automation – Synthesis Lab – Microscale experimentation. Intellectual property – patents – types, procedure. Publications – categories – Science Citation Index – impact factor – citation metrics. Intellectualproperty –patents- types, procedure. Financial Control – Budgets, Plans, Costs, research grants & funding, project proposal writing. Risk Assessment – Performance standards and indicators – Audit & review	9	C5
	Total	**45**	

	Course Outcomes	
Course Outcomes	On completion of this course, students will;	**Program Outcomes**
CO1	Be able to understand the broad concepts of devise research methods, techniques and strategies in the appropriate manner for research and development	PO2, PO5
CO2	Be able to apprehend, analyze and evaluate the basic principles of appropriate business analysis techniques for an innovative environment	PO1, PO7
CO3	Be able to learn and examine the process of good practices, systems, procedures, techniques in R & D Quality Management	PO1, PO5, PO6
CO4	Be able to classify, appraise and assess the skills required for R & D management.	PO2, PO6
CO5	Be able to appraise, and evaluate on the various elements of need, services, procedures of R & D supportive service	PO2, PO5

	Reading List
1.	https://www.cleverism.com/rd-research-and-development-overview-process/
2.	**https://businessanalystmentor.com/business-analysis-techniques/**

3.	https://elsmar.com/elsmarqualityforum/threads/quality-management-system-for-r-d-research-development-work.42130/
4.	https://www.ispatguru.com/research-and-development-and-the-needed-skills-requirement/

References Books	
1.	R.K.Jain, Harry C Triandis, Management of Research and Development Organization:Managing the Unmanageable, John Wiley & Sons, 1997.
2.	George F Thompson, The Management of Research and Development, Batsford, 1970
3.	Peter Barnfield, Research and Development in the Chemical and Pharmaceutical Industry,Wiley, 2006.
4.	Alan Glasser, Research and Development Management, Prentice-Hall, 1982.
5.	Harold Arthur Collison, Management of Research and Development, Pitman, 1964.
6.	Andreas Holzinger, Successful Management of Research & Development, Books on Demand,2011

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1		3			2			
CO 2	3						2	3
CO 3	2				3	3		2
CO 4		3				2		
CO 5		3			2			

3 - Strong   2 - Medium   1 - Low

UNIVERSITY OF MADRAS
MASTER OF BUSINESS ADMINISTRATION (MBA) DEGREE PROGRAMME
SYLLABUS WITH EFFECT FROM 2023-2024

Subject Code	Subject Name	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
934E917D	**Intellectual Property Rights**	Elective	3	-	-	-	3	3	25	75	100

Course Objectives	
C1	To provide an in-depth understanding on understandings on Intellectual Property
C2	To analyze and evaluate the activities of the procedures of GATT, TRIPS International Protection of Intellectual Property
C3	To examine the dimensions of understandings the patents
C4	To appraise on the overview to familiarize with copyrights, Trademarks and trade secrets.
C5	To appraise the various elements, insights & awareness about the legal aspects of Intellectual Property rights

UNIT	Details	No. of Hours	Course Objectives
I	**Introduction to Intellectual Property -** Introduction - Invention and Creativity - An Overview of Intellectual Property (IP) - Importance - Protection of IPR - Basictypes of property. Forms of Industrial Properties: Patents, Industrial Designs, Plant Varieties, copyrights, Trademarks, Geographical Indications.	9	C1
II	**International Protection of Intellectual Property Rights** - Establishment of WIPO, General Agreement on Trade and Tariff (GATT).Patent Co- Operation Treaty, TRIPS agreement, Bern Convention, Rome convention, WTO and Intellectual Property Rights.	9	C2
III	**Patents -** Introduction to Patents – Overview, Historical development, concepts on Novelty, Utility, Non-Obviousness. Patentable and Non Patentable Inventions. Procedure for Filing of patents. Acquisition of patent rights. Compulsory Licenses, patent offices in India and jurisdiction.	9	C3
IV	**Copyrights, Trademarks, Other Intellectual Property Rights** - Copyrights and related rights - Trade Marks and rights arising from Trademark registration - Definitions - Industrial Designs and Integrated circuits - Protection of Geographical Indications at national and International levels, Plant Varieties - Application Procedures, Trade Secret,	9	C4
V	**Legal Aspects of Intellectual Property Rights** -	9	C5

	Infringement of Patents and Remedies. Modification of granted patents, Case Studies on - Patents - Copyright and related rights - Trade Marks - Industrial design and Integrated circuits - Geographic indications - Protection against unfair competition. Enforcement of Intellectual Property Rights	
Total		**45**

Course Outcomes

Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Be able to understand the broad concepts of Intellectual Property	PO2, PO5
CO2	Be able to apprehend, analyze and evaluate the basic principles of GATT, TRIPS International Protection of Intellectual Property	PO1, PO6
CO3	Be able to learn and examine the process of applying Patents	PO1, PO5, PO7
CO4	Be able to classify, appraise and assess the techniques copyrights, Trademarks.	PO5, PO6
CO5	Be able to appraise, and evaluate on the various elements of legal aspects of Intellectual Property rights	PO6, PO8

Reading List

1.	https://www.uspto.gov/sites/default/files/about/offices/ous/121115.pdf
2.	https://www.wto.org/english/thewto_e/whatis_e/tif_e/agrm7_e.htm
3.	https://ipindia.gov.in/patents.htm
4.	https://www.icsi.edu/media/webmodules/CRCPP_IPRL%26P_2018_DEC_30.pdf

References Books

1.	P. Narayanan, Intellectual property Rights, Eastern law House, Third Edition , 2008
2.	G. P. Reddy, Intellectual Property Rights & Other Law, Gogia Law Agency, 2004
3.	P. Narayanan, Patent Law, Eastern Law House, Fourth Edition, 2002
4.	V.K. Unni, Trademarks & The Emerging Concepts of Cyber Property Rights, Eastern LawHouse, 2005.
5.	Prof. A. Chandrasekaran, Intellectual Property Law, C. Sitaraman & Co. Pvt. Ltd., 2004.
6.	Dr. Vikes Vashishth, Law & Practice of Intellectual Property in India, Bharath Law House Pvt.Ltd., 2002

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1		3			2			
CO 2	3					2		
CO 3	3				2		2	
CO 4					2	3		
CO 5						3		2

3 - Strong   2 - Medium   1 - Low

UNIVERSITY OF MADRAS
MASTER OF BUSINESS ADMINISTRATION (MBA) DEGREE PROGRAMME
SYLLABUS WITH EFFECT FROM 2023-2024

Subject Code	Subject Name	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
934E917E	**Managing Technological Innovation**	Elective	3	-	-	-	3	3	25	75	100

	Course Objectives										
C1	To provide an in-depth understanding of Innovation types, process and techniques.										
C2	To analyze and evaluate the activities of knowledge on technology change and entrepreneurs opportunities										
C3	To examine the dimensions on building innovative capabilities										
C4	To appraise on the overview of Innovative strategy										
C5	To appraise the various elements of Innovative organization and contributions of public.										

UNIT	Details	No. of Hours	Course Objectives
I	**Introduction** - Innovation types, Process - Economic scale of innovation –Innovation system – Innovation research & development - Creativity techniques.	9	C1
II	**Technology Change** - Technology change – Organizational issues – Entrepreneurs opportunities and Technology changes – Technology change and productivity.	9	C2
III	**Innovation Strategy** - Importance - innovation strategy in practice –types – formulating strategy - building innovative capabilities - returns from innovation strategy - innovation strategy in SMEs.	9	C3
IV	**Innovation Strategy** - Importance - innovation strategy in practice –types – formulating strategy - building innovative capabilities - returns from innovation strategy - innovation strategy in SMEs.	9	C4
V	**Innovation Organisation** - Entrepreneurship - Technology based, knowledge spillover in large and small firms – financing - contribution of public entities.	9	C5
	Total	**45**	

	Course Outcomes	
Course Outcomes	On completion of this course, students will;	**Program Outcomes**
CO1	Be able to understand the broad concepts of Innovation types, process and techniques.	PO2, PO6
CO2	Be able to apprehend, analyze and evaluate the basic	PO1, PO5

UNIVERSITY OF MADRAS
MASTER OF BUSINESS ADMINISTRATION (MBA) DEGREE PROGRAMME
SYLLABUS WITH EFFECT FROM 2023-2024

	principles of technology change and entrepreneurs opportunities	
CO3	Be able to learn and examine the process of building innovative capabilities	PO5, PO6, PO7
CO4	Be able to classify, appraise and assess the Innovative strategy	PO2, PO6, PO7
CO5	Be able to appraise, and evaluate on the various elements of Innovative organization and contributions of public.	PO1, PO6
Reading List		

Reading List

1.	https://alcorfund.com/insight/the-innovation-process-importance-steps-types-examples-and-risks-involved/
2.	https://www.citeman.com/8228-entrepreneurial-opportunities-changes-in-technology.html
3.	https://www.innosight.com/services/develop-innovation-capabilities/
4.	https://www.business.qld.gov.au/running-business/growing-business/becoming-innovative/strategy/types

References Books

1.	Mark Dodgson, David Gann, and Ammon Salter, The Management of TechnologicalInnovation, Oxford University Press, 2008.
2.	Scott Shane, Handbook of Technology and Innovation Management, John Wiley & Sons, 2009.
3.	Frederick Betz, Managing Technological Innovation, John Wiley & Sons, Third Edition, 2011.
4.	Edited by Michael Tushman and Philip Anderson (The Second Edition, 2004)
5.	Robbert Szakonyl, Managing Strategic Innovation and Change: A Collection of Readings, Handbook of Technology Management – Viva Books Private, Limited, 2006.
6.	Twiss B & Goodridge, M. Pitman, Managing Technology for Competitive Advantage: Integrating Technological and Organizational Development from Strategy to Action, 1989

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1		3				2		
CO 2	2				3			
CO 3					3	2	2	
CO 4		3				3	2	
CO 5	3					2		

3 - Strong   2 - Medium   1 - Low

UNIVERSITY OF MADRAS
MASTER OF BUSINESS ADMINISTRATION (MBA) DEGREE PROGRAMME
SYLLABUS WITH EFFECT FROM 2023-2024

Subject Code	Subject Name	Category	L	T	P	O	Credits	Inst. Hours	Marks CIA	Marks External	Marks Total
934E917F	**E - Business Management**	Elective	3	-	-	-	3	3	25	75	100

Course Objectives	
C1	To provide an in-depth understanding of framework of E-business.
C2	To analyze and evaluate the activities of technology infrastructure
C3	To examine the dimensions of business applications and E-governance
C4	To appraise on the overview of E-business payments and security
C5	To appraise the various elements of legal and privacy issues

UNIT	Details	No. of Hours	Course Objectives
I	**Introduction to e-Business :**Overview of E-Business; Fundamentals, E-Business framework; E-Business application; Major requirements in E-Business; Emerging trends and technologies in E-Business; From E-Commerce to E-Business.	9	C1
II	**Technology Infrastructure :**Internet and World Wide Web, internet protocols - FTP, intranet and extranet, information publishing technology- basics of web server hardware and software.	9	C2
III	**Business Applications :**Consumer oriented e-business – e-tailing and models - Marketing on web – advertising, e-mail marketing, affiliated programs - e-CRM; online services, Business oriented e-business, e-governance, EDI on the internet.	9	C3
IV	**E-Business Payments and Security :**E-payments - Characteristics of payment of systems, protocols, e-cash, e-cheque and Micro payment systems- internet security – cryptography – security protocols – network security.	9	C4
V	**Legal and Privacy Issues :**Legal, Ethics and privacy issues – Protection needs and methodology – consumer protection, cyber laws, contracts and warranties, Taxation and encryption policies.	9	C5
	Total	**45**	

Course Outcomes		
Course Outcomes	On completion of this course, students will;	**Program Outcomes**
CO1	Be able to understand the broad concepts on the framework of E-business.	PO2, PO3, PO4

CO2	Be able to apprehend, analyze and evaluate the basic principles to possess knowledge on technology infrastructure	PO1, PO2, PO4, PO6, PO7
CO3	Be able to learn and examine the process of the importance of business applications and E-governance	PO3, PO4, PO5, PO6, PO7
CO4	Be able to classify, appraise and assess the to have better understanding on E-business payments and security	PO3, PO4, PO7
CO5	Be able to appraise, and evaluate on the various elements of legal and privacy issues	PO3, PO4, PO7, PO8

Reading List	
1.	**https://fabric.inc/blog/ecommerce-framework/#:~:text=An%20e%2Dcommerce%20framework%20is,shopping%20cart%2C%20and%20payment%20processing**.
2.	https://www.techtarget.com/searchdatacenter/definition/infrastructure
3.	**https://cleartax.in/s/e-governance**
4.	**http://www.mcrhrdi.gov.in/fcg/fbf-week3/challenges%20and%20issues%20in%20e%20governance.pdf**

References Books	
1.	ParagKulkarni, SunitaJahirabadkao, PradeepChande, e business, Oxford University Supplementary Readings
2.	Kamlesh K.Bajaj and Debjani Nag, Ecommerce- the cutting edge of Business, Tata McGrawHill Publications, 7th reprint, 2009
3.	Hentry Chan &el , E-Commerce – fundamentals and Applications, Wiley India Pvt Ltd, 2007.
4.	Dave Chaffey E-Business and E-Commerce Management ,Financial Times/ Prentice Hall, 2006
5.	**Colin Combe**,Introduction to e-Business: Management and Strategy Paperback – 1st ed, 2006
6.	**Michael J. Shaw**, E-Business Management: Integration of Web Technologies with Business Models: 1 (Integrated Series in Information Systems) Springer, 2nd ed, 2002

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1		3	2	3				
CO 2	3	2		2		3	3	
CO 3			3	3	3	2	3	
CO 4			3	3			2	
CO 5			3	2			3	3

3 - Strong   2 - Medium   1 - Low

UNIVERSITY OF MADRAS

MASTER OF BUSINESS ADMINISTRATION (MBA) DEGREE PROGRAMME
SYLLABUS WITH EFFECT FROM 2023-2024

Subject Code	Subject Name	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
934E917G	**Software Project and Quality Management**	Elective	3	-	-	-	3	3	25	75	100

Course Objectives	
C1	To provide an in-depth understanding of project planning, project tracking
C2	To analyze and evaluate the activities of the principles and philosophies of Software metrics
C3	To examine the dimensions of software project estimation
C4	To appraise on the overview of awareness and importance of Software quality
C5	To appraise the various elements of models, standards and process of software quality Assurance

UNIT	Details	No. of Hours	Course Objectives
I	**Introduction -** Software Projects, Projects Planning, Process models, Waterfall,RAD, V, Spiral, Incremental, Prototyping, Agile, Project Tracking.	9	C1
II	**Software Metrics -** Goal, Question, Metric (GQM) model, Product Quality metrics, In process Quality metrics, Metrics for software maintenance and testing, Complexity Metrics.	9	C2
III	**Software Project Estimation -** Effort and Cost Estimation - Expert Judgment, LOC, Function Points, Extended Function Points, Feature Points, Object Points, COCOMO-81, COCOMO-II; Risk Management.	9	C3
IV	**Software Quality -** Quality Management Systems, Software Quality Models- FURPS, McCalls Models, Applying seven basic quality tools in software development, Measuring Quality, Gilb, CoQUAMO, Lean software development	9	C4
V	**Software Quality Assurance -** Software Reliability models-Rayleigh model, Weibull model; Defect Removal Effectiveness; Quality standards- ISO 9000 models and standards for process improvement, ISO/IEC 9126-1 to 9126-4, SQuaRE, ISO/IEC 25000,	9	C5

	ISO/IEC 25010, CMM, PCMM, CMMI, SPICE.		
	Total	**45**	

Course Outcomes

Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Be able to understand the broad concepts of having the insights on project planning, project tracking	PO2, PO6
CO2	Be able to apprehend, analyze and evaluate the basic principles of Software metrics	PO1, PO2, PO8
CO3	Be able to learn and examine the process of software project estimation	PO1, PO6, PO7
CO4	Be able to classify, appraise and assess the Software quality	PO2, PO5
CO5	Be able to appraise, and evaluate on the various elements of the models, standards and process of software quality Assurance	PO2, PO6

Reading List

1.	https://www.projectmanager.com/guides/project-tracker
2.	https://www.javatpoint.com/software-engineering-software-metrics
3.	https://www.geeksforgeeks.org/software-engineering-project-size-estimation-techniques/
4.	https://www.softwaretestinghelp.com/software-quality-assurance/

References Books

1.	Roger S. Pressman, Software Engineering A Practioners Approach, McGraw Hill International Edition, New Delhi, 7th Edition, 2010.
2.	Stephen Kan, Metrics and Models in Software Quality Engineering, Pearson ducation Asia, 8th Impression 2009.
3.	Alan Gillies, Software Quality – Theory and Management, Thomson Learning, 2011.
4.	Bob Hughes and Mike Cotterell, Software Project Management, Tata McGraw Hill, 5th Edition, 2010.
5.	Robert T. Futrell, Donald F. Sahefer and Linda I. Shafer, Quality Software Project Management, Pearson Education Asia, 2002.
6.	Richard H. Thayer, Software Engineering Project Management, John Wiley, 2007

UNIVERSITY OF MADRAS

MASTER OF BUSINESS ADMINISTRATION (MBA) DEGREE PROGRAMME

SYLLABUS WITH EFFECT FROM 2023-2024

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1		3				2		
CO 2	2	3						3
CO 3	3					3	2	
CO 4		2			3			
CO 5		3				3		

3 - Strong   2 - Medium   1 - Low

UNIVERSITY OF MADRAS
MASTER OF BUSINESS ADMINISTRATION (MBA) DEGREE PROGRAMME
SYLLABUS WITH EFFECT FROM 2023-2024

Subject Code	Subject Name	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
934E917H	**Data Mining & Business Intelligence**	Elective	3	-	-	-	3	3	25	75	100

	Course Objectives
C1	To provide an in-depth understanding of Data mining and Business intelligence
C2	To analyze and evaluate the activities of Data warehousing and various models
C3	To examine the dimensions of advanced Data mining tools, methods and techniques
C4	To appraise on the overview of modern information technology and business opportunities
C5	To appraise the various elements of BI and Power BI

UNIT	Details	No. of Hours	Course Objectives
I	**Introduction** - Data mining, Text mining, Web mining, Spatial mining, Processmining, BI process- Private and Public intelligence, Strategic assessment of implementing BI	9	C1
II	**Data Warehousing** - Data ware house – characteristics and view - OLTP and OLAP - Design and development of data warehouse, Meta data models, Extract/ Transform / Load (ETL) design	9	C2
III	**Data Mining Tools, Methods and Techniques** - Regression and correlation; Classification- Decision trees; clustering –Neural networks; Market basket analysis- Association rules-Genetic algorithms and link analysis, Support Vector Machine, Ant Colony Optimization	9	C3
IV	**Modern Information Technology and its Business Opportunities** - Business intelligence software, BI on web, Ethical and legal limits, Industrial espionage, modern techniques of crypto analysis, managing and organizing for an effective BI Team	9	C4
V	**BI and Data Mining Applications** - Applications in various sectors – Retailing, CRM, Banking, Stock Pricing, Production, Crime, Genetics, Medical, Pharmaceutical.	9	C5
	Total	**45**	

UNIVERSITY OF MADRAS
MASTER OF BUSINESS ADMINISTRATION (MBA) DEGREE PROGRAMME
SYLLABUS WITH EFFECT FROM 2023-2024

Course Outcomes		
Course Outcomes	On completion of this course, students will;	**Program Outcomes**
CO1	Be able to understand the broad concepts of data Data mining its various types and Business intelligence	PO2, PO6
CO2	Be able to apprehend, analyze and evaluate the principles of Data warehousing and its various models	PO1, PO2, PO8
CO3	Be able to learn and examine the process to develop Data Models and use the DAX Formula language and M language to develop POWERFUL calculations	PO1, PO6, PO7
CO4	Be able to classify, appraise and assess the professional-quality business intelligence reports from the ground up and share for collaboration	PO2, PO5
CO5	Be able to appraise, and evaluate on the design visualization system for large datasets and dashboards using power BI, interpret the visualization created from the data set	PO2, PO6
Reading List		
1.	https://hevodata.com/learn/data-mining-and-business-intelligence/	
2.	https://www.getdbt.com/blog/five-principles-that-will-keep-your-data-warehouse-organized/	
3.	https://powerpartners.pro/en/power-query-vs-dax/#:~:text=DAX%2C%20or%20Data%20Analysis%20Expressions,collection%20of%20functions%20and%20operators.	
4.	https://powerbi.microsoft.com/en-us/data-visualization/	
References Books		
1.	Jaiwei Ham and Micheline Kamber, Data Mining concepts and techniques, KauffmannPublishers, 3rd edition, 2011.	
2.	Efraim Turban, Ramesh Sharda, Jay E. Aronson and David King, Business Intelligence,Prentice Hall,2nd edition, 2010.	
3.	W. H. Inmon, Building the Data Warehouse, Fourth Edition Wiley India Pvt. Ltd., 2005.	
4.	Ralph Kimball and Richard Merz, The Data Warehouse Toolkit, John Wiley, 3rd edition, 2013.	
5.	Michel Berry and Gordon Linoff, Mastering Data Mining, John Wiley and Sons Inc,	
6.	Michel Berry and Gordon Linoff, Data Mining Techniques for Marketing, Sales andCustomer Support, John Wiley,3rd edition, 2011.	

UNIVERSITY OF MADRAS
MASTER OF BUSINESS ADMINISTRATION (MBA) DEGREE PROGRAMME
SYLLABUS WITH EFFECT FROM 2023-2024

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CO 4		2			3			
CO 5		3				3		

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