UNIVERSITY OF MALTA
FACULTY OF ENGINEERING
MSC IN INTEGRATED PRODUCT DEVELOPMENT (IPD)
COURSE GROUP 2010 – 2013

YEAR I
Programme of Studies for 2010/11

NOTE : Students are required to register for all compulsory credits (20) as well as (10) credits from the elective study units, to a **total of 30 credits**

Code	Description	Credits	Lecturers
Compulsory Study Units			
Semester 1			
MFE5101	Fundamentals of Product Development	5	Prof Ing. J. C. Borg
MME5101	Materials Engineering in Products and Processes	5	Dr Ing. J. Betts Dr Ing. S. Abela Dr J. Buhagiar Dr B. Mallia
MFE5102	Lean and Agile Manufacturing	5	Ing. P. Vella Dr Ing. C. Pace
Semester 2			
ENR5101	Advanced Manufacturing Processes and Methodologies	5	Dr Ing. P Farrugia Dr Ing. J. Betts Dr J. Buhagiar Dr B. Mallia
Elective Study Units (offered only in Semester 2 subject to time-table constraints and availability of resources)			
Semester 1			
/		/	/
Semester 2			
ENR5103	Nano and Micro Technologies	5	TBA
MFE5103	Product Quality, Reliability and Safety Engineering	5	Mr. E. Francalanza Dr Ing. C. Pace
MFE5104	Industrial Automation and Robotics	5	TBA

YEAR II
Programme of Studies for 2011/12

NOTE : Students are required to register for all compulsory credits (15) as well as (15) credits from the elective study units, to a **total of 30 credits**

Code	Description	Credits	Lecturers
Compulsory Study Units			
Semester 1			
MGT5056	Fundamentals and Principles of Management	5	Dr J. Azzopardi
MGT5058	Technology Entrepreneurship	5	Dr Ing. M. M. Zammit
MEC5101	Product Modelling and Simulation	5	Dr Ing. M. Muscat
Semester 2			
/	/	/	/
Elective Study Units (offered only in Semester 2 subject to time-table constraints and availability of resources)			
Semester 1			
/	/	/	/
Semester 2			
ENR5102	Tool Design and Manufacture	5	Dr Ing. P. Farrugia Dr Ing. Arif Rochman Dr Ing. S. Abela
ENR5104	Environmental Engineering in Product Development	5	Prof R Ghirlando Dr Ing. C Ciantar
MGT5057	Fundamentals of Business and Market Development	5	Dr Ing. M. M. Zammit
EMA5901	Financial Control in Product Development	5	Mr G. Vella

YEAR III
Programme of Studies for 2012/13

NOTE : All students are required to register for this unit:

Code	Description	Credits	Lecturers
Semester 1 & 2			
ENR5000	Integrated Product Development Project	30	Various

Requirement for admittance to the diploma in postgraduate studies:

	60 credits in taught study units
Total credits:	**60 credits***

Requirement for admittance to the master of science degree:

	15 credits in Year 1 Semester 1
	15 credits in Year 1 Semester 2
	15 credits in Year 2 Semester 1
	15 credits in Year 2 Semester 2
	30 credits in Year 3
Total credits:	**90 credits***

* According to M.Sc./Pg.Dip. bye-laws

MSc in Integrated Product Development
Study Unit Descriptions for Course commencing Oct 10

ENR5101 Advanced Manufacturing Processes and Methodologies

Tutor:	Dr.Ing. P Farrugia Dr.Ing. J. Betts Dr. J. Buhagiar Dr. B. Mallia		
Subject Area	Product and Process Engineering		
ECTS	5	***No. of Delivery Hours***	27
Unit Objectives:	The manufacturing of a product is becoming increasingly complex. Traditional manufacturing processes are inadequate for such products. This module aims to provide students with knowledge on the principles of advanced manufacturing processes and technologies, which are indispensable in modern manufacturing.		
Unit Outline:	• *Overview of types of Manufacturing Processes and Technologies* - classification, basic principles of sheet-metal forming processes, polymer processing, ceramic processing, metal casting processes etc. • *Non-conventional machining* - Electrochemical, Electro-Discharge machining, High-energy-beam machining, Water jet cutting, Abrasive water jet and Abrasive-jet machining. • *Additive Manufacturing* - Rapid Prototyping, Rapid Tooling, Rapid Manufacturing. • *Micro Machining* - Conventional (e.g. milling, grinding) and non-conventional (e.g. electro discharge). • *Laser Related Manufacture* - laser cutting, laser bending, laser machining, laser joining, laser material deposition • *Ceramic Powder Processing* – green preparation methods, sintering, applications. • Powder Metallurgy - Production steps, Effect of process and powder variables; applications. • *Composite Material Processing* – manufacturing processes for polymer-, metal- and ceramic-matrix composites.		
Competencies Achieved	○ Familiarization with a range of advanced processes ○ Awareness of processes, and of the availability of alternatives to more traditional methods		
Assessment:	25% coursework 75% written exam		
Reading list:	• Kalpakjian, S., Schmid, S.R. Manufacturing Processes For Engineering Materials, 4th edition, ISBN 013040871-9. • Pham, D.T., Dimov, S.S. Rapid Manufacturing: The Technologies and Applications of Rapid Prototyping and Rapid Tooling, ISBN 185233360X. • Steen W.M., Laser Materials Processing, 2nd ed., Springer Verlag, 2001, ISBN 3540761748. • Composite Materials: Engineering and Science F.L. Matthews and R. D. Rawlings Chapman and Hall ISBN 0412559406		

ENR5102 Tool Design and Manufacture

Tutor:	Dr Ing. Philip Farrugia Ing. Arif Rochman Dr Ing. Stephen Abela		
Subject Area	Product and Process Engineering		
ECTS	5	***No. of Delivery Hours***	27
Unit Objectives:	This module introduced participants to tool design and manufacture. For this purpose, the module essentially covers various design approaches and also part fabrication and finishing techniques.		
Unit Outline:	• Introduction: tool terminology, mould cavities and cores, bolsters, use of inserts, parting line, line of draw, draft angle. Prototype moulds. • Tool Design Methods: Rapid Tooling; Design for Injection Moulding' The Two Plate Mould; Multiplate Moulds; Undercut Moulds • Tool Design Methods: Runner and gate design, ejector systems, venting mould shrinkage, methods of location and aligning each half, mould venting; Runnerless Moulds • Internal and external undercuts, splits, side cores/cavities, hydraulics, internal threads, etc. • Design of cooling methods for various core/cavity shapes. • Tool Part Fabrication techniques: Machine tools, die sinking, spark erosion, hobbing, castings etc. • General Mould Construction • Standard Mould Parts • Jigs & fixtures • Stamp tools • Mould Materials and Heat Treatment; Low carbon, pretoughened, fully hardening and stainless steels. Non ferrous materials, case hardening, nitriding etc. Materials for prototype moulds. • Mould surface engineering; mould Finishes; Polishing, texturing.		
Competencies Achieved	o By the end of the module, the student should have gained sufficient knowledge on how to design and construct an injection mould for a given plastic part. Furthermore, knowledge shall be acquired by the student on the basics of the design and construction on jigs, fixtures and stamp tools.		
Assessment:	25% coursework 75% written exam		
Reading list:	• Injection Mould Design by R G W Pye. Longman Scientific & Technical. ISBN 0-582-01611-8.		

ENR5103 Nano and Micro Technologies

Tutor:	TBA		
Subject Area	Product and Process Engineering		
ECTS	5	***No. of Delivery Hours***	27
Unit Objectives:	To provide students with good working knowledge and understanding of: - the basic concepts of nanotechnology - micro and nano materials properties and processes - metrology in the nano scale - nanoelectronics, and hence the skills required to pursue a successful career in this domain.		
Unit Outline:	• Intro. to the Nano & Micro Scale; the length scale, review of Nanotechnology definitions & background • Generic methodologies for nanotechnology; principles of nanostructure production, laboratory preparation, working in ultra-clean environments • Metrology Techniques for the Micro and Nano Scale; use and operation of Scanning Probe Microscopy (SPM), Stylus Profilometry (SP), Scanning Electron Microscopy (SEM), Super Resolving Optical Microscopy (SROM) • Micro and Nano fabrication methods and techniques; Laser machining, Photolithography, Semiconductor lithography, Microfabrication of tools for nanoscale measurements, e.g. silicon cantilever structures. • Materials on the Nanometer scale; Introduction to nano materials, Nano structured materials, Nano powders / coatings, Assessment of nano properties • Nanoelectronics; Semi-conductor nano-electronic devices, Spin-tronics and molecular electronics • Nano bioengineering technology; measurement techniques of micro and nano particles in bio-systems, Nano bio materials, DNA technology • MEMs and NEMS; Principles of operation of Micro- and Nano-Electromechanical systems, Principles of MEMS and NEMS design, Materials for MEMS / NEMS design • Sensing and Manipulation of Micro and Nano particles - sensing and manipulation challenges at the micro and nano scales, micro sensors and actuators, and microassembly, the atomic force microscope (AFM), nanorobots and nanoassembly • Future prospects of Nano Technology; the importance of Nano for future developments. The way forward		
Competencies Achieved	o Develop an understanding of the characteristics exhibited by micro and nano scale products in the various application areas. o Develop an understanding of the issues and methods involved in processing at the micro and nano scale level o Acquire basic principles in the design and development of products in the micro and nano scale level		
Assessment:	25% coursework 75% written exam		
Reading list:	• **Understanding Nanotechnology,** *ISBN 0446679569* • **Springer Handbook of Nanotechnology,** *ISBN 3540012184* • **Nanoscale Materials,** *ISBN 1402073666* • **Handbook of Microscopy for Nanotechnology,** *ISBN 1402080034*		

ENR5104 Environmental Engineering in Product Development

Tutor:	Prof. Robert Ghirlando Dr Ing. Christopher Ciantar		
Subject Area	Product and Process Engineering		
ECTS	5	***No. of Delivery Hours***	27
Unit Objectives:	To provide students with a deeper understanding of the environmental issues involved in product development and manufacture in order that they learn to develop commercially viable greener products and processes through sustainable engineering practices.		
Unit Outline:	• Sustainable product development - life cycle thinking - new product design concepts - design for the environment procedures - tasks for the engineer/designer versus those of the environmentalist - green products. • Life cycle assessment - a methodology for sustainable product development - environmental impact - simplifying LCA - case studies • Waste minimisation and prevention - five business reasons for waste minimisation - profiting from waste - workshop approach to waste minimisation • Drivers for sustainable development - laws and regulations - the environment protection act - the solid waste management plan - eco-labels - producer responsibility - packaging and packaging waste - electrical and electronic waste directive - integrated product policy - standards. • Materials and the environment – choice of materials based on environmental concerns include cleaner manufacture • Pollution and manufacture – energy efficiency in production - air emissions and water pollution issues in manufacture • EU initiatives to promote green products and cleaner production –ETAP – case studies • The disassembly factory – recycling as a means of waste disposal		
Competencies Achieved	• An understanding of the environmental impact of products from material extraction, through to production, use and disposal; • The ability to carry our an environmental impact assessment, through life cycle analysis of products; • The ability to reduce this environmental impact of products at the product development stage; • An apprecation of the various EU directives that apply in the case of product development.		
Assessment:	25% coursework 75% written exam		
Reading list:	• The students will be given a list of relevant EU directives and downloadable papers to read at the start of the module; this will be updated continuously.		

MEC5101 Product Modelling and Simulation

Tutor:	Dr Ing. Martin Muscat		
Subject Area	Product and Process Engineering		
ECTS	5	***No. of Delivery Hours***	27
Unit Objectives:	In designing a product due attention must be given to detailed design such that the product is not only manufacturable and aesthetatically pleasing but also fit for its intended purpose. The aim of this module is to present and introduce computer based tools that can be used in understanding product modelling beyond classical techniques The use of computers imply that less simplifying assumptions are taken in modelling the system thus resulting in a more realistic analysis of the product.		
Unit Outline:	• Introduction to modeling and simulation – using computers • Finding roots of equations • Solving linear and non-linear sets of equations • Optimization • Interpolation and curve fitting • Numerical differentiation and integration • Numerical solution of ordinary and partial differential equations • The finite difference and finite element methods		
Competencies Achieved	At the end of the module the student should be competent in or have a working knowledge in o Numerical techniques directly applicable to solve mathematical equations that model practical engineering problems o VBA – Visual basic for applications software platform for Microsoft Excel		
Assessment:	75% coursework 25% written exam		
Reading list:	• Numerical methods for Engineers – S.C.Charpa & R.P.Canale ISBN 0-07-112180-3 • Applied numerical Analysis – Gerald. Wheatley ISBN 0-321-19019-X • Numerical Recipes in Fortran 90 – ISBN 0-521-57439-0		

MFE 5101 Fundamentals of Product Development

Tutor:	Dr Ing. Jonathan C. Borg		
Subject Area	Product and Process Engineering		
ECTS	5	***No. of Delivery Hours***	27
Unit Objectives:	The world around us is made up of man-made products, which need to primarily satisfy a host of functional requirements. From a manufacturing business perspective, the way products are designed has a significant impact on the ease of manufacture, assembly and also disposal, these collectively influencing the marketability of such products. There is thus a direct link between a manufacturing organisation's competitiveness and the design of its products. The aim of this module is to provide a theoretical foundation to how the process of product development can be exploited to positively contribute in improvements to a range of business performance measures including cost, time, quality and flexibility.		
Unit Outline:	• Why Lean Design in Product Development? Innovation process, design and business performance; • Sequential Design; Concurrent Design; Integrated Product Development Approach; • Artefacts viewed as technical systems; • Design Problem Solving via The Basic Design Cycle • Tools & Methods for Problem Analysis; • Tools & Methods for Solution Synthesis; • Tools & Methods for Solution Analysis; • Managing Product Platforms; • Design in Industry – Patents, CE Marking; Managing the 'design process'; Financing Innovative Design, R&D.		
Competencies Achieved	• By the end of this module, the participant will gain a better understanding of the complex product development process and a number of tools/methods used to help handle this complexity. This competence will collectively help the participant to handle product development projects not only from an engineering perspective, but also from a business and processing perspective.		
Assessment:	25% coursework 75% written exam		
Reading list:	• Design in Business – Strategic Innovation Through Design, *Margaret Bruce & John Bessant, Pearson Education Ltd., ISBN 0 273 64374 6* • Product Design: Fundamentals & Methods, *N. F. M. Roozenburg, J. Eekels, John Wiley & Sons, ISBN 0 471 95465 9* • Integrated Product Development, *M. Myrup Andreasen & Lars Hein, Institute of Product Development, Technical University, Denmark* • Product Design and Development, *K. T. Ulrich & S. D. Eppinger, Irwin McGraw-Hill, ISBN 0 07 229647 X*		

MFE 5102 Lean and Agile Manufacture

Tutor:	Ing. Pierre Vella Dr Ing. Conrad Pace		
Subject Area	Product and Process Engineering		
ECTS	5	***No. of Delivery Hours***	27
Unit Objectives:	Lean manufacturing concepts enable companies to remain competitive, innovative, and profitable. However, there are new challenges facing manufacturers, namely: • Global competition is intensifying. • Customers expect low volume, high quality, and custom products. • Very short product life cycles, development time, and production lead times are required. Considering the scenario above, it is therefore not only important to have mastered the methods of world class manufacturing including lean manufacturing, but also forward looking, highly competitive organizations need to introduce agility if they want to have a chance to remain competitive. Agile manufacturing techniques are therefore perceived as the manufacturing systems of the future. In view of all the above, the aims of this module are to provide an understanding of the characteristics of internationally competitive manufacturing systems and knowledge of, and experience in using, the lean/ agile manufacturing philosophy and techniques. Practice in carrying out the redesign process and in using the appropriate methodologies/ tools for the practical and detailed realisation of the newly designed or redesigned lean/ agile manufacturing system will be included. An integrated approach to efficient manufacturing with emphasis on the topics listed below will thus be adopted.		
Unit Outline:	• Modelling Manufacturing System Behaviour • Introduction to Lean/ Agile Manufacturing. • Waste Identification and Elimination. • Fundamentals of Continuous Improvement. • Small Lot Production • Set-up Time Reduction (SMED). • Introduction to Total Productive Maintenance • TPM Pillars and Implementation of TPM • Focused Factories and Group Technology. • Workcells and Cellular Manufacturing. • Manufacturing Control Systems. • 5 S Workplace Organization; • Standard Operations. • Lean Implementation • Overview of Agile Manufacturing.		
Competencies Achieved	• Gain knowledge of the Lean/ Agile manufacturing philosophies and the respective tools/ enablers • Be capable of carrying out a manufacturing system design process through the use of appropriate lean tools/ methodologies and simulation techniques..		
Assessment:	75% coursework 25% written exam		

Reading list:	• *Womack JP. et al , Lean Thinking, 2003, Simon and Schuster,* ISBN*: 0743249275* • *Monden Y., Toyota Production system: An Integrated Approach to Just in Time, 1998, Engineering & Management Press,* ISBN: 0898061806 • Allen J. et al, *Lean Manufacturing - A Plant Floor Guide*, 2*001. ISBN: 0872635252* • *Law, A.M., Kelton W.D. Simulation, Modeling and Analysis, ISBN :0070592926*

MFE5103 Product Quality, Reliability and Safety Engineering

Tutor:	Mr. Emmanuel Francalanza Dr Ing. Conrad Pace		
Subject Area	Product and Process Engineering		
ECTS	5	***No. of Delivery Hours***	27
Unit Objectives:	The module focuses on three principle and related areas of engineering, namely Quality, Reliability and Safety Engineering. The module provides an insight into the key areas of Quality Engineering Management, Product Development for Quality and Quality Control Additionally, the unit will provide an insight into the management of product safety and reliability through the product development stages. The delivered content will provide an understanding of the role of the safety lifecycle, including considerations of preliminary safety analysis, right through the consideration of the manufacture, operation and use, maintenance and final product disposal		
Unit Outline:	• Integrated approaches to Quality, Environmental, and Safety Management Systems • Advanced Statistical Process Control • Quality Function Deployment • Quality tools for continuous improvement (engineering tools) • Six sigma • Total Quality Management • Safety considerations in product development. The role and significance of safety engineering, definitions of safety, hazards and risk • The Product Safety Life Cycle – phases of the safety life-cycle – the impact of safety in each life cycle phase, definitions and concepts of safety, safety management within the product life cycle • Safety/ Reliability Analysis Tools – hazard analysis, fault tree analysis, failure mode and effect analysis, risk assessment. • The relation between safety and product reliability		
Competencies Achieved	o Develop a comprehension of the philosophy behind continuous improvement and Total Quality Management o Develop an understanding of the activities involved in the management of product quality and safety o Knowledge and an ability to apply tools effectively in the development of products in terms of ensuring product quality and safety.		
Assessment:	25% coursework 75% written exam		
Reading list:	• Creating Quality - Process Design for Results, *William J. Kolarik, ISBN 0-07-116428-6* • Product Safety Engineering and Management, *W. Hammer, American Society of Safety Engineers, ISBN 0939874903*		

MFE5104 Industrial Automation and Robotics

Tutor:	TBA		
Subject Area	Product and Process Engineering		
ECTS	5	***No. of Delivery Hours***	27
Unit Objectives:	In today's competitive environment, high productivity and consistent product quality are vital for survival in the manufacturing industry. Almost invariably, manufacturing companies are discovering that the only way to remain competitive is to automate all or parts of their production processes. The objective of this module is to take a critical overview of industrial automation from both the technology and economic viewpoints. The student will learn how to carry out task and component analyses prior to automating a process, and how to carry out a detailed feasibility study of the automation. Exercises in technical design of installations will focus on techniques for affordable automation. Available actuator, sensor and controller technologies, as well as end effector design and material handling and storage issues, will be discussed. Part of the module will focus on industrial robots, including both their application and programming as well concepts behind their design. The module will lead to a detailed discussion of all the issues and timelines involved in the implementation of a successful automation project, and each student will apply the knowledge acquired in this module to a detailed case study.		
Unit Outline:	• Introduction to Industrial Automation and Robotics; overview of topic; benefits and drawbacks of automation • The Building Blocks of Automation: sensors, analyzers, actuators and drives • Mechanization of Parts Handling and Storage; end effector design; part design for automation; parts presentation • Automatic Production and Assembly • Numerical Control • Industrial Robots: description; applications; programming; end effector design; safety issues; economic and ethical issues • Industrial Control Systems • Task analysis and component analysis for automation • Robot / Automation Implementation: feasibility study; planning; development; mock-up and test; installation; production and follow-through		
Competencies Achieved	o Develop a detailed awareness of the various technologies available for automation, of their applicability, and of the methods by which they can be implemented and integrated. o Develop an appreciation of the specific problems that are often encountered in automation, such as parts handling, assembly, and control issues, and of how these problems can be addressed. o Develop a knowledge of how to analyse and understand an existing process, how to simplify it in preparation for automation, how to carry out a feasibility study of the proposed automation, and then how to go through all of the necessary steps to ensure successful implementation of the automation.		
Assessment:	50% coursework 50% written exam		

Reading list:	• *Robots and Manufacturing Automation, 2nd Edition*, C. Ray Asfahl, *John Wiley and Sons, 1992. ISBN 0471553913.* • *Automation, Production Systems, and Computer-Integrated Manufacturing*, *2nd Edition*, M.P. Groover, *Prentice-Hall, 2001. ISBN 0130889784.* • *Manufacturing: Design, Production, Automation and Integration*, B Benhabib*, Marcel Dekker Inc., 2003. ISBN 0-8247-4273-7.* • *Affordable Automation,* Sabrie Soloman, *McGraw-Hill, 1996. ISBN 0-07-059633-6.* • *Robotics: Designing the Mechanisms for Automated Machinery,* Ben-Zion Sandler*, Prentice-Hall Inc., 1991. ISBN 0-13-781683-9.* • *Handbook of Industrial Automation,* Richard L. Snell and Ernest L. Hall editors*, Marcel Dekker Inc., 2000. ISBN 0-8247-0373-1.* • *Handbook of Modern Sensors,* Jacob Fraden*, Springer-Verlag, New York, Inc., 1996. ISBN 1-56396-538-0.* • *Robotics: An Introduction,* Douglas R. Malcolm, Jr.*, Delmar Publishers Inc., 1988. ISBN 0-8273-3913-5.* • *Modeling and Control of Robot Manipulators,* Lorenzo Sciavicco and Bruno Siciliano*, McGraw-Hill Companies, Inc., 1996. ISBN 0-07-057217-8.*

MME5101 Materials Engineering in Products and Processes

Tutor:	Dr Ing. Stephen Abela Dr Ing. John Betts Dr. Bertram Mallia Dr. Joseph Buhagiar		
Subject Area	Product and Process Engineering		
ECTS	5	***No. of Delivery Hours***	27
Unit Objectives:	This module discusses materials like tool steels and ceramics used in the manufacturing of tools as well as materials used in the manufacture of product.		
Unit Outline:	• Steels and cast irons • Tool steels / Stainless steels • Non Ferrous alloy systems • Ceramics • Polymer materials • Composite materials • Material Selection for tools • Material selection for products • Introduction to Surface Engineering		
Competencies Achieved	The student would acquire knowledge on the various materials including metals, polymers, ceramics and composites, which knowledge he should be able to apply in the selection of materials suitable for tooling and products		
Assessment:	25% coursework 75% written exam		
Reading list:	• Light Alloys, I J Polmear, • Steels Metallurgy and Applications, D T Llewellyn • Handbook of Structural Ceramics, M Schwartz, McGraw-Hill Inc., 1992, ISBN 0070557195 • Principles of Polymer Engineering, 2nd ed., N.G.McCrum, C.P.Buckley, C.B.Bucknall, Oxford University Press, 1997, ISBN 0198565267 • Composite Materials: Engineering and Science, F.L.Matthews, R.D.Rawlings, Chapman and Hall, 1996, ISBN 0412559706		

MGT 5056 Fundamentals and Principles of Management

Tutor:	Dr Joseph Azzopardi		
Subject Area	Business		
ECTS	5	***No. of Delivery Hours***	27
Unit Objectives:	Regardless of the major area of study, participants often end up assuming a management position when they start their career or change jobs. They need to have a good idea of what management is about. This unit is designed to introduce participants to the concepts of management and the role of a manager. The emphasis will be upon effective managerial practices.		
Unit Outline:	• The concept of management • Development of management thinking • The functions of management • Ethical and social considerations • The environmental context • Managing strategically • Communication • Managing change		
Competencies Achieved			
Assessment:	50% coursework 50% written exam		
Reading list:	• Management A Competency-Based Approach, Jackson, Hellriegel and Slocum, ISBN: 1428806687		

MGT 5057 Fundamentals of Business and Market Development

Tutor:	Dr Ing. Martin M. Zammit		
Subject Area	Business		
ECTS	5	***No. of Delivery Hours***	27
Unit Objectives:	This module is designed to equip participants with an in-depth understanding of markets and buyers. This will enable them to appreciate how organisations can innovate and create improved offerings that will generate, amongst other things, improved profits, greater market share and future success. Participants will benefit from taking an outward approach to their business environment in order to serve the market with new products.		
Unit Outline:	The topics covered will centre around the following areas: • Development of a market centred approach • Analysis of market forces and trends • Building relationships with customers • Buyers selection models • Market key success factors		
Competencies Achieved	Participants will be able to generate new competitive ideas by analysing the interacting forces of customer, buyer, competitor and other market factors		
Assessment:	25% coursework 75% written exam		
Reading list:	Managing Product and Service Development: Text and Cases, 1st Edition Stefan H. Thomke, HARVARD BUSINESS SCHOOL ISBN-13 9780073023014 Marketing Management: A Strategic Decision-Making Approach, 6th Edition John Mullins, University of Denver Orville C Walker, UNIV OF MINNESOTA-MINNEAPOLIS Harper W Boyd, Jr. ISBN-13 9780073529820		

MGT5058 Technology Entrepreneurship

Tutor:	Dr Ing. Martin M. Zammit		
Subject Area	Business		
ECTS	5	***No. of Delivery Hours***	27
Unit Objectives:	One of the key ingredients to success in industry is entrepreneurial skill. This module covers the key issues that one has to address to start up and to manage a high technology company, and will provide students with an understanding of and appreciation for the following: • The elements and strategies involved in finding a suitable technological or scientific concept or idea and then turning this into a profitable business; • The mechanics and theories of developing and managing a knowledge-based business; • The roles and objectives of all the stakeholders in a knowledge-based business; • The role of the entrepreneur as a creative risk-taker, in creating, leading and developing a profitable knowledge-based business; • The importance of understanding, motivating and inspiring people in all aspects of a business to drive and grow a knowledge-based business; • The critical role of the entrepreneur in finding financing for start-ups and developing companies; • The relationship of the entrepreneur as CEO to the Board of Directors and shareholders, and entrepreneurial attitudes towards control of the company. As a part of the requirements of this module, students will be divided into teams, and each team shall find a knowledge-based business opportunity and write a full business plan and investment proposal that will attract equity investors.		
Unit Outline:	• Introduction and overview; components and dynamics of a knowledge-based business; the high-tech start-up. • The characteristics of the entrepreneur. • The franchise; The effect of technical standards on defining and creating business opportunities. • Forming the start-up: The selection of the team, developing a business strategy and goals, implementing a business plan. Analysis and explanation of the issues that entrepreneurs face in getting a business started. • Financing the start-up: Sources of capital, the role of venture capital, deal making and deal structuring. • Managing the start-up: Employees, product development strategies, distribution and marketing approaches, dealing with investors, incentive arrangements, growing the management team, dealing with common problems. • Innovation, intellectual property and technology transfer • Team presentations and related class discussions		
Competencies Achieved	A successful participant will be able to critically analyse the role of creativity and innovation in entrepreneurial opportunity identification and critically examine the components of a new venture or project plan and aspects of the planning process.		
Assessment:	75% coursework 25% written exam		
Reading list:	• *Entrepreneurs in high technology – lessons from MIT and beyond,* Edward B. Roberts*, Oxford University Press, New York, Oxford 1990.* • *The Dynamics of Entrepreneurship: Growth and Strategy,* edited by Tan Wee Liang*, 2002. ISBN 0-13-067616-0.*		

	• *Idea Makers and Idea Brokers in High-Technology Entrepreneurship: Fee vs. Equity Compensation for Intellectual Venture Capitalists*, Elias G. Carayannis, and Todd L Juneau*, Praeger Publishers, 2003. ISBN: 1-567-20456-2.*

EMA5901 Financial Control in Product Development

Tutor:	Mr George M. Vella		
Subject Area	Business		
ECTS	5	***No. of Delivery Hours***	27
Unit Objectives:	To provide engineers and science graduates with an insight into cost accounting fundamentals related to product development.		
Unit Outline:	• Differences between financial accounting & cost / management accounting • An introduction to cost terms and concepts • Assigning costs to cost objects using absorption costing • Activity-based costing • Job costing (including an overview of contract costing) • Process costing • Joint and by product costing • Product costing & pricing strategies in a competitive business environment • An introduction to budgeting and budgetary control • Capital investment decisions		
Competencies Achieved	Candidates who follow this course should be in a much better position to understand the jargon and techniques used by cost/management accountants. This perspective should enhance the process of communication. Moreover, participants should be able to support specific proposals made to management by a quantitative analysis making use of appropriate cost/management accounting concepts and tools.		
Assessment:	100% written exam		
Reading list:	Prescribed textbook Drury Colin, Cost & Management Accounting: An Introduction, latest edition, Thomson Learning, ISBN 1-86152-905-8 Additional reading Horngren et al, *Cost Accounting – A Managerial Emphasis*, latest international edition, Pearson/Prentice Hall, ISBN 0-13-122588-X Russell et al, *Cost Accounting – An Essential Guide*, latest edition, Pearson/Prentice Hall, ISBN 0-273-65167-6		

ENR5000 Integrated Product Development Project

Tutor/ Supervisor:	Various
Subject Area	Product and Process Engineering and Business
ECTS	30
Unit Outline:	The project will generally be a problem integrating the various fields related to product development. The outline of the project programme can be defined as follows: • Project proposal and evaluation of proposal • programme of work • Subject Area review • Analysis of the problem - design work, experimentation, simulation analysis, etc.. (depending on the type of the problem investigated and the research area) • Writing up of dissertation together with preparation of any additional submission requirements • Defense of the dissertation as appropriate The dissertation should demonstrate the ability of the student in comprehending and investigating the project problem and the student's ability in applying the knowledge and skills gained throughout the course.
Assessment:	100% by Dissertation