ANNEX A-1
STRUCTURE AND CONTENTS OF THE FIRST YEAR AT THE "LAUREA MAGISTRALE IN INGEGNERIA GESTIONALE" (UNIVERSITA' DI PISA)

Exam	**Aim and contents**	**Credits (Italian system)**
Statistica II (Statistics II)	To provide students with knowledge, methods, interpretive skills, and programming ability with statistical software, for topics in computational statistics, such as the analysis of multivariate data and time series of interest in industrial engineer.	6
Ricerca Operativa II *(Operational Research II)*	Ability to develop advanced optimization models for real-world applications arising in the management of complex systems, such as industrial production and service logistics. Basic optimization software tools.	6
Gestione integrata della produzione *(Integrated manufacturing systems)*	To provide knowledge, methods and applications on modern integrated manufacturing systems, needed to carry out an efficient firm management. The following competences will be provided: 1) components of integrated manufacturing systems, 2) programming methods for the management of manufacturing systems, 3) basics of sizing and balancing of production lines, 4) examples of automated manufacturing processes	12
Strategie di business and management accounting (*Business strategy and management accounting*)	General objectives of teaching are to understand the fundamental concepts (characteristics, feasibility, introduction issues) of management control systems, processes and techniques such as enablers of strategy implementation and dynamic re-definition.	9
Modellistica e simulazione dei processi di produzione discreti (*Modeling and simulation of*	- To model discrete manufacturing processes such as communication systems, traffic management systems, services management systems, event	6

discrete manufacturing processes)	based dynamical systems; - To appropriately use simulation tools; - To use queue theory and Markov chain theory in order to model and solve various industrial issues and the associated decision making problems.	
Curriculum Digital Product Innovation		
Industrial Data Design e Applicazioni gestionali data driven (*Industrial Data Design and Data-Driven Management Applications*)	The students will acquire knowledge that are transversal to the Master Degree in Data Science and Business Informatics. In particular, the students at the end of the course will: - Be aware of the whole process of value generation in a data science process; - Know available methods for designing data-driven products and services; - Understand the differences between research projects and a development process; - Be aware of the business, environmental and social impact of data science solutions.	12
9 credits to be selected among those approved by the degree course board		9
Curriculum *Fabbrica digitale - Smart Industry - Digital Operations*		
Supply Chain Management and e-business (*Supply Chain Management and e-business*)	To provide knowledge and tools to design and manage the supply chain with particular reference to the strategic value of collaborative approaches and to sustainability.	9
Finanza per la supply chain (*Supply Chain Finance*)	The objectives of the course are double folded. Firstly, provide students with the financial tools for taking decisions regarding equity, debts and the firm's financial structure. Secondly, allow students to achieve skills in the use of solutions (implemented by financial institutions or technology providers) for the alignment of financial flows with product and information flows within the	6

	supply chain, in order to improve cash flow management from a supply chain perspective	
6 credits to be selected among those approved by the degree course board		6

ANNEX A-2

STRUCTURE AND CONTENTS OF THE SECOND YEAR AT CRANFIELD UNIVERSITY – MSc Engineering Management of Manufacturing Systems (School of Applied Sciences)

Exam	Aim and contents	Credits (UK system)	Credits (Italian system)
Operations Management	An introduction to manufacturing and service activities. Capacity, demand and load; identifying key capacity determinant; order-size mix problem; coping with changes in demand. Standard times, and how to calculate them; process analysis and supporting tools; process simplification. What quality is; standards and frameworks; quality tools; quality in the supply chain. Scheduling rules; scheduling and nested set-ups. Roles of inventory; dependent and independent demand; Economic Order Quantity; uncertain demand; inventory management systems and measures Information systems – at operational, managerial, and strategic levels; bills of material; MRP, MPRll and ERP systems Ohno's 7 wastes; Just-in-Time systems (including the Toyota Production System, and Kanbans).	10	3
Sustainability in manufacturing systems		10	3
Operations Analysis	Six Sigma, Process capability, common and special cause variability, control charts, acceptance sampling. Analysis of systems to produce simple models. IDEF0 and IDEF3 and their application. Business process fundamentals and the process review. Improvement procedures, modelling methods and process models.	10	3

	Performance measurement. Responding to and improving reliability.		
Manufacturing Systems Engineering	Design of layouts. Human centred factory design. Group Technology & Cellular manufacturing. Different approaches to factory layout such as process and product layouts. Reasons for choice of cellular manufacturing and benefits. Manufacturing Systems modelling using discrete-event simulation. Analysis of manufacturing systems using simulation.	10	3
Smart Manufacturing		10	3
Supply Chain Management	Competitive manufacturing strategy concepts. Benchmarking of manufacturing system performance. Manufacturing strategy in business success. Strategy formation and formulation, leading on to system design. Structured strategy formulation and system design methodologies. Approaches to strategy formulation in differing business contexts. Realisation of new strategies/system designs, including approaches to implementation. Case study on design of competitive manufacturing strategy.	10	3
Manufacturing Strategy	Competitive manufacturing strategy concepts. Benchmarking of manufacturing system performance. Manufacturing strategy in business success. Strategy formation and formulation, leading on to system design. Structured strategy formulation and system design methodologies. Approaches to strategy formulation in differing business contexts. Realisation of new strategies/system designs, including approaches to implementation. Case study on design of competitive manufacturing strategy.	10	3
Implementing Effective Change in Manufacturing	Innovation & Technology. Business Finance and Investment Appraisals. Business Case Development. Project Management. Implementing Change.	10	3
Group project	Applying taught material to a real current problem; working with an organisation and its staff (in some cases); developing interpersonal and group-working skills. Each project will be supervised by a member/s of academic staff and you will be expected to hold regular group meetings. At the end of the project each student is expected to write a	40	12

	report and there will also be an oral presentation of your work.		
Individual thesis project	The individual thesis tests the ability of the student: (a) to define the project by reference to the scientific, technical and/or commercial literature, to undertake a critical appraisal of such literature and to provide a justification for the research. (b) to plan and manage the research programme. (c) to define the work to be carried out and to report the results in a clear manner. (d) to analyse the work, relate it to the work of others where appropriate and to be self critical. (e) to communicate the work, its results and analysis in a technical document.	80	24