Liverpool John Moores University

Title:	ADVANCED MANUFACTURING
Status:	Definitive
Code:	**7022MAR** (115918)
Version Start Date:	01-08-2018
Owning School/Faculty:	General Engineering Research Institute
Teaching School/Faculty:	General Engineering Research Institute

Team	Leader
Mike Morgan	Y

Academic Level:	FHEQ7	**Credit Value:**	10	**Total Delivered Hours:**	51
Total Learning Hours:	100	**Private Study:**	49		

Delivery Options
Course typically offered: Semester 2

Component	Contact Hours
Lecture	24
Practical	12
Tutorial	12

Grading Basis: 50 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1	Examination	70	3
Essay	AS2	Coursework - Laboratory Assignment 1	15	
Essay	AS3	Coursework - Laboratory Assignment 2	15	

Aims

To develop understanding and to illustrate some important principles underlying advanced manufacturing technology with a strong relevance to the aerospace / automotive sectors.

To acquire a practical knowledge of industrial and laboratory contact and non-contact measurement instruments and to understand the effect of the operator and environment on measured results.

Learning Outcomes

After completing the module the student should be able to:

1	Identify and discuss key design issues associated with machine tool frame construction.
2	Identify the common spindle bearing arrangements and briefly discuss their distinguishing performance characteristics. Use simple mathematical relationships to calculate performance measures, including: load capacity, flowrate, pumping power and bearing stiffness.
3	Explain in clear and concise statements the mechanism of material removal in orthogonal cutting and grinding operations. Use simple mathematical relationships to determine machining quantities. Discuss how the process planner may use machining data to aid efficient design of part production and for process optimization.
4	Explain the role of fluid in machining operations. Use simple mathematical relationships to calculate measures of fluid performance.
5	Explain the role of sensors and instrumentation and adaptive / intelligent systems for process monitoring and control in advanced manufacture.
6	Use, under supervision, high precision metrology

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

EXAM	1	2	3	4	5
Laboratory Assignment 1	4	5	6		
Laboratory Assignment 1	1	3	4	5	

Outline Syllabus

Machine tool design principles: Machine tool construction; slideways design
Spindle and bearing design for high precision
Process kinematics and production optimization techniques
The role of fluid in machining. Fluid delivery systems design.
Process modelling and control. Intelligent and adaptive control systems.
High-Precision measurement, Industrial / Laboratory Metrology. Surface measurement parameters.
Sensors and instrumentation: In-process / off-line measurements.
Thermal effects in precision machining. Performance monitoring and evaluation.
Precision and accuracy. Process capability and Statistical control.

Learning Activities

A series of lectures supported by tutorials, practical laboratory work and presentations from engineering industry and leading researchers.

Notes

Industry is continually challenged by the demand for higher quality parts delivered at higher production rates. This requires advanced manufacturing systems and knowledge of the process capability and performance. This module explores many of the issues involved in achieving such high precision manufacturing systems.