Liverpool John Moores University

Title:	Advanced CAD/CAM
Status:	Definitive
Code:	**6123ENG** (117172)
Version Start Date:	01-08-2011
Owning School/Faculty:	Engineering
Teaching School/Faculty:	Engineering

Team	Leader
Stephen Ebbrell	Y

Academic Level:	FHEQ6	**Credit Value:**	24.00	**Total Delivered Hours:**	72.00
Total Learning Hours:	240	**Private Study:**	168		

Delivery Options
Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	24.000
Practical	36.000
Tutorial	12.000

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Report	Rpt		30.0	
Technology	Tech		35.0	
Technology	Tech		35.0	

Aims

The aim of this module is to explore current CAD/ CAM technologies and develop skills in the transformation and transfer of CAD data into CAM equipment. It will also enable students to gain a broader understanding of the practical application of a CAD / CAM systems and how to successfully implement CAD / CAM systems into a manufacturing company.

Learning Outcomes

After completing the module the student should be able to:

LO1	To appraise the design/manufacture interface and undertake an integrated approach to product development
LO2	Transfer CAD data to a CAM system for future machining in a CIM environment
LO3	Optimise the machining sequence of a range of component geometries with the aid of a CAM system
LO4	Transfer CAM part programmes to CNC machines for production.
LO5	To distinguish between CNC systems and their application.

Learning Outcomes of Assessments

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

Report	LO 1	LO 5	
Task 1	LO 2	LO 3	LO 4
Task 2	LO 2	LO 3	LO 4

Outline Syllabus

The design/manufacture interface an integrated approach to product development: Flexible manufacturing systems, design for manufacture, design for assembly, process planning techniques, concurrent engineering.

Linking machine control with CAM systems in a CIM environment:
The Computer Integrated Manufacturing (CIM) environment, Machine control for different applications, programming techniques, part programming languages, main preparatory functions, programming with CAD/CAM systems, machining from 3D models, tool path generation from solid models, analytical geometry, CAM and rapid prototyping, robotics technology: types, motions, accuracy, repeatability, programming and applications. Data transfer: CAD data and reference to engineering drawing information in terms of dimensions, tolerances, datum points, surfaces and planes.

Tooling and work holding:
Tooling types, approach to cutting and cutting paths, tooling sequences to optimise cutting time and meet tolerances and surface finish requirements, tooling data files with calculated speeds and feeds in relation to component material, cutting direction, determining offsets. Clamping and work holding devices including programmed control clamping. The use of cutting fluids in machining.

CAM:

Validation and verification of programme using software. Using CAM software to generate G-code programmes; understanding G-code part programmes; computer-assisted part programming versus manual programming. Canned and repetitive cycles analyzed and incorporated into the programme. Use of subroutines for pockets, profiles linked to main programme. Accuracy and repeatability of machine tools. Machining techniques: turning operations including screw threads, milling operations including 5-axis machining. Machining a range of geometries and materials.
CNC Grinding: the process, machines, types of grinding wheels, role in industry.

Design and analysis of CNC systems and sensor-assisted machining
Machine tool structures, machine tool drives, feedback and position control, in-process gauging, in-process detection of tool breakage, chatter theory, chatter detection and suppression, adaptive control.

Learning Activities

A practical approach to this module will be adopted. A series of lectures and integrated practical laboratories will give the students the opportunity to experience the technology at first hand and generate evidence for that satisfy the learning outcomes.

References

Course Material	Book
Author	Amirouche F.M
Publishing Year	2004
Title	Principles of Computer Aided Design and Manufacture
Subtitle	
Edition	
Publisher	Prentice Hall
ISBN	0130646318

Course Material	Book
Author	Altinas Y
Publishing Year	2000
Title	Manufacturing Automation
Subtitle	
Edition	
Publisher	Cambridge University Press
ISBN	0-521-65973-6

Course Material	Book
Author	Kalpakjian S
Publishing Year	2006

Title	Manufacturing Engineering and Technology
Subtitle	
Edition	
Publisher	Addison-Wesley
ISBN	0131489658

Course Material	Book
Author	McMahon C & Browne J
Publishing Year	1998
Title	CADCAM: Principles, Practice and Manufacturing Management
Subtitle	
Edition	
Publisher	
ISBN	0-201-17819-2

Notes

The practical, hands-on approach of this module will give students the experience of using CAD/CAM technology to produce a range of engineered components and satisfy the learning outcomes. It focuses on the integration of the two technologies and looks at the development of manufactured components from existing CAD data.