MODULE DESCRIPTOR

Module Title

Computer Aided Engineering 2

Reference	EN4102	Version	5
Created	February 2024	SCQF Level	SCQF 10
Approved	July 2018	SCQF Points	30
Amended	April 2024	ECTS Points	15

Aims of Module

To provide the student with the skills required to use a variety of commercial software in design and manufacture of products and the rapid prototyping techniques which can be used to reduce time to market of new products.

Learning Outcomes for Module

On completion of this module, students are expected to be able to:

1	Develop Numerical Control (NC) codes to machine solid geometry features using an integrated feature based solid modelling and multi axis NC manufacturing programming package.
2	Critique the mouldability of components using an integrated feature based solid modelling and manufacturing (mould flow simulation) package.
3	Execute rapid prototyping to an industrial environment to assist in reducing time to market of complex shaped components.
4	Optimise engineering component production applying the techniques of Design of Experiments and Six Sigma analysis.
5	Execute operations on risk and security management systems.

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Indicative Module Content

Computer aided NC programming, set up of manufacture model from solid model, specification of machine tool and cutting tool, identification of surfaces to be machined, creation of machining sequence, post processing. Evaluation of polymer components for moulding, use of software to create the mould model from component solid model, position of sprues and runners, optimisation of material flow in mould. Rapid prototyping, comparison of different rapid prototyping techniques, surface finish, component size, accuracy etc, cost of machine and prototype components, application of the rapid prototyping in the industrial environment. Sensitivity and optimization: design a range of design variables for geometric and material properties for sensitivity studies for linear elastic static, dynamic and thermal problems to establish initial parameters, perform optimal solution using selected design variables for specified optimisation goal and imposed design constraints, such as displacement, stress, temperature and frequency. Define the concepts of Design of Experiments and Six Sigma analysis and apply the concepts to sensitivity studies for optimisation of engineering components. Safety and environmental management, including relevant security issues. Health and safety issues. Hazard identification, evaluation and control. Risk evaluation and analysis. ALARP principle.

Module Delivery

The module is delivered in Blended Learning mode using structured online learning materials/activities and directed study, facilitated by regular online tutor support. Workplace Mentor support and work-based learning activities will allow students to contextualise this learning to their own workplace. Face-to-face engagement occurs through annual induction sessions, employer work-site visits, and modular on-campus workshops.

Indicative Student Workload	Full Time	Part Time
Contact Hours	30	N/A
Non-Contact Hours	30	N/A
Placement/Work-Based Learning Experience [Notional] Hours	240	N/A
TOTAL	300	N/A
Actual Placement hours for professional, statutory or regulatory body	240	

ASSESSMENT PLAN

If a major/minor model is used and box is ticked, % weightings below are indicative only.

Component 1

Type:	Coursework	Weighting:	40%	Outcomes Assessed:	1, 2
Description:	Report covering NC manufacturing and solid modelling.				

Component 2

Type:	Coursework	Weighting:	60%	Outcomes Assessed:	3, 4, 5
Description:	Online assessment.				

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MODULE PERFORMANCE DESCRIPTOR

Explanatory Text

The module has 2 components and to gain an overall pass a minimum D grade must be achieved in each component. The component weighting is as follows: C1 (x-axis) is worth 40% and C2 (y-axis) is worth 60%.

		Coursework:						
		A	**B**	**C**	**D**	**E**	**F**	**NS**
Coursework:	**A**	A	A	B	B	E	E	
	B	B	B	B	C	E	E	
	C	B	C	C	C	E	E	
	D	C	C	D	D	E	E	
	E	E	E	E	E	E	F	
	F	E	E	E	F	F	F	
	NS	Non-submission of work by published deadline or non-attendance for examination						

Module Requirements

Prerequisites for Module	Completion of EN3110, EN3101, EN3102, EN3103 or equivalent.
Corequisites for module	None.
Precluded Modules	None.

INDICATIVE BIBLIOGRAPHY

1	DIETER, G, E. and SHHMIDT, L, C; 2009. Engineering Design. 4th ed. New York: McGraw-Hill.
2	JACOB P F., 1992. Rapid Prototyping and manufacturing
3	KALPAKJIAN, S. and SCMID S., 2014. Manufacturing engineering & technology. 7th ed. Harlow: Pearson.
4	OSTROM, L. T., WILHELMSEN, C. A., 2019. Risk Assessment: Tools, Techniques, and Their Applications. Newark: John Wiley & Sons, Incorporated.
5	TAYLOR, A., ALEXANDER, D., FINCH, A., SUTTON, D., 2020. Information Security Management Principles. 2nd ed. Swindon: BCS.
6	VELLANI, K. H., 2019. Strategic security management : a risk assessment guide for decision makers. 2ND ED. Boca Raton: CRC Press.