Name of Institute: Indus Institute of technology and Engineering
Name of Faculty: Prof Jignesh M Patel

Course code: ME0762
Course name: Computer Integrated Manufacturing
Pre-requisites:
Credit points: 03
Offered Semester: 7th JULY - DEC 2021

Course coordinator (weeks 14–15)
Full name: Jignesh Patel
Department with siting location: 1st floor, CimLaboratory ,Bhanwar Building
Telephone: 3103
Email: jigneshpatel.me@indusuni.ac.in
Consultation times:9 A.M to 4.50 P.M

Course lecturer (weeks 14–15)
Full name: Jaypalsinh rana
Department with siting location: 3rd floor, Drawing hall ,Bhanwar Building
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Consultation times: 9 A.M to 4.50 P.M

Students will be contacted throughout the session via mail with important information relating to this course.

Course Objectives

By participating in and understanding all facets of this course a student will:

1. Recognize the importance of CIM in today's technology and its impacts on market competition.
2. Automate tasks for preparing most appropriate manufacturing and assembly processes and their sequences.
3. Understand Robot Programming.
4. Analyze the engineering and economical aspects of AS/RS systems.

Program Outcomes (PO's)

Engineering Graduates will be able to:

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Course Outcomes (CO)

After learning the course the students should be able to:

1. Comprehend basic concepts of CAM application and understand CIM wheel

2. Get prepared the CNC programs for manufacturing of different geometries on milling and
lathe machines.

3. Classify different components using different techniques of group technology.

4. Select layouts of FMS for industrial applications

5. Understand robot for preliminary industrial applications like pick and place.

6. Identify application of PPC, JIT, MRP-I, MRP-II, and Expert system to CAM

Course Outline:

UNIT-I

Introduction

Introduction to CIM Concepts & Scope of CIM, Nature & Type of Manufacturing System, Evolution, Benefits of CIM, Role of Manufacturing Engineers, CIM Wheel, CIM CASA wheel.

Group Technology

Introduction, Part Families, Part Classification and Coding, Machining Cells, Benefits of Group Technology.

UNIT-II

Computer Aided Production Management

Introduction, PPC fundamentals, Problems with traditional PPC, Use of Computer in PPC such as CAPP, MRP-I, MRP-II, CAGC etc.

Material Handling and Storage

Types, Characteristics, Automated Material Movement & AS/RS AGVS, RGV Vehicles, Control and Application, Bar code Render, Walking Beam theory. Carousel Storage Systems, Engineering Analysis of AS/RS and Carousel Systems.

UNIT-III

Robot Technology

Introduction, Industrial Robots, Robot physical Configuration, Basic Robot Motions, Robotic Power Sources, Sensors, Actuators, Transducer and Grippers. Programming of the Robot, Introduction to Robot Languages, Robot Applications & Economics.

Maintenance of CNC Machines

Types of machine tools maintenance, Systems and Sub systems of CNC machines, CNC Maintenance practice: Tools required, Daily checklist, Problems related to mechanical systems, Backlash, Causes and precautions of electronics system

UNIT-IV

Numerical Control in machine tools

Types-Numerical, Direct Numerical, Computerized Numerical and Distributive Numerical, Evolution of Controllers, Components of NC/CNC System, Specification of CNC System. Classification of NC/CNC Machines, Transducers Used, Salient Features, Tape, Tape Codes and Tape Readers Used in NC Machines,

Computer Numerical Control

Constructional Details of CNC Machines, Machine structure- Requirements and reasons. Elements of CNC machines - Types, sketch, working and importance of Axis Designation, NC/CNC Tooling.

Manual part programming :- Various types of programming formats, G codes, M codes and other codes, Canned cycles, radius compensation, programming exercises for drilling, milling and turning, subroutine, parametric subroutine.

Computer assisted programming: - Enlist languages, Automated programmed Tools (APT)-geometrical motion, auxiliary and post processor statements, APT programs for drilling, milling and turning, tool path generation and verification. CNC programming based on CAD/CAM.

Method of delivery

Face to face lectures, self study material, PPT, Web Resources

Study time

2 hours/Week

CO-PO Mapping (PO: Program Outcomes)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 10	PO1 11	PO1 12
CO1	√											
CO2	√	√			√							
CO3		√										
CO4												
CO5									√			
CO6	√				√				√			

Blooms Taxonomyand Knowledge retention(For reference)

(Blooms taxonomy has been given for reference)

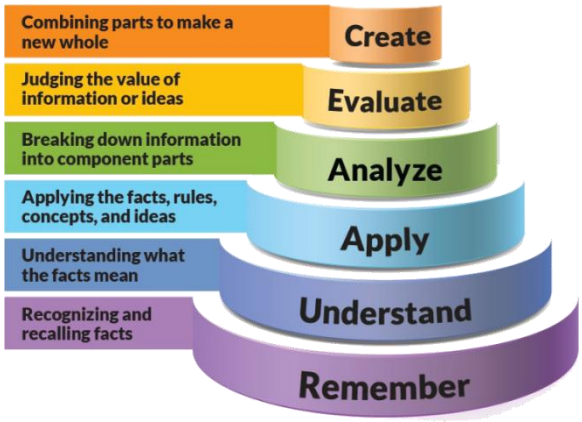

Figure 1: Blooms Taxonomy

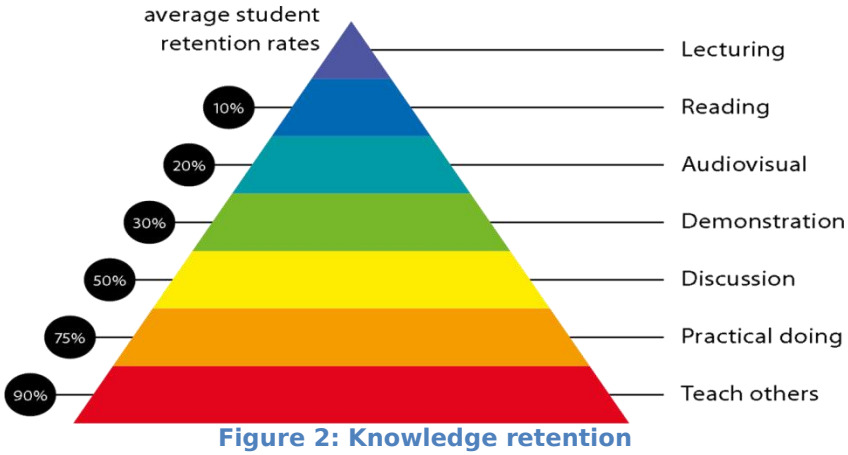

Figure 2: Knowledge retention

Graduate Qualities and Capabilities covered

(Qualities graduates harness crediting this Course)

General Graduate Qualities	Specific Department of Mechanical Graduate Capabilities
Informed Have a sound knowledge of an area of Basic application of CIM technology and understand its elements. Understand how an area of study has developed and how it relates to other areas.	**1 Professional knowledge, grounding & awareness**
Independent learners analyzedifferent part classification and coding techniques for industrial aspects and find out various optimum solution for different nature of product. Find and evaluate various GT technology and part programming methods for a variety of sources and technologies	**2 Information literacy, gathering & processing**
Problem solvers Creative various advance part programming methods for complex part geometry & Make various simulation to minimize program length thorough various simulation software of cnc controller.	**4 Problem solving skills**
Effective communicators Articulate ideas about flexible manufacturing system and material handling systemand show effective	**5 Written communication** **6 Oral communication** **7 Teamwork**

layouts of flow production Work collaboratively and easy to communicate with each others.	

Practical work:

(Mention what practical work this Course involves)

To prepare case study on CIM technology
To study about Group Technology
To Study about Flexible Manufacturing System.
To Study about Robot Technology.
To Study about Computer aided Production and Operation Management
To study about Numerical Control in Machine Tool.
Manual Part Programming for Turning.
Manual Part Programming for Milling.
Manual Part Programming for Drilling.
Manual part programming for Parametric Subroutine.
APT programming for Turning, Drilling and Milling

Lecture/tutorial times

(Give lecture times in the format below)

Lecture

Practicals

Attendance Requirements

The University norms states that it is the responsibility of students to attend all lectures, tutorials, seminars and practical work as stipulated in the course outline. Minimum attendance requirement as per university norms is compulsory for being eligible for semester examinations.

Details of referencing system to be used in written work

PPTs, Lecture Notes/E-book, Web-Resources.

Text books

Text Books :

1. Computer Aided manufacturing by Tienchienchang “pearsonedition .
2. Automation, Production Systems and Computer Integrated Manufacturing by Groover, Pearson Education

Reference Books

1. CNC programming – Dr.S.K.Sinha – Golgotia publications.
2. Flexible Manufacturing Cells and System -William. W. Luggen Prentice Hall, England Cliffs, New jersy
3. P.Radhakrishnan, “Computer Numerical Control ", New Central Book Agency, 1992.
4. Computer integrated manufacturing -S. Kant Vajpayee – Prentice Hall of India.
5. Computer Aided Manufacturing- Rao, Tewari, Kundra, McGraw Hill, 1993
6. CAD/CAM, Principles and Applications –P N Rao, McGraw Hill, 2010
7. CAD/CAM, Introduction, -Ibrahim Zeid, Tata McGraw Hill, 2007
8. CAD/CAM, Groovers and Zimmers, Pearson.

Additional Materials

Web Resources: http://nptel.ac.in/courses

ASSESSMENT GUIDELINES

Your final course mark will be calculated from the following:

CIE Theory

Mid Semester examination	**40 marks (66.66%)**	**Objective (1-4)**
Assignments	**10 marks (16.66%)**	**Objective (1-4)**
Attendance	**05 marks (08.33%)**	**Objectives (1-4)**
Presentation/ class participants	**05 marks (08.33%)**	**Objectives (1-4)**

CIE Practical

Lab practical submission	**40marks (66.66%)**	**Objective (1-4)**
Lab Quiz/ viva	**10 marks (16.66%)**	**Objective (1-3)**
Attendance	**10 marks (16.66%)**	**Objective (1-4)**

SUPPLEMENTARY ASSESSMENT

Students who receive an overall mark less than 40% in internalcomponent or less than 40% in the end semester will be considered for supplementary assessment in the respective components (i.einternal component or end semester) of semester concerned. Students must make themselves available during the supplementary examination period to take up the respective components (internal component or end semester) and need to obtain the required minimum 40% marks to clear the concerned components.

Practical Work Report/Laboratory Report:

A report on the practical work is due the subsequent week after completion of the class by each group.

Late Work

Late assignments will not be accepted without supporting documentation. Late submission of the reports will result in a deduction of -% of the maximum mark per calendar day

Format

All assignments must be presented in a neat, legible format with all information sources correctly referenced. **Assignment material handed in throughout the session that is not neat and legible will not be marked and will be returned to the student.**

Retention of Written Work

Written assessment work will be retained by the Course coordinator/lecturer for two weeks after marking to be collected by the students.

University and Faculty Policies

Students should make themselves aware of the University and/or Faculty Policies regarding plagiarism, special consideration, supplementary examinations and other educational issues and student matters.

Plagiarism - Plagiarism is not acceptable and may result in the imposition of severe penalties. Plagiarism is the use of another person's work, or idea, as if it is his or her own - if you have any doubts at all on what constitutes plagiarism, please consult your Course coordinator or lecturer. Plagiarism will be penalized severely.

Do not copy the work of other students.
Do not share your work with other students (except where required for a group activity or assessment)

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Course schedule(subject to change)

(Mention quiz, assignment submission, breaksetcas well in the table under the Teaching Learning Activity Column)

	Week #	Topic & contents	CO Addressed	Teaching Learning Activity (TLA)
	Weeks 1	Introduction to cad cam integration	CO 1,3	BB & PPT
	Weeks 2	Group technology & part classification	CO ,3	BB & PPT
	Week 3	NC machine & tooling	CO 1,2	BB & PPT
	Week 4	NC programming	CO1, 2	BB & PPT
	Week 5	CNC& advance part programming	CO 1,2	BB & PPT
	Week 6	Apt & Subroutine Programming	CO 4	BB & PPT
	Week 7	Maintenance of CNC Machines	CO 4	BB & PPT
	Week 8	AGV vehicles	CO 2	BB & PPT
	MID SEMESTER EXAM			
	Week 9	ASRS system	CO 2	BB & PPT
	Week 10	Robot technology	CO 5	BB & PPT
	Week 11	Robot technology	CO 1	BB & PPT
	Week 12	Computer aided production management	CO 6	BB & PPT
	Week 13	File submission		