Integral University, Lucknow

Effective from Session: 2024-25							
Course Code	ME309	**Title of the Course**	Machine Design Lab	**L**	**T**	**P**	**C**
Year	**III**	**Semester**	V	**0**	**0**	**2**	**1**
Pre-Requisite	None	**Co-requisite**	None				
Course Objectives	1. To understand the practical viability of design methodologies. 2. To impart and apply basic design approach on simple members such as shafts, keys etc. 3. To design complex machines parts like coupling, screw jack and springs. 4. To impart design for important joints like welded joints, riveted joints etc. under static and dynamic load. 4. To provide working knowledge of Designing, drafting and solid modelling softwares methods and procedures						

Course Outcomes	
CO1	The student can understand the concepts of static analysis applied on shafts
CO2	Understand design and applications of mechanical fasteners and joints such as screwed joints and riveted joints.
CO3	Understand the design and drawing of a welded joint, knuckle joint/ cotter joint.
CO4	The student can design complex machines parts like coupling, screw jack and springs using software programming
CO5	The student can draw machine parts using different drafting and modelling softwares.

Unit No.	**Title of the Unit**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	Introduction to SOLID MODELING TOOLS	Study and practice various SOLID MODELING TOOLS using various commands.	2	CO1, CO5
2	Design and drawing of Riveted Joints	Demonstrate basic design approach and SOLID MODELING TOOL commands for Riveted Joints.	2	CO2, CO5
3	Design and drawing eccentrically loaded welded joints	Demonstrate basic design approach and SOLID MODELING TOOL commands for eccentrically loaded welded joints.	2	CO2, CO3
4	Design of stepped shaft	Demonstrate basic design approach and SOLID MODELING TOOL commands of shaft for different loading conditions.	2	CO1, CO2
5	Design and drawing of rigid coupling (flanged type).	Demonstrate basic design approach and SOLID MODELING TOOL commands of rigid coupling (flanged type).	2	CO4, CO5
6	Design of spline keys	Demonstrate basic design approach and SOLID MODELING TOOL commands for spline keys.	2	CO5
7	Introduction to SOFTWARE PROGRAMMING	Study and practice using SOFTWARE programming codes.	2	CO4, CO5
8	Design and drawing of a helical spring/	Demonstrate basic design approach using SOFTWARE programming.	2	CO4, CO5
9	Design and drawing of Rotating shafts	Demonstrate basic design approach using SOFTWARE programming.	2	CO1, CO2
10	Design of leaf spring for a given application.	Demonstrate basic design approach and Auto-Cad commands of a leaf spring for a given application.	2	CO4, CO5
11	Design and drawing of a Screw Jack	Demonstrate basic design approach and Auto-Cad commands of screw Jack for a given application.	2	CO4, CO5

Reference Books:

Data Design Hand book by Mahadevan

Design of machine Elements by Bhandari

e-Learning Source:

https://www.youtube.com/watch?v=1y2Vec5XdXg&list=PLBY9jx3ikVaM00Va4Zrnu4neTPRj6zuQb

https://www.youtube.com/watch?v=EgKc9L7cbKc&list=PLC3EE33F27CF14A06

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)														
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	2	1	3			1	2		3	3	1	3
CO2	3	3	3	2	2	3			1	2		3	3	2	3
CO3	3	2	3	2	1	3			2	2		3	3	2	3
CO4	3	2	3	2	2	3			3	2		3	3	2	3
CO5	3	3	3	2	3	3			3	2		3	3	1	3

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Integral University, Lucknow

Effective from Session: 2024-25							
Course Code	ME401	**Title of the Course**	Industrial Engineering	**L**	**T**	**P**	**C**
Year	**IV**	**Semester**	VII	**3**	**1**	**0**	**4**
Pre-Requisite	None	**Co-requisite**	None				
Course Objectives	Contribute to the success of companies through effective problem solving. Design, develop, implement, and improve integrated systems that include people, materials, information, equipment, and environments · Effectively manage business operations and project management teams. · Continue to develop holistically, including the personal and professional skills necessary to adapt to our changing societal, technological, and global environments · To be able to adapt and solve the increasingly complex problems faced by industry; embrace innovation through intellectual diversity and creative problem solving; and continue to develop holistically as a learner to become leaders of tomorrow.						

Course Outcomes	
CO1	Apply knowledge and understanding of productivity models in various industries. Design and develop the products and processes. Apply basic knowledge of product development and industrial process design.
CO2	Analyze the facility location and network models. Understanding of supply chain system.
CO3	Interpretation and analysis of data from aggregate output planning models. Knowledge and understanding of Human Factors Engineering and various job design techniques.
CO4	Select and analyze an inventory control model. Understanding of manufacturing resources and queuing systems.
CO5	Analyze and control the quality of an end product. Analysis of industrial systems using linear and non-linear programming approaches.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Introduction	Introduction : Concept of Industrial Engineering, Functions of Industrial Engineering, Industrial Engineering techniques, Role of an Industrial Engineer. Applications of Industrial Engineering. 4 Production and Productivity : Concept of production, production function, production system, Definition of productivity, Difference between productivity and production, Productivity, efficiency and effectiveness. Measurement of productivity, Types of productivity, productivity index, ways to improve productivity. Industry 4.0 introduction.	8	CO1
2	Job Evaluation and Merit Rating	Job Evaluation and Merit Rating : Concept of job evaluation, job analysis, job description, job simplification, job evaluation methods, Definition and methods of merit rating, wage-incentive payment plans. Plant Layout and Materials Handling: Considerations in plant location, Definition of plant layout, types of layout, Principle of plant layout, Material, handling, Material handling equipments. Production Planning and Control (PPC) Objectives of PPC, Functions of PPC, production planning, steps in PPC, effectiveness of PPC system.	8	CO2
3	Depreciation and Replacement	Depreciation and Replacement : Concept of depreciation and obsolescence, Classifications of depreciation, Methods of charging depreciation, Service life of an asset, Replacement of items which deteriorate with time. Inventory Control : Inventory, function of inventory, inventory costs, Inventory models. Statistical Quality Control: Introduction, Process control, Control charts, acceptance plan, acceptance sampling, single, Double and sequential Sampling plans, concept of average outgoing quality.	8	CO3
4	Industrial Ownership	Industrial Ownership: Introduction, Sole proprietor enterprise, partnership firm, joint stock company, Classification of company, Comparison of Public, Private and Joint sector, Cooperative organization. Factory Legislation in India : Importance and principles of Labour legislation, Factory Act, Payment of wages Act, Minimum wages Act, Workmen's compensation Act, Employee's State Insurance Act.	8	CO4
5	Break-Even-Analysis	Break-Even-Analysis : Introduction and purpose of BEA, Assumptions, Steps in BEA, Fixed Cost, Variable cost, Margin of safety. Brief Introduction of the Following Terms: Concept of optimization, Supply Chain Management, Plant Maintenance, Concept of value engineering, Total quality management, Management of Projects	8	CO5

Reference Books:

1. Industrial Engineering: M.I. Khan, New-Age Int.
2. Industrial Engineering and Management: O.P. Khanna, Dhanpat Rai
3. Principles of Management, An Analysis of Management Fuction: H.Kontz and C.D. Donnel
4. Manufacturing Management: J.Moore, Prentice Hall.

e-Learning Source:

https://www.youtube.com/watch?v=yhywrCChJBQ&list=PLLy_2iUCG87D5n9zraFS2QYajk0OAOlVK

https://www.youtube.com/watch?v=yYIVumq6sVM&list=PL299B5CC87110A6E7

https://www.youtube.com/watch?v=r-o86V4zcMM&list=PLbjTnj-t5Gkl0z3OHOGK5RB9mvNYvnImW

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)														
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	2	2	1					3	3	2	3
CO2	3	3	3	2	2	3	1					2	3	3	2
CO3	3	3	2	2	2	3						2	3	2	3
CO4	3	2	2	2	3	3	1					2	3	3	2
CO5	3	1	1	1	1	3						2	3	2	3

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Integral University, Lucknow

Effective from Session: 2024-2025							
Course Code	ME402	**Title of the Course**	CAD & CAM	**L**	**T**	**P**	**C**
Year	IV	**Semester**	VII	**3**	**1**	**0**	**4**
Pre-Requisite	NONE	**Co-requisite**	NONE				
Course Objectives	1. Provide basic foundation in computer aided design / manufacturing, IoT for manufacturing. 2. Understand the fundamentals used to create and manipulate geometric models 3. Get acquainted with the basic CAD software designed for geometric modeling 4. Learn working principles of CNC machines CNC control and part programming 5. Understand concept of FMS and CIM ,Industrial application of Robots and 3D Printer.,Numerical Methods.						

Course Outcomes	
CO1	Introduction of CAD & CAM and IoT for manufacturing, MATLAB Program
CO2	Acquire the knowledge of geometric modeling and Execute the steps required in CAD software for developing 2D and 3D models and perform transformations
CO3	Explain fundamental and advanced features of CNC machines
CO4	Explain Flexible manufacturing Group Technology, CAQC and CIM concepts, Applications of Robots in Manufacturing,3D Printer
CO5	Know about the Concept of Numerical Methods required in CAM for Optimization.

Unit No.	**Title of the Unit**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	Introduction of CAD & CAM , Smart manufacturing	Introduction and Review of Computer Programming : Introduction to CAD/CAE, Elements of CAD, Concepts of integrated CAD/CAM, CAD Engineering applications, its importance and necessity. IoT for manufacturing. IoT enabling technologies, Introduction to MATLAB; Multiplication, addition, subtraction and division. Utility and application. Functions and 2D plots.	8	CO1
2	Computer Graphics	Computer Graphics Graphics software, Graphics functions, output primitives-Bresenham's line drawing and Mid-point circle algorithms. Geometric Transformations: Word/device co-ordinate representations, 2D and 3D geometric transformations, Matrix representations-translation, scaling, shearing, rotation and reflection, composite transformations, concatenation about arbitrary axis. Exercise and programs	8	CO2
3	Introduction to CNC Machines and Part Programming	Introduction to CNC Machines: Introduction to Automation, Need and future of NC systems and CAM; Advantages and disadvantages; Classification; Open and closed loop systems; Historical development and future trends. Interpolators: Principle, Digital Differential Analyzers; Linear interpolator, Circular Interpolator and its software. Control of NC Systems: Open and closed loops. Automatic control of closed loops with encoder and tachometers; Speed variation of DC motor; Adaptive control. CNC Part programming: (a) Manual (word address format) programming; Examples Drilling and Milling. (b) APT programming. Geometry, Motion and Additional statements, Macro-statement	8	CO3
4	Flexible Manufacturing System	Flexible Manufacturing System: Group Technology, Manufacturing cell, Transfer lines, FMS, CIM, CAD/CAM, CAPP,, Concept of Mechatronics, 3D Printer use & industrial applications Storage and Data capturing systems: Conventional storage methods and equipment, Storage system performance, Analysis of Automated storage/retrieval systems (ASRS) . Introduction Industrial Robots: Types of industrial robots, Load handling capacity, general considerations in Robotic material handling, material transfer, machine loading and unloading, CNC machine tool loading, Robot centered cell. Applications of Robots in Manufacturing.	8	CO4
5	Numerical Methods	Numerical Methods : Newton Raphson method, Interpolation Lagrange and Newton's interpolation, Curve fitting-Least Square method Numerical integration-Trapezoidal and Simpson Method. Finite Element Methods: Introduction and Application of FEM, Stiffness Matrix/Displacement Matrix, One/Two Dimensional bar and beam element (as spring system) analysis.	8	CO5

Reference Books:

1. Computer Graphics: Hearn and Baker (Pearson/Prentice hall) Yoram Koren, "Robotics for Engineers", McGraw Hill Book Co.

2. Computer Aided Design : R.K. Srivastava
3. Computer Graphics, Theory and Practice: Foley, Van Dam, Feiner, (Pearson Education)
4. CAD/CAM, Theory and practice: Ibrahim Zeid (McGraw Hill International) M. P. Groover, "Automation, Production Sysytems, and Computer – Integrated Manufacturing", Pearson Education,ISBN-81-7808-511-9
5. Computer Aided Analysis and Design of Machine Elements: (Rao and Dukkipati)
6. Mathematical Elements for Computer Graphics: Rogers and Adams (McGraw Hill)
7. CAD/CAM : Groover and Zimmers (Prentice Hall of India Pvt. Ltd.) Deb S.R., "Robotics", Tata McGraw Hill Publications, New Delhi.
8. Computer Oriented Numerical Methods: Rajaraman (Prentice Hall)

e-Learning Source:

https://www.youtube.com/watch?v=EgKc9L7cbKc&list=PLC3EE33F27CF14A06

https://www.youtube.com/watch?v=1gDmNDJ9SHc&list=PL1F857AA89C464B15

https://www.youtube.com/watch?v=sp7JwktN9fo

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)														
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	1	2	2	1	3	1	1	2	3	3	2	2
CO2	3	3	3	1	2	3	1	1	2	1	2	3	3	2	3
CO3	3	3	3	2	2	3	1	2	2	1	2	3	3	3	2
CO4	2	3	3	2	2	3	3	1	1	2	3	1	3	3	3
CO5	3	3	2	2	3	3	2	1	1	1	3	2	2	3	2

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Integral University, Lucknow

Effective from Session: 2024-2025							
Course Code	ME405	**Title of the Course**	Unconventional Manufacturing Process	**L**	**T**	**P**	**C**
Year	IV	**Semester**	VII	**3**	**1**	**0**	**4**
Pre-Requisite	Manufacturing science 1	**Co-requisite**	Nil				
Course Objectives	1. To impart understanding of different types of modern Machining techniques. 2. To classify and analyze various nun conventional machines and their applications. 3. To analyze material removal mechanism in different unconventional machining processes. 4. To study the parameters involved in efficient working of the unconventional machining processes.						

Course Outcomes	
CO1	The students will understand the principle, working and applications of unconventional machining process, need of unconventional manufacturing processes & its classification and its future possibilities. The students will know the principle and working and application of unconventional machining processes like Electro-Discharge machining, Electrochemical machining and Abrasive Jet Machining
CO2	The students will learn the principle and working and application of unconventional machining processes like Laser beam machining, Electron beam machining
CO3	Know the principle and working and application of Unconventional welding processes, Under water welding, Cladding.
CO4	Know the principles, working and applications of High energy forming processes such as Explosive Forming, Electromagnetic forming, Electro-Discharge forming, water hammer forming, explosive compaction
CO5	Know the principles, working and applications of 3D printing technologies and photolithography.

Unit No.	**Title of the Unit**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	**Introduction to Unconventional Machining Process**	Limitations of conventional manufacturing processes Need of unconventional manufacturing processes, its classification and future possibilities. Principle, working and applications of unconventional machining processes. Electro-Discharge machining, Wire EDM process, Electrochemical machining, Abrasive jet machining Abrasive Water jet Machining	8	CO1
2	**Unconventional Machining Process (continued):**	Principle, working and application of unconventional machining processes, Laser beam machining, Laser jet Machining, Electron beam machining, Ultrasonic machining	8	CO2
3	**Unconventional welding processes**	Principle and working and application of unconventional welding processes, Explosive welding Cladding : Different techniques of Cladding Under water welding Wet and Dry Welding Metalizing, Plasma arc welding	8	CO3
4	**Unconventional Forming processes**	Principle, working and applications of High energy forming processes such as Explosive Forming, Electromagnetic forming, Hydro forming process Electro-Discharge forming, water hammer forming, explosive compaction etc	8	CO4
5	**3D printing Technologies, Electronic-device Manufacturing:**	Types of 3D printers. 3D printing materials, Classification of printing techniques, Rapid prototyping. Brief description of Diffusion and Photo- Lithography process for electronic-device manufacturing.	8	CO5

Reference Books:

Modern Machining Processes – P.C. Pandey

Unconventional Machining – V.K. Jain

e-Learning Source:

https://www.youtube.com/watch?v=cxU1zUOpGLk&list=PLtpJfjyaifnmCI-JcNxs6uQgv3b2WYKzS

https://www.youtube.com/watch?v=tpv1Iza90_o&list=PL0TzZgFtsAPFRqV3wwY9InMHQROYe_gpt

https://www.youtube.com/watch?v=EgKc9L7cbKc&list=PLC3EE33F27CF14A06

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)															
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
CO1	3	3	3	3	3	2	2	2	1	1	1	2	3	2	3	

CO2	3	3	3	3	3	2	2	2	1	1	1	2	3	3	3
CO3	3	3	3	3	3	2	2	2	1	1	1	2	3	3	3
CO4	3	3	3	3	3	2	2	2	1	1	1	2	3	3	3
CO5	3	3	3	3	3	2	2	2	1	1	1	2	3	3	3

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Integral University, Lucknow

Effective from Session: 2024-2025							
Course Code	ME408	**Title of the Course**	MECHANICAL SYSTEMS DESIGN	**L**	**T**	**P**	**C**
Year	**IV**	**Semester**	VII	**3**	**1**	**0**	**4**
Pre-Requisite	**NONE**	**Co-requisite**	**NONE**				
Course Objectives	1. To impart the knowledge about system concept of engineering, role of engineer, concurrent engineering, Problem formulation. 2. To know about system theories and system modeling. 3. To impart knowledge about linear graph analysis and optimization concepts. 4. To understand system evaluation and calculus methods for optimization. 5. To know about decision analysis and system simulation.						

Course Outcomes	
CO1	Apply system concept of engineering, engineering activity matrix, solve engineering problems and formulate problems.
CO2	Understand black box approach, state theory approach, concepts of linear graph modeling and mathematical modeling.
CO3	Understand black box approach, state theory approach, concepts of linear graph modeling and mathematical modeling.
CO4	Assess feasibility, plan horizon, financial analysis and to understand the concept of model with one and two decision variables.
CO5	Learn the elements of decision problem, utility value and to apply Baye's theorem.

Unit No.	**Title of the Unit**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	**Fundamental Concepts and Definition**	Fundamental Concepts and Definitions: Apply system concept of engineering, engineering activity matrix, solve engineering problems and formulate problems.	8	CO1
2	**Understand black box approach**	Understand black box approach, state theory approach, concepts of linear graphmodeling and mathematical modeling, Data Analytics in Mechanical Process	8	CO2
3	**Analyze path problems**	Analyze path problems, network flow problems and to understand the concept andmethods of optimization	8	CO3
4	**Assess feasibility**	Assess feasibility, plan horizon, financial analysis and to understand the concept ofmodel with one and two decision variables	8	CO4
5	**Learn the elements of decision problem**	Learn the elements of decision problem, utility value and toApply Baye's theorem.	8	CO5

Reference Books:

Design and Planning of Engineering System: D.D. Meredith, K.V.Wong, R.W. Woodhead, R.R. Worthman, prentice-Hall Inc. Englewood Clifts, New Jersey.

Design Engineering: J.R. Dixon, Tata McGraw Hill.

Optimization Techniques: S.S. Rao.

System Analysis and Project Management : Devid I, Cleland, William R. King, Mc. Graw Hill.

Engineering Design : Robot Matousck, Blackie and son.

e-Learning Source:

https://www.youtube.com/watch?v=-LiNZYpk870&list=PLm_MSClsnwm_fIdzKR-ARchhAG0KL0iYn

https://www.youtube.com/watch?v=mzWMdZZaHwI&list=PL3D4EECEFAA99D9BE

https://www.youtube.com/watch?v=SHbb9dV-we8&list=PLBE92469895618E50

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)														
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	2		2						3	3	1	1
CO2	2	3	3	2		3						3	2	3	2
CO3	1	3	3	3		3						3	3	2	1
CO4	3	2	3	2		3						3	1	2	1
CO5	2	3	3	3		3						3	3	2	2

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Integral University, Lucknow

Effective from Session: 2024-25							
Course Code	ME421	**Title of the Course**	CAD & CAM LAB	**L**	**T**	**P**	**C**
Year	IV	**Semester**	VII	**0**	**0**	**2**	**1**
Pre-Requisite	ME421	**Co-requisite**					
Course Objectives	To impart basic knowledge on Computer Aided Design methods and procedures. Demonstrate different methods for geometric modeling in CAD. To introduce the fundamentals of solid modeling. To impart basic knowledge of CNC machine structures and part programming.						

Course Outcomes	
CO1	To demonstrate the application of SOLIDWORKS.
CO2	To demonstrate the application MATLAB programming
CO3	To demonstrate the application of Flexible Manufacturing System.
CO4	To demonstrate the working of CNC milling and lathe machines.
CO5	To demonstrate the working and application of 3D printer.

Experiment No.	Title of the Experiment	Content of Units (Minimum 10 experiments to be performed)	Contact Hrs.	Mapped CO
1	Solidmodelling Practice	To make the part model, assembly and drawing of the Knuckle joint using solid modelling tools.	2	CO1
2	Solidmodelling Practice	To make the part model, assembly and drawing of the Oldham coupling using solid modelling tools.	2	CO1
3	Introduction to algorithms	Write an Algorithm and program code for Bresenham's line algorithm.	2	CO2
4	Bresenham's circle generating algorithm	Write an Algorithm and program code for Bresenham's circle generating algorithm.	2	CO2
5	Geometric transformations	Write an Algorithm and program code for 2D translation of line/ circle/ rectangle.	2	CO2
6	Introduction to Flexible Manufacturing System	Study of Flexible Manufacturing System & Automation. (ASRS & Industrial Robot)	2	CO3
7	CNC machines sub programs	Write a CNC Sub- Program on CNC lathe Machine/ CNC milling machine.	2	CO4
8	CNC machines contour programs	Write a CNC contour program on CNC lathe Machine/ CNC milling machine.	2	CO4
9	CNC machines turning operation	Write a CNC program and perform turning operation on CNC lathe machine for the given problem.	2	CO4
10	CNC machines milling operation	Write a CNC program and perform milling operation on CNC milling machine for the given problem.	2	CO4
11	3D printer	To study the working of 3D printer and make a job.	2	CO5

e-Learning Source:

https://drive.google.com/drive/folders/1YDPwwHV8tBH9MAA3tOH33EEd2vtgpDnw?usp=share_link

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)														
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	3	2	3			3	2		3	3	2	2
CO2	3	3	2	3	2	3			3	2		3	3	2	2
CO3	3	3	2	3	2	3			3	2		3	3	2	2
CO4	3	3	2	3	2	3			3	2		3	3	2	2
CO5	3	2	2	2	2	3			2	2		3	3	2	2

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	Sign & Seal of HoD