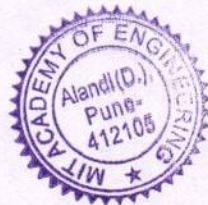**Criterion 1 - Curricular Aspects**

1.2.2: Percentage of Programmes in which Choice Based Credit System (CBCS) / elective course system has been implemented (Data for the latest completed academic year).

In MIT AOE, in last five years two different curriculum structure are followed, 2016 -20 pattern and 2019-23 pattern. The **Choice Based Credit System (CBCS) is followed in campus by offering the various courses to the students in the form of Open electives and department electives. Following is the list of courses offered by the different department under the category of Choice Based Credit System (CBCS).**

Dr. Mahesh D. Goudar
Director
MIT Academy of Engineering
Alandi (D) Pune - 412105

DIRECTOR
MIT Academy of Engineering
Alandi (D.), Pune-412 105.

(ID No. PU/ENGG/134/1999)

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Open Elective (OE) :Term - I		
(List of courses for Academic Year 2018-19)		
Chemical		
1	CH311	Process Modeling and Simulation.
2	CH312	Piping Engineering
Civil		
3	CV311	Construction Planning & Management
Computer		
4	CS311	Descriptive Analytics
5	CS312	Artificial Intelligence & Neural Network
Electronics		
6	EX311	Fundamentals of Robotics
E & TC		
7	ET311	Embedded System Programming (ESP)
8	ET312	IoT Architecture and Sensors
IT		
9	IT311	Cryptography & System Security
Mechanical		
10	ME311	Geometric Modeling & Design
11	ME312	Fundamentals of Robotics
12	ME313	Work Process Assessment

Open Elective (OE) :Term - II		
(List of courses for Academic Year 2018-19)		
Chemical		
1	CH331	Process Engineering.
2	CH332	Piping Layout
Civil		
3	CV331	Visualization & Information Exchange
Computer		
4	CS331	Data Science-I
5	CS332	Machine Learning
Electronics		
6	EX331	Kinematics and Dynamics of Robotics
E & TC		
7	ET331	Embedded Processor
8	ET332	IoT Networks & Protocols
IT		
9	IT331	Cyber Security
Mechanical		
10	ME331	Finite Element Analysis
11	ME332	Kinematics & Dynamics of Robots
12	ME333	Facility Planning & Design

Open Elective (OE) :Term - I		
(List of courses for Academic Year 2019-20)		
Chemical		
1	CH421	Process Synthesis, Design and Optimization
2	CH422	Piping Design & Engineering
Civil		
3	CV421	Financial Management
Computer		
4	CS421	Data Science-II
5	CS422	Pattern Recognition
Electronics		
6	EX421	Robotics Vision and Control
E & TC		
7	ET421	Low-Power SoC Architecture & Applications (SoC&A)
8	ET422	Privacy and Security in IoT
IT		
9	IT421	Ethical Hacking & Cyber Laws
Mechanical		
10	ME421	Computational Fluid Dynamics
11	ME422	Robotics Control
12	ME423	Operations Management
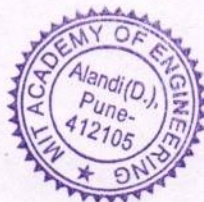
Open Elective (OE) :Term - II		
(List of courses for Academic Year 2019-20)		
Chemical		
1	CH451	Process Intensification & Integration
2	CH452	Pipeline Engineering
Civil		
3	CV451	Operation Research
Computer		
4	CS451	Practitioner's approach for Data analytics
5	CS452	Reinforcement Learning
Electronics		
6	EX451	Intelligent and High-Performance Robotics
E & TC		
7	ET451	Real-Time Embedded System (RES)
8	ET452	Energy Management for IoT Devices
IT		
9	IT451	Cyber Forensics
Mechanical		
10	ME451	Advanced Engineering Analysis
11	ME452	Robotic Actuators
12	ME453	Supply Chain Management

			Open Electives (OE): 03 Courses				
Programme Name	**Open Track Name**	**Semester V**		**Semester VI**		**Semester VII**	
		Course Code	**Course Name**	**Course Code**	**Course Name**	**Course Code**	**Course Name**
Chemical Engineering	Process Engineering	CH351	Process Engineering	CH371	Process Modeling and Simulation	CH471	Process Intensification and Integration
	Piping Design and engineering	CH352	Piping Engineering	CH372	Piping Layout	CH472	Piping Design & Engineering
Civil Engineering	Construction Project Management	CV325	Construction Planning and Management	CV332	Operation Research	CV422	Financial Management
	Environmental Engineering	CV326	Solid Waste Management	CV333	Unit Operations for Liquid Waste/Effluent Treatment	CV423	Environmental Impact assessment and Climate Change
	Structural Engineering	CV327	Advanced mechanics of Solids	CV334	Advanced Structural Analysis	CV424	Advanced RC structures
Computer Engineering	Data science	CS351	Descriptive Analytics	CS354	Predictive Analysis	CS461	Big Data Analytics
	Artificial Intelligence and Machine Learning	CS352	Artificial Intelligence	CS355	Machine Learning	CS462	Deep Learning
	Cloud Computing	CS353	Cloud Computing Foundation	CS356	Cloud Native Application Development	CS463	Cloud Native DevOps
Electronics Engineering	Robotics and Automation	EX351	Fundamentals of Robotics	EX371	Robot Dynamics and Control	EX471	Robotics Vision
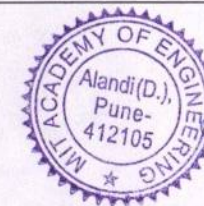
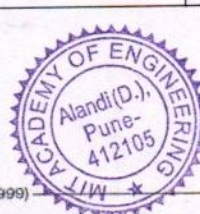|		Semester V		Semester VI		Semester VII	
Open Electives (OE)							
Programme Name	Open Track Name	Course Code	Course Name	Course Code	Course Name	Course Code	Course Name
Electronics &Telecommuni-cation	Embedded Systems	ET351	Embedded System Programming (ESP)	ET371	Embedded Processor	ET471	RTOS
	Internet of Things	ET352	IoT Architecture and Sensors	ET372	IoT Network & Protocols	ET472	Data Management and Analytics
Information Technology	Computer Security	IT351	Cryptography and System Security	IT352	Cyber Security and Forensics	IT461	Ethical Hacking & Cyber Laws
Mechanical Engineering	Computer Aided Engineering	ME351	Finite Element Analysis	ME361	Computational Fluid Dynamics	ME491	Advanced Analysis
	Robotics and Automation	ME352	Fundamentals of Robotics	ME362	Kinematics & Dynamics of Robots	ME492	Electrical and Electronics Systems of Robots
	Industrial Engineering & Management	ME353	Industrial Engineering	ME363	Operations Management	ME493	Supply Chain Management
	Automobile Engineering	ME354	Automobile System Design	ME364	Vehicle Dynamics	ME494	Autotronics and e-Vehicles
Entrepreneur-ship Cell	Innovation, Entrepreneurship & Venture Development	HP311	Foundational Course in Entrepreneurship	HP312	Advanced Course in Entrepreneurship	HP411	Startup and Incubation
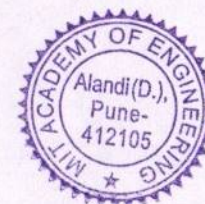
List of Department Electives as CBCS

Courses offered by Chemical Department – 2016-20 Pattern

Department Elective (DE) : 2 Courses		
Sl. No.	**Course Code**	**Course**
1	CH411	Introduction to Paint Technology
2	CH441	Paint Manufacturing Process
3	CH412	Energy Engineering
4	CH442	Energy Management and Audit
5	CH413	Petroleum Refining Technology
6	CH443	Petrochemical Engineering
7	CH414	Biochemical Engineering
8	CH444	Bioprocess Technology
9	CH415	Environment Engineering
10	CH445	Chemical Process Safety

Courses offered by Chemical Department – 2019-23 Pattern

Discipline Elective (DE): 2 Courses and 6 Credits			
Sl. No.	**Course Code**	**Course Name**	**Course Credits**
1.	CH481	Introduction to Paint Technology	3
	CH483	Petroleum Refining Technology	
	CH484	Biochemical Engineering	
	CH485	Environmental Engineering	
2.	CH491	Paint Manufacturing Process	3
	CH493	Petrochemical Technology	
	CH494	Bioprocess Technology	
	CH495	Chemical Process Safety	
	CHSWAYAM01	Membrane Technology	
	CHSWAYAM02	Environmental Quality Monitoring and Analysis	
	CHSWAYAM03	Biomass Conversion and Biorefinery	

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Courses offered by Computer Department 2016-20 Pattern

Department Elective (DE) : 6 Courses	
CS411	Operating System Design
CS412	Wireless and Mobile Network
CS413	Information Retrieval
CS441	Distributed System
CS442	Ubiquitous Systems
CS443	Cloud & Virtualization

Courses offered by Computer Department 2019-23 Pattern

Discipline Elective (DE): 2 Courses and 6 Credits			
Sl. No.	Course Code	Course Name	Course Credits
1.	CS472	Wireless Mobile Network	3
	CS473	Information Retrieval	
	CS477	Computer Vision	
2.	CS474	Ubiquitous Systems	3
	CS475	AR/VR	
	CSSWAYAM01	Deep Learning for Computer Vision	
	CSSWAYAM02	Artificial Intelligence: Search method for problem solving	
	CSSWAYAM03	Cryptography & Network Security	
	CSSWAYAM04	Cloud Computing	
	CSSWAYAM05	Introduction to Machine Learning	
	CSSWAYAM06	Natural Language Processing	
	CSSWAYAM07	Introduction to industry 4.0 and Industrial Internet of Things	

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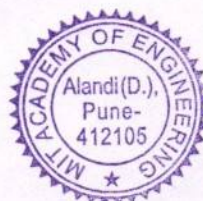
Courses offered by Civil Department 2016-20Pattern

Department Elective (DE): 2 Courses			
	Course Code	**Name of Course**	
1.	CV411	Building Services	
	CV412	Advanced Design of Structures	
	CV413	Railway Engineering	
	CV414	Hydro Power Engineering	
2.	CV441	Foundation Engineering	
	CV442	Engineering Geology	

Courses offered by Civil Department 2019-23 Pattern

		Discipline Elective (DE) : 2 Courses	
Sl. No.	**Course Code**	**Course Name**	**Course Credit**
1.	CV471	Building Services	3
	CV472	Structural Dynamics & Earthquake Engineering	
	CV473	Railway Engineering	
	CV474	Numerical Methods in Civil Engineering	
2.	CV475	Foundation Engineering	3
	CV476	Geospatial Tools and Techniques	
	CV477	Air and Noise Pollution	
	CV478	Finite Element Methods	
	CVSWAYAM01	Discipline Elective Swayam MOOC Courses	
	CVSWAYAM02	Discipline Elective Swayam MOOC Courses	
	CVSWAYAM03	Discipline Elective Swayam MOOC Courses	

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Courses offered by Electronics Department 2016-20 Pattern

Department Elective (DE) : 2 Courses		
1.	ET411	Digital Image Processing
	ET412	Microwave Engineering
	EX413	Electronic Drives and Applications
	ET414	Machine Learning
2.	EX441	Biomedical Engineering
	ET442	Artificial Intelligence
	ET443	Wireless Sensor Network
	ET444	Speech Signal Processing

Courses offered by Electronics Department 2019-23 Pattern

Discipline Elective (DE) : 2 Courses and 6 Credits			
Sl. No.	Course Code	Course Name	Course Credits
1.	ET481	Deep Learning	3
	ET482	Digital Image Processing	
	ET483	Electric Vehicles	
	ET484	RTOS	
2.	ET491	ASIC Design	3
	ET492	Network Security	
	ET493	Signal Detection and Estimation Techniques	
	ET494	Biomedical Engineering	
	ETSWAYAM01	Discipline Elective Swayam MOOC Course	
	ETSWAYAM02	Discipline Elective Swayam MOOC Course	
	ETSWAYAM03	Discipline Elective Swayam MOOC Course	

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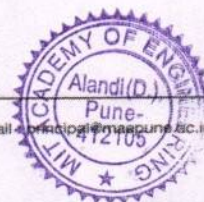
Courses offered by Electronics & Telecommunication Department 2016-20 Pattern

Department Elective (DE) : 2 Courses			
1.	ET411	Digital Image Processing	
	ET412	Microwave Engineering	
	ET413	RISC Processors	
	ET414	Machine Learning	
2.	EX441	Biomedical Engineering	
	ET442	Artificial Intelligence	
	ET443	Wireless Sensor Network	
	ET444	Speech Signal Processing	

Courses offered by Electronics & telecommunication Department 2019-23 Pattern

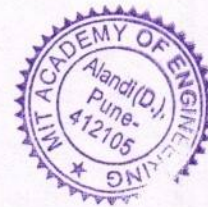| Discipline Elective (DE) : 2 Courses and 6 Credits			
Sl. No.	Course Code	Course Name	Course Credits
1.	ET481	Deep Learning	3
	ET482	Digital Image Processing	
	ET483	Electric Vehicles	
	ET484	RTOS	
2.	ET491	ASIC Design	3
	ET492	Network Security	
	ET493	Signal Detection and Estimation Techniques	
	ET494	Biomedical Engineering	
	ETSWAYAM01	Discipline Elective Swayam MOOC Course	
	ETSWAYAM02	Discipline Elective Swayam MOOC Course	
	ETSWAYAM03	Discipline Elective Swayam MOOC Course	

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Courses offered by Information Technology Department 2016-20 Pattern

Department Elective (DE) : 6 Courses	
IT411	Operating System Administration
CS412	Wireless and Mobile Network
CS413	Information Retrieval
CS441	Distributed System
IT442	IoT and Wireless Sensor Network
IT443	Computer Graphics & Multimedia Techniques

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Courses offered by Mechanical Department 2016-20 Pattern

Department Elective (DE): 2 Courses		
	Course Code	**Name of Course**
1.	ME411	Mechatronics
	ME412	Pressure Vessel Design
	ME413	Power Plant Engineering
	ME414	Product Lifecycle Management
2.	ME441	Hydraulics & Pneumatics
	ME442	Mechanical System Design
	ME443	Non-Conventional Machining
	ME444	Enterprise Resource Planning

Courses offered by Mechanical Department 2019-23 Pattern

Discipline Elective (DE): 2 Courses and 6 Credits			
Sl. No.	Course Code	Course Name	Course Credits
1.	ME471	Operations Research	3
	ME472	Mechanical Control Systems	
	ME473	Mechanical System Design	
	ME474	Sustainable Energy	
	ME475	Artificial Intelligence	
2.	ME481	Optimization Tools & Techniques	3
	ME482	Product Lifecycle Management	
	ME483	Smart Manufacturing	
	ME484	Reliability Engineering	
	ME485	Machine Learning	
	MESWAYAM01	Discipline Elective_Swayam MOOC Courses	
	MESWAYAM02	Discipline Elective_Swayam MOOC Courses	
	MESWAYAM03	Discipline Elective_Swayam MOOC Courses	

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