

Programme Template

1. Name of the Programme and Code	B.Tech. in Mechanical Engineering (ME1)
2. Degree (UG/PG)	UG
3. Minimum Duration of the Programme (Specify for FT and PT, if applicable)	4 years (FT); PT not applicable
4. Maximum Duration of the Programme (Specify for FT and PT, if applicable)	As per IIT norms
5. Capacity (Max. Student Strength) of the Programme	85
6. Number of Regular Faculty Members Involved as Teaching Faculty in the Programme	51
7. Minimum Credit Requirements for the Degree	~~158~~ 154
8. Articulate the Program Learning Outcomes (PLO) At the end of the programme, students should: PLO1. Be able to use the principles of conservation to design, develop and analyze mechanical engineering systems to address industry and society needs. PLO2. Demonstrate skills to model mechanical engineering systems to facilitate their design for safe, efficient and sustainable operation. PLO3. Demonstrate the ability to use mechanical engineering skills to address interdisciplinary technological problems. PLO4. Be able to design effective man-machine interfaces. PLO5. Possess the ethical awareness and reasoning skills to consider the societal and environmental impact of engineering solutions.	

9. Map PLOs with Institute Learning Outcomes (ILOs) of the Degree					
[Indicate ‘1’ for weak, ‘2’ for good, and ‘3’ for excellent relation. Leave the cell blank to indicate no relation]					
	PLO1	PLO2	PLO3	PLO4	PLO5
ILO1	3	3	2	3	2
ILO2	2	2	1	1	3
ILO3	2	2	3	2	2
ILO4	3	2	2	2	3
...	...	...	...	...	
10. Number of Programme Core Credits			74 64		
11. Number of Programme Elective Credits			12 18		
12. Number of Open Credits			9		
13. Number of Project Core Credits			3		
14. Details of Creative Expression and Ethical Reasoning (CEER) Component in the Programme [Mandatory for UG]					
Number of Credits Assigned			3		
Courses Involved and Credits Accounted [e.g., If one module in AMLXXX with contact hours YY satisfies Z credits, then write AMLXXX (Z credits)]			1. Engineering visualization & communication (0.5 credit) 2. Manufacturing for product innovation (0.5 credit) 3. B.Tech. Project 1 (0.5 credit) 4. Engineering mechanics (0.5 credit) 5. Machine learning for mechanical engineers (0.5 credit) 6. Mechanical design & drawing (0.5 credit)		
15. Details of Emerging Trends (ETT) Component in the Programme [Mandatory for UG]					

Number of Credits Assigned	3
Courses Involved and Credits Accounted [e.g., <i>If one module in AMLXXX with contact hours YY satisfies Z credits, then write AMLXXX (Z credits)</i>]	1. Machine learning for mechanical engineers (3 credits) 2. Industrial automation & smart manufacturing (1.5 credits)

16. Details of Environment and Sustainability (E&S) Component in the Programme [Mandatory for UG]

Number of Credits Assigned	5
Courses Involved and Credits Accounted [e.g., <i>If one module in AMLXXX with contact hours YY satisfies Z credits, then write AMLXXX (Z credits)</i>]	1. Renewable energy systems & sustainability (3 credits) 2. Mechanical design & drawing (0.5 credits) 3. Energy systems (0.5 credits) 4. Manufacturing & service system design (0.5 credits) 5. Manufacturing processes I (0.5 credits)

17. Details of Research/Technical Communication Component in the Programme [Mandatory for PG]

Number of Credits Assigned	
Courses Involved and Credits Accounted [e.g., <i>If one module in AMLXXX with contact hours YY satisfies Z credits, then write AMLXXX (Z credits)</i>]	6. xxx (Z1 credits) 7. xxx (Z2 credits) 8. ...

18. Details of Professional Ethics Component in the Programme [Mandatory for PG]

Number of Credits Assigned	1
Courses Involved and Credits Accounted [e.g., <i>If one module in AMLXXX with contact hours YY satisfies Z credits, then write AMLXXX (Z credits)</i>]	1. Mechanical design & drawing (0.25 credit) 2. Machine learning for mechanical engineering (0.25 credit) 3. BTP (0.25 credit) 4. Manufacturing & service system design (0.25 credit)

19. Details of External Connect Component in the Programme [Mandatory for PG]

Number of Credits Assigned	
Courses Involved and Credits Accounted [e.g., <i>If one module in AMLXXX with contact hours YY satisfies Z credits, then write AMLXXX (Z credits)</i>]	5. xxx (Z1 credits) 6. xxx (Z2 credits) 7. ...

20. List of prescribed courses in all baskets (BS, GE, DC/PC, DE/PE, ...)

Basic Sciences: Institute Core

S. No.	Course No. & Title	L-T-P	Credits
1	MTL1001 Mathematics I Calculus	3-1-0	4
2	MTL1002 Mathematics II Linear Algebra and Differential Equations	3-1-0	4
3	PYP1000 Physics Laboratory	0-0-4	2
4	CMP1000 Chemistry Laboratory	0-0-4	2
5	SBP1100 Experimental Biology for Engineers	0-0-2	1

Basic Sciences: Selected by AU

S. No.	Course No. & Title	L-T-P	Credits
1	PYL1001 Introduction to Electrodynamics	2-1-0	3
2	CML1001 Structural Insights into Atoms and Molecules	2-1-0	3
3	SBL1100 Biology for Engineers: Microbes in health and disease	2-0-0	2

General Engineering: Institute Core

S. No.	Course No. & Title	L-T-P	Credits
1	COL0100 Computer Literacy	0-0-2	1
2	COL1000 Introduction to Programming I	1-0-1	1.5

3	COL1001 Introduction to Programming II	1-0-1	1.5
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General Engineering: Selected by AU

S. No.	Course No. & Title	L-T-P	Credits
1	MEP1000 Engineering Visualization	0.5-0-3	2
2	MEP1001 Manufacturing for Product Innovation	0.5-0-3	2
3	ELL1000 Introduction to Electrical Engineering	2-1-2	4
4	MLL1001 Introduction to Materials Science and Engineering	3-0-2	4
5	MTL2008 Introduction to Probability and Statistics	3-1-0	4

Departmental Core:

S. No.	Course No. & Title	L-T-P	Credits
1	MEL1002 Engineering Mechanics	3-1-0	4
2	MEL2001 Solid Mechanics	3-0-2	4
3	MEL2002 Kinematics & Dynamics of Machines	3-0-2	4
4	MEL2003 Mechanical Engineering Design and Drawing	2-0-2	3
5	MEL2004 Engineering Thermodynamics	3-1-0	4
6	MEL2005 Fluid Mechanics	3-1-0	4
7	MEP2005 Thermofluids laboratory	0-0-2	1
8	MEL2006 Energy Systems	3-1-0	4
9	MEL2007 Manufacturing Processes-I	3-0-2	4
10	MEL2008 Introduction to Operations Research	3-0-0	3
11	MEL3001 Design of Machines	3-0-2	4
12	MEL3002 Control Systems Engineering	3-0-2	4
13	MEL3003 Finite Element Analysis	2-0-2	3
14	MEL3004 Heat and Mass Transfer	3-1-0	4
15	MEL3005 Renewable Energy Systems and Sustainability	2-1-0	3
16	MEP3005 Heat Transfer & Thermal Systems Labs	0-0-2	1
17	MEL3006 Numerical methods	2-0-2	3
18	MEL3007 Manufacturing Processes-II	3-0-2	4
19	MEL3008 Manufacturing and Service System Design	3-0-0	3
20	MEL3009 Machine Learning for Mechanical Engineering	3-0-0	3
21	MEL4001 Industrial Automation and Smart Manufacturing	3-0-2	4
22	MED4011 BTP-I	0,0,6	3

21. Nominal Semester-wise Academic Plan [An example is provided below]

Semster	Course-1	Course-2	Course-3	Course-4	Course-5	Course-6	Course-7	Course-8	L	T	P	Credits	Course hours
1	MTL1001	PYL1001	PYP1000	COL0100 + COL1000	MEP1000	MEP1001			7	2	13	15.5	22
	Calculus	Introduction to electro-dynamics	Physics lab	Computer Literacy + Intro to Programming I	Engineering visualiza-tion	Mfg for product inno-vation							
	3-1-0-4	2-1-0-3	0-0-4-2	0-0-2-1 + 1-0-1-1.5	0.5-0-3-2	0.5-0-3-2							
2	MTL1002	CML1001	CMP1000	COL0102	ELL1000	MEL1002			11	4	7	18.5	22
	Linear algebra and diff equations	Structural insights into atoms and molecules	Chemistry lab	Introduction to Programming II	Intro to Electrical Engineering	Engineering Mechanics							
	3-1-0-4	2-1-0-3	0-0-4-2	1-0-1-1.5	2-1-2-4	3-1-0-4							
3	MLL1001	MEL2001	MEL2002	MEL2004	MEL2005				18	2	6	23	26
	Intro to materials science & engg	Solid mechanics	Kinematics & dynam-ics of machines	Engineering thermodynamics	Fluid mechanics	HUL / SSW							
	3-0-2-4	3-0-2-4	3-0-2-4	3-1-0-4	3-1-0-4	3-0-0-3							
4	MEL2006	MEL2006	MEL2007	MEL2008	MTL2008	MEP2005			17	3	6	23	26
	Mechanical Engineer-ing design and drawing	Energy systems	Manufacturing Pro-cesses-I	Intro to OR	Intro to Probability & statistics	Thermofluids lab	Elective GE						
	2-0-2-3	3-1-0-4	3-0-2-4	3-0-0-3	3-1-0-4	0-0-2-1	3-1-0-4						
5	MEL3001	MEL3004	~~MEL3006~~	MEL3007	MEP3005	SBL1100	SBP1100		16	1	10	22	27
	Design of machines	Heat and mass trans-fer	Numerical methods DE1	Manufacturing pro-cess-II	Heat transfer and ther-mal systems lab	Bio for Engineers: Microbes in health and disease	Experimental Biology for Engineers	HUL/SSW					
	3-0-2-4	3-1-0-4	2-0-2-3	3-0-2-4	0-0-2-1	2-0-0-2	0-0-2-1	3-0-0-3					
6	MEL3002	~~MEL3003~~	MEL3005	MEL3008	MEL3009				19	2	4	23	26
	Control Systems Engineering	Finite element analy-sis -DE2	Renewable energy sys-tems and sustainabil-ity	Manufacturing & ser-vice system design	Machine Learning for Mechanical Engineer-ing	DE3	HUL/SSW						
	3-0-2-4	2-0-2-3	2-1-0-3	3-0-0-3	3-0-0-3	3-1-0-4	3-0-0-3						
7	~~MEL4001~~	MED4011							15 12	1	8	20 16	24 19
	Industrial Automation and Smart Manufac-turing	B.Tech. Project	DE4	Elective BS	HUL/SSW	OC1							
	~~3-0-2-4~~	0-0-6-3	3-1-0-4	3-0-0-3	3-0-0-3	3-0-0-3							
8									12	1	0	13	13
	DE5	HUL/SSW	OC2	OC3									
	3-1-0-4	3-0-0-3	3-0-0-3	3-0-0-3									
									Total Credits			158 154	

22. Average Contact Hours per Faculty <i>per Week</i> , for this Programme	
23. Average Credit Students per Faculty per Semester, for this Programme	71.7
24. If the program is a revision of an existing program, please list the major changes made.	(i) Addition of a renewable energy and sustainability course in DC (ii) Addition of a Machine Learning course in DC (iii) Modification in lab courses and introducing labs from 4th sem onwards (iv) Removal of 3 courses from core (equivalent to 10 credits.) (v) Electives increased from 12 to 18 (vi) Total credits reduced from 155 to 154
25. Please elaborate on,	
a) how flexibility for the students has increased?	i. DEs increased from 12 to 18 credits. ii. Introduction of DE's from semester V
b) how engagement and interaction with the student have increased?	Through modification in laboratory for engagement from 4 th sem onwards; First DC will have smaller classes; for some common core courses, there may be separate sections for ME1 and ME2
c) how hands-on learning is emphasized in the program?	Through introduction of laboratory courses in 4 th sem soon after theory courses.