MANIPAL UNIVERSITY JAIPUR
(University under Section 2(f) of the UGC Act)

Faculty of Engineering, School of Automobile, Mechanical and Mechatronics Engineering
Department of Mechatronics Engineering
Degree: Bachelor of Technology in Mechatronics Engineering
Total Credit: 160

	Third Semester						**Fourth Semester**				
Code	Subject Name	L	T	P	C	Code	Subject Name	L	T	P	C
MAS21XX/ MEE22XX[i]	Engineering Economics	3	0	0	3	MAS21XX MEE22XX	Statistics & Probability	3	0	0	3
MBB21XX	Management of Technology	3	0	0	3	MCE2201	Kinematics and Dynamics of Machines	3	1	0	4
MCE2101	Linear Integrated Circuits	3	1	0	4	MCE2202	Sensors and Control Systems	3	1	0	4
MCE2102	Embedded Controllers	3	1	0	4	MCE22XX	Flexi Core 2	3	1	0	4
MCE2103	Strength of Materials	3	0	0	3	MCE22XX	Program Elective 1	3	0	0	3
MCE21XX	Flexi Core 1	3	1	0	4	MCE20XX	Open Elective 1	3	0	0	3
MCE2130	Embedded Controllers Lab	0	0	2	1	MCE2230	Sensors and Control Systems Lab	0	0	2	1
MCE2131	PLC Lab	0	0	4	2	MCE2231	Integrated Electronics Lab	0	0	2	1
MCE2170	Project-based Learning-1	0	0	2	1	MCE2270	Project-based Learning-2	0	0	2	1
	Total Contact Hours (L+T+P)	**18**	**3**	**8**	**25**		**Total Contact Hours (L+T+P)**	**18**	**3**	**6**	**24**
	Fifth Semester						**Sixth Semester**				
Code	Subject Name	L	T	P	C	Code	Subject Name	L	T	P	C
MCE3101	Design of Machine Elements	3	1	0	4	MCE32.0	Drives and Automation	3	1	0	4
MCE3102	Robotics	3	0	0	3	MCE32XX	Program Elective 4	3	0	0	3
MCE31XX	Flexi Core 3	3	1	0	4	MCE32XX	Program Elective 5	3	0	0	3
MCE31XX	Program Elective 2	3	0	0	3	MCE32XX	Program Elective 6	3	0	0	3
MCE31XX	Program Elective 3	3	0	0	3	MCE30XX	Open Elective 3	3	0	0	3
MCE30XX	Open Elective 2	3	0	0	3	MCE3202	Professional Practice	0	0	2	1
MCE3130	Design and Modelling Lab	0	0	2	1	MCE3230	Robotics Lab	0	0	2	1
MCE3131	Pneumatics and Hydraulics Lab	0	0	4	2	MCE3231	Drives and Automation Lab	0	0	2	1
MCE3170	Project-based Learning-3	0	0	2	1	MCE3270	Project-based Learning-4				3
	Total Contact Hours (L+T+P)	**18**	**2**	**6**	**24**		**Total Contact Hours (L+T+P)**	**15**	**1**	**6**	**22**
	Seventh Semester						**Eighth Semester**				
Code	Subject Name	L	T	P	C	Code	Subject Name	L	T	P	C
MCE41XX	Program Elective 7	3	0	0	3	MCE4270	Major Project				12
MCE41XX	Program Elective 8	3	0	0	3						
MCE40XX	Open Elective 4	3	0	0	3						
MCE40XX	Open Elective 5	3	0	0	3						
MCE4170	Internship (Industry or Research)	0	0	2	1						
	Total Contact Hours (L+T+P)	**12**	**0**	**2**	**13**		**Total Contact Hours (L+T+P)**	**0**	**0**	**0**	**12**

List of Flexi Core Course

MANIPAL UNIVERSITY
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Total Credit: 160

Flexi Core 1	Flexi Core 2	Flexi Core 3
MCE2120 Manufacturing Process CSE21XX Data Structures and Algorithms	MCE2220 Fluid Mechanics CSE22XX Object Oriented Programming	MCE3120 Flexible Manufacturing CSE31XX Relational Database Management Systems

List of Program Electives Courses

IV	V	VI	VII
PE1 • MCE2240: Digital System Design • MCE2241: IOT Systems	**PE2** • MCE3140: Finite Element Methods • MCE3141: Signals and Systems • MCE3142: Drone Modelling and Control **PE3** • MCE3150: Advance Control Theory • MCE3151: Cyber-Physical System • MCE3152: Mobile Robots	**PE 4** • MCE3240: Optimal Control • MCE3241: Drone Applications • MCE3242: Building Automation **PE5** • MCE3250: MEMS and NEMS • MCE3251: Robot Path Planning and Control • MCE3252: Artificial Intelligence **PE6** • MCE3260: Wireless Sensor Networks • MCE3261: Machine Vision • MCE3262: Production and Operations Management	**PE 7** • MCE4140: Farming Automation • MCE4141: Electric Vehicles • MCE4142: Additive Manufacturing **PE8** • MCE4150: industrial IOT • MCE4151: Intelligent Systems • MCE4152: Collaborative Robots

List of Open Electives Courses

Graded OE	Non-Graded OE
OE1 MCE2201: Fundamental of Robotics OE2 MCE3101: Automation in Industry OE3 MCE3201: Building Automation OE4 MCE4101: Sensor Technologies OE5 MCE4102: Smart Agriculture OE1 MCE4103: Predictive Maintenance OE2 MCE4104: Inventory and Quality Control	

[i] Statistics & Probability: CSE, AIML, SEEC students will take in 3rd semester. Engineering Economics: SIT, SCCE, All Core (-) SEEC will take in 3rd semester. In 4th semester, these courses are switched.

Degree: Bachelor of Technology in (Hons) Mechatronics Engineering
Total Credit: 178 (160 + 18*)

	Third Semester						Fourth Semester				
Code	Subject Name	L	T	P	C	Code	Subject Name	L	T	P	C
MAS21XX/ MEE22XX[i]	Engineering Economics	3	0	0	3	MAS21XX MEE22XX	Statistics & Probability	3	0	0	3
MBB21XX	Management of Technology	3	0	0	3	MCE2201	Kinematics and Dynamics of Machines	3	1	0	4
MCE2101	Linear Integrated Circuits	3	1	0	4	MCE2202	Sensors and Control Systems	3	1	0	4
MCE2102	Embedded Controllers	3	1	0	4	MCE22XX	Flexi Core 2	3	1	0	4
MCE2103	Strength of Materials	3	0	0	3	MCE22XX	Program Elective 1	3	0	0	3
MCE21XX	Flexi Core 1	3	1	0	4	MCE20XX	Open Elective 1	3	0	0	3
MCE2130	Embedded Controllers Lab	0	0	2	1	MCE2230	Sensors and Control Systems Lab	0	0	2	1
MCE2131	PLC Lab	0	0	4	2	MCE2231	Integrated Electronics Lab	0	0	2	1
MCE2170	Project-based Learning-1	0	0	2	1	MCE2270	Project-based Learning-2	0	0	2	1
	Total Contact Hours (L+T+P)	**18**	**3**	**8**	**25**		**Total Contact Hours (L+T+P)**	**18**	**3**	**6**	**24**
	Fifth Semester						**Sixth Semester**				
Code	Subject Name	L	T	P	C	Code	Subject Name	L	T	P	C
MCE3101	Design of Machine Elements	3	1	0	4	MCE32.0	Drives and Automation	3	1	0	4
MCE3102	Robotics	3	0	0	3	MCE32XX	Program Elective 4	3	0	0	3
MCE31XX	Flexi Core 3	3	1	0	4	MCE32XX	Program Elective 5	3	0	0	3
MCE31XX	Program Elective 2	3	0	0	3	MCE32XX	Program Elective 6	3	0	0	3
MCE31XX	Program Elective 3	3	0	0	3	MCE30XX	Open Elective 3	3	0	0	3
MCE30XX	Open Elective 2	3	0	0	3	MCE3202	Professional Practice	0	0	2	1
MCE3130	Design and Modelling Lab	0	0	2	1	MCE3230	Robotics Lab	0	0	2	1
MCE3131	Pneumatics and Hydraulics Lab	0	0	4	2	MCE3231	Drives and Automation Lab	0	0	2	1
MCE3170	Project-based Learning-3	0	0	2	1	MCE3270	Project-based Learning-4				3
MCE3181	Research Methodology				1	MCE328X*	Honors Elective1				3
	Total Contact Hours (L+T+P)	**18**	**2**	**8**	**25**		**Total Contact Hours (L+T+P)**	**18**	**1**	**6**	**25**
	Seventh Semester						**Eighth Semester**				
Code	Subject Name	L	T	P	C	Code	Subject Name	L	T	P	C
MCE41XX	Program Elective 7	3	0	0	3	MCE4270	Major Project	0	0	0	12
MCE41XX	Program Elective 8	3	0	0	3	MCE428X*	Honors Project	0	0	0	8
MCE40XX	Open Elective 4	3	0	0	3						
MCE40XX	Open Elective 5	3	0	0	3						
MCE4170	Internship (Industry or Research)	0	0	2	1						
MCE418X*	Honors Elective 2	3	0	0	3						
MCE418X*	Honors Elective 3	3	0	0	3						
	Total Contact Hours (L+T+P)	**18**	**0**	**2**	**19**		**Total Contact Hours (L+T+P)**	**0**	**0**	**0**	**20**

Degree: Bachelor of Technology in (Hons) Mechatronics Engineering
Total Credit: 178 (160 + 18*)

List of Flexi Core Course

Flexi Core 1	Flexi Core 2	Flexi Core 3
MCE2120 Manufacturing Process CSE21XX Data Structures and Algorithms	MCE2220 Fluid Mechanics CSE22XX Object Oriented Programming	MCE3120 Flexible Manufacturing System CSE31XX Relational Database Management Systems

List of Program Electives Courses

IV	V	VI	VII
PE1 • MCE2240: Digital System Design • MCE2241: IOT Systems	**PE2** • MCE3140: Finite Element Methods • MCE3141: Signals and Systems • MCE3142: Drone Modelling and Control **PE3** • MCE3150: Advance Control Theory • MCE3151: Cyber-Physical System • MCE3152: Mobile Robots	**PE 4** • MCE3240: Optimal Control • MCE3241: Drone Applications • MCE3242: Building Automation **PE5** • MCE3250: MEMS and NEMS • MCE3251: Robot Path Planning and Control • MCE3252: Artificial Intelligence **PE6** • MCE3260: Wireless Sensor Networks • MCE3261: Machine Vision • MCE3262: Production and Operations Management	**PE 7** • MCE4140: Farming Automation • MCE4141: Electric Vehicles • MCE4142: Additive Manufacturing **PE8** • MCE4150: industrial IOT • MCE4151: Intelligent Systems • MCE4152: Collaborative Robots

List of Open Electives Courses

Graded OE	Non-Graded OE
OE1 MCE2201: Fundamental of Robotics OE2 MCE3101: Automation in Industry OE3 MCE3201: Building Automation OE4 MCE4101: Sensor Technologies OE5 MCE4102: Smart Agriculture OE1 MCE4103: Predictive Maintenance OE2 MCE4104: Inventory and Quality Control	

List of Program Electives for Hons.

VI / VII
MCE3281: Robotics and its Control – **Pre-Requisite:** Nil MCE4181: Smart Manufacturing – **Pre-Requisite:** (Manufacturing Process course offered as Flexi core -1 and Flexible Manufacturing System course offered as Flexi core -3 by Mechatronics Department) MCE4182: AI-based Controllers **Pre-Requisite:** Nil

[i] Statistics & Probability: CSE, AIML, SEEC students will take in 3rd semester. Engineering Economics: SIT, SCCE, All Core (-) SEEC will take in 3rd semester. In 4th semester, these courses are switched.

Degree: B. Tech Mechatronics Engineering with Minor Specialization in Robotics
Total Credit: 178 (160 + 18*)

	Third Semester						Fourth Semester				
Code	Subject Name	L	T	P	C	Code	Subject Name	L	T	P	C
MAS21XX/ MEE22XX[i]	Engineering Economics	3	0	0	3	MAS21XX MEE22XX	Statistics & Probability	3	0	0	3
MBB21XX	Management of Technology	3	0	0	3	MCE2201	Kinematics and Dynamics of Machines	3	1	0	4
MCE2101	Linear Integrated Circuits	3	1	0	4	MCE2202	Sensors and Control	3	1	0	4
MCE2102	Embedded Controllers	3	1	0	4	MCE22XX	Flexi Core 2	3	1	0	4
MCE2103	Strength of Materials	3	0	0	3	MCE22XX	Program Elective 1	3	0	0	3
MCE21XX	Flexi Core 1	3	1	0	4	MCE20XX	Open Elective 1	3	0	0	3
MCE2130	Embedded Controllers Lab	0	0	2	1	MCE2230	Sensors and Control Lab	0	0	2	1
MCE2131	PLC Lab	0	0	4	2	MCE2231	Integrated Electronics Lab	0	0	2	1
MCE2170	Project-based Learning-1	0	0	2	1	MCE2270	Project-based Learning-2	0	0	2	1
	Total Contact Hours (L+T+P)	**18**	**3**	**8**	**25**		**Total Contact Hours (L+T+P)**	**18**	**3**	**6**	**24**
	Fifth Semester						**Sixth Semester**				
Code	Subject Name	L	T	P	C	Code	Subject Name	L	T	P	C
MCE3101	Design of Machine Elements	3	1	0	4	MCE32.0	Drives and Automation	3	1	0	4
MCE3102	Robotics	3	0	0	3	MCE32XX	Program Elective 4	3	0	0	3
MCE31XX	Flexi Core 3	3	1	0	4	MCE32XX	Program Elective 5	3	0	0	3
MCE31XX	Program Elective 2	3	0	0	3	MCE32XX	Program Elective 6	3	0	0	3
MCE31XX	Program Elective 3	3	0	0	3	MCE30XX	Open Elective 3	3	0	0	3
MCE30XX	Open Elective 2	3	0	0	3	MCE3202	Professional Practice	0	0	2	1
MCE3130	Design and Modelling Lab	0	0	2	1	MCE3230	Robotics Lab	0	0	2	1
MCE3131	Pneumatics and Hydraulics Lab	0	0	4	2	MCE3231	Drives and Automation Lab	0	0	2	1
MCE3170	Project-based Learning-3	0	0	2	1	MCE3270	Project-based Learning-4	0	0	0	3
MCE3190	Research Methodology				1	MCE329X*	Minor Elective 1				3
	Total Contact Hours (L+T+P)	**18**	**2**	**6**	**24**		**Total Contact Hours (L+T+P)**	**15**	**1**	**6**	**22**
	Seventh Semester						**Eighth Semester**				
Code	Subject Name	L	T	P	C	Code	Subject Name	L	T	P	C
MCE41XX	Program Elective 7	3	0	0	3	MCE4270	Major Project	0	0	0	12
MCE41XX	Program Elective 8	3	0	0	3	MCE4271*	Minor Specialization Project	0	0	0	8
MCE40XX	Open Elective 4	3	0	0	3						
MCE40XX	Open Elective 5	3	0	0	3						
MCE4170	Internship (Industry or Research)	0	0	2	1						
MCE419X*	Minor Elective 2	3	0	0	3						
MCE419X*	Minor Elective 3	3	0	0	3						
	Total Contact Hours (L+T+P)	**18**	**0**	**2**	**13**		**Total Contact Hours (L+T+P)**	**0**	**0**	**0**	**20**

Degree: B. Tech Mechatronics Engineering with Minor Specialization in Robotics
Total Credit: 178 (160 + 18*)

List of Flexi Core Course

Flexi Core 1	Flexi Core 2	Flexi Core 3
MCE2120 Manufacturing Process CSE21XX Data Structures and Algorithms	MCE2220 Fluid Mechanics CSE22XX Object Oriented Programming	MCE3120 Flexible Manufacturing System CSE31XX Relational Database Management Systems

List of Program Electives Courses

IV	V	VI	VII
PE1 • MCE2240: Digital System Design • MCE2241: IOT Systems	**PE2** • MCE3140: Finite Element Methods • MCE3141: Signals and Systems • MCE3142: Drone Modelling and Control **PE3** • MCE3150: Advance Control Theory • MCE3151: Cyber-Physical System • MCE3152: Mobile Robots	**PE 4** • MCE3240: Optimal Control • MCE3241: Drone Applications • MCE3242: Building Automation **PE5** • MCE3250: MEMS and NEMS • MCE3251: Robot Path Planning and Control • MCE3252: Artificial Intelligence **PE6** • MCE3260: Wireless Sensor Networks • MCE3261: Machine Vision • MCE3262: Production and Operations Management	**PE 7** • MCE4140: Farming Automation • MCE4141: Electric Vehicles • MCE4142: Additive Manufacturing **PE8** • MCE4150: industrial IOT • MCE4151: Intelligent Systems • MCE4152: Collaborative Robots

List of Open Electives Courses

Graded OE	Non-Graded OE
OE1 MCE2201: Fundamental of Robotics OE2 MCE3101: Automation in Industry OE3 MCE3201: Building Automation OE4 MCE4101: Sensor Technologies OE5 MCE4102: Smart Agriculture	OE1 MCE2251: Predictive Maintenance OE2 MCE3151: Inventory and Quality Control OE3 MCE3251: Biomedical Instrumentation OE4 MCE4151: Fundamental of Cyber-Physical System OE5 MCE4152: Optimization and Decision Techniques

List of Program Electives Program Electives for Minor Specialization

VI / VII
MCE3290: Robotics and its Control - Pre-Requisite-(**Fundamental of Robotics** course offered as OE1 by Mechatronics Department) MCE4191: Wheeled Robots, Pre-Requisite-Nil MCE4192: Advance Robotics and Applications, Pre-Requisite-Nil

Eligibility Criteria for Minor Specialization[ii]

SN	Minor Program	Eligible Branch of Students	@ Offering Department	Award of Degree
1	Robotics	All (Except Mechanical Engineering and Electronics & Communication Engineering)	Mechatronics	B. Tech. in **"branch"** name with Minor in Robotics

Degree: B. Tech Mechatronics Engineering with Minor Specialization in Robotics
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[i] Statistics & Probability: CSE, AIML, SEEC students will take in 3rd semester. Engineering Economics: SIT, SCCE, All Core (-) SEEC will take in 3rd semester. In 4th semester, these courses are switched.

[ii] For Eligibility criteria, refer the AICTE APH.