B.Tech. in Mechatronics: Specialization: EV-Mechanical

Department of Faculty of Engineering and Technology,
Sri Sri University. Cuttack, India

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	B.Tech. Mechatronics (Specialization : Mechanical EV)					
	1st Year					
Course code	Semester – 1	L	T	P	Cr	
	Major Courses					
TEC101	Basic Electronics Engg.	2	0	0	2	10
TEC102	Basic Electronics Engg. Lab	0	0	1	1	
TEE101	Basic Electrical	2	0	0	2	
TEE102	Basic Electrical lab	0	0	1	1	
TCS101	Computational Thinking and Problem Solving for Software Development (IBM)	2	0	0	2	
TCS102	Computational Thinking and Problem Solving for Software Development (IBM) Lab	0	0	1	1	
TEC103	Engineering Graphics & Design	0	0	1	1	
	Minor Courses					
TMN101	Innovation Management(Ex)	3	0	0	3	4
TMN102	Innovation Management lab	0	0	1	1	
	Multidisciplinary Courses					
	Engineering Mathematics-1	2	0	0	2	6
	Engineering Mathematics-1 Lab.	0	0	1	1	
	Engineering Chemistry	2	0	0	2	
	Engineering Chemistry Lab.	0	0	1	1	
	Ability enhancement course					
	Communicative English-1	2	0	0	2	3
	Communicative English-1 Lab.	0	0	1	1	
	Skill enhancement course					
TSE103	Engineering workshop on Automation and Mechatronics	0	0	0	3	3
	Value added course					
	Happiness Connect program	0	0	2	2	3
TVA101	Sustainable Development Goal	1	0	0	1	
	General Proficiency					
TGP101	General Proficiency-I	0	0	0	1	1

Total Credit in 1st Semester – 30

Course code	Semester – 2	L	T	P	Cr	
	Major Courses					
TEE103	Circuit Theory and Network Theory	2	0	0	2	11
TEE104	Circuit Theory and Network Theory Lab	0	0	1	1	
TMC101	Engg. Mechanics	2	0	0	2	
TMC102	Engg. Mechanics Lab	0	0	2	1	
TEE105	Introduction to Sensor & Transducer	2	0	0	2	
TCS110	Programing in C	2	0	0	2	
TCS111	Programing in C Lab	0	0	1	1	
	Minor Courses					
TMN103	Entrepreneurship Development(Ex)	3	0	0	3	4
TMN104	Entrepreneurship Development lab	0	0	1	1	
	Multidisciplinary Courses					
	Engineering Mathematics-2	2	0	1	3	6
	Engineering Physics	2	0	0	2	
	Engineering Physics Lab	0	0	1	1	
	Ability enhancement course					
TAE105	Communicative English-2	2	0	0	2	4
TAE106	Communicative English-2 Lab.	0	0	1	1	
TAE103	Design Thinking	0	0	1	1	
	Skill enhancement course					
TSE109	CAD Simulation and Finite Element Analysis (FEA)	0	0	1	3	3
	Value added course					
	Green governance	1	0	0	1	1
	General Proficiency					
TGP102	General Proficiency-II	0	0	0	1	1

Students exiting the programme after securing 40 credits will be awarded UG Certificate in the relevant Discipline /Subject provided they secure 4 credits in work based vocational courses offered during summer term or internship / Apprenticeship in addition to 6 credits from skill-based courses earned during first and second Semester.

Total Credit in 2nd Semester - 30

B.Tech. Mechatronics (Specialization :Mechanical- EV)						
2nd Year						
Course code	Semester – 3	L	T	P	Cr	
Major Courses						
TMC201	Solid Mechanics/Basic Concepts ofMechatronics	2	0	0	2	
TMC202	Solid Mechanics Lab/Basic Concepts of Mechatronics lab	0	0	1	1	
TEC203	Foundations of EV & Hybrid Vehicles (L&T)	2	0	0	2	
TEC204	Foundations of EV & Hybrid Vehicles Lab	0	0	1	1	12
TEE201	Introduction to Measurement	2	0	0	2	
TEE202	Measurement Lab	0	0	1	1	
TEE203	Control system-I	2	0	0	2	
TEE204	Control System-I lab	0	0	1	1	
Minor Courses						
TMN201	Python Programming	3	0	0	3	4
TMN202	Python Programming Lab	0	0	1	1	
Multidisciplinary Courses						
	Engineering Mathematics-3	3	0	0	3	3
Skill enhancement course						
TSE203	Model based Design on Mechatronics and simulation	0	0	1	3	3
Value Added						
TVA201	Disaster Management	0	0	1	1	1
Summer Internship						
TSI201	Internship	0	0	2	2	2
General Proficiency						
TGP201	General Proficiency-III	0	0	0	1	1

Total Credit in 3rd Semester - 26

Course code	Semester – 4	L	T	P	Cr	
Major Courses						
TMC203	Machine Design and Manufacturing Processes	3	0	0	3	14
TMC204	Machine Design and Manufacturing Processes Lab	0	0	1	1	
TMC205	Applied Thermodynamics,	3	0	0	3	
TMC206	Applied Thermodynamics Lab	0	0	1	1	
TMC207	Automotive Mechanics for Electric Vehicles	2	0	0	2	
TMC208	Automotive Mechanics for Electric Vehicles Lab	0	0	1	1	
TEE207	Fundamentals microcontroller	2	0	0	2	
TEE208	Fundamentals of microcontroller lab	0	0	1	1	
Minor Courses						
TMN203	Introduction to AIML (RD-2)	3	0	0	3	4
TMN204	Introduction to AIML Lab	0	0	1	1	
Skill Enhancement Courses						
TSE206	Minor Project	0	0	2	2	2
Value Added						
TVA202	Constitution of India	0	0	1	1	1
General Proficiency						
TGP202	General Proficiency-IV	0	0	0	1	1
Students exiting the programme after securing minimum 80 credits will be awarded UG diploma in the relevant Discipline /Subject provided they secure 4 credits in work based vocational courses offered during summer term or internship / Apprenticeship during 1st year or second year summer term						

Total Credit in 4th Semester – 22

3rd Year						

Course code	Semester – 5	L	T	P	Cr	
	Major Courses					
TMC301	Fluid Mechanics and Kinematics & Dynamics of Machines	3	0	0	3	
TMC302	Fluid Mechanics and Kinematics & Dynamics of Machines Lab	0	0	1	1	
TMC303	Theory of Finite Element Methods,	3	0	0	3	
TMC304	Theory of Finite Element Methods Lab	0	0	1	1	14
TMC305	EV Mechanical Design, Development & Analysis	2	0	0	2	
TMC306	EV Mechanical Design, Development & Analysis Lab	0	0	1	1	
TEE301	Electromagnetic Field Theory	2	0	0	2	
TEE302	Electromagnetic Field Theory lab	0	0	1	1	
	Minor Courses					
TMN301	Deep Learning	3	0	0	3	4
TMN302	Deep Learning Lab	0	0	1	1	
	Value Added					
	Vedic Mathematics	0	0	1	1	1
	Internship					
TSI301	Internship	0	0	2	2	2
	Ability enhancement course					
TAE301	Employability planning and preparation – 1	0	0	1	1	1
	General Proficiency					
TGP301	General Proficiency-V	0	0	0	1	1

Total Credit in 5th Semester –23

Course code	Semester – 6	L	T	P	Cr	
	Major Courses					
TMC307	EV FEA Analysis	3	0	0	3	
TMC308	EV FEA Analysis Lab	0	0	1	1	
TMC309	Kinematics and Theory of Machines	3	0	0	3	
TMC310	Kinematics and Theory of Machines lab	0	0	1	1	14
TMC311	EV Product Development, Homologation & Hydrogen FCEV	3	0	0	3	
TMC312	EV Product Development, Homologation & Hydrogen FCEV	0	0	1	1	
TMC313	Mechatronics System	2	0	0	2	
	Minor Courses					
TMN303	Computational linguistics & NLP	3	0	0	3	4
TMN304	Computational linguistics & NLP Lab	0	0	1	1	
	Skill Enhancement Course					
TSE301	Major Project	0	0	2	2	2
	Ability enhancement course					
TAE302	Employability planning & preparation – II	0	0	1	1	1
	Value Added					
TVA301	Universal Human Value	0	0	0	1	1
	General Proficiency					
TGP302	General Proficiency	0	0	0	1	1

Total Credit in 6th Semester –23

B.Tech. Mechatronics (Specialization :Mechanical- EV)						
4th Year						
Course code	Semester – 7	L	T	P	Cr	
Major Courses						
	HONs Degree					
TMC401	EV Data Analytics & Cyber Security	3	0	0	3	
TMC402	EV Data Analytics & Cyber Security	1	0	1	1	
TMC403	Industrial Automation & Robotics	3	0	0	3	
TMC404	Industrial Automation & Robotics Lab	0	0	1	1	
TEE303	Power Electronics	3	0	0	3	
TEE304	Power Electronics Lab	0	0	1	1	
Ability Enhancement						
RM1	Research Methodology	2	0	0	2	2
Value added						
	Indian Knowledge system	1	0	0	1	1
Summer Internship						
TSI401	Summer Internship	0	0	3	3	3
Minor Courses						
TMN401	Opportunity Spotting and evaluation(Ex)	3	0	0	3	4
TMN402	Opportunity Spotting and evaluation lab	0	0	1	1	
Skill Enhancement						
TSE401	Modelling & Simulation of Mechatronics System	0	0	3	3	3
General Proficiency						
TGP401	General Proficiency-VII	0	0	0	1	1

Total Credit in 7th Semester – 26

Course code	Semester – 8	L	T	P	Cr	
	Major Courses					
TMC405	Mechanical Vibrations	3	0	1	4	16
	Research project in relevant specialization (The research outcomes of their project work may be published in peer-reviewed journals or may be presented in conferences/seminars or may be patented)				12	
	Minor Courses					
TMN403	Industry and Market Research (Ex)	3	0	0	3	4
TMN404	Industry and Market Research LAB	0	0	1	1	
	General Proficiency					
TGP402	General Proficiency	0	0	0	1	1
	B.Tech. (Honours with research) Mechatronics(Specialization : Mechanical EV)					

Total Credit in 8th Semester - 21

1. Generic Elective can also be opted from Swayam Portal and students should produce Grade certificate on successful completion of the course but the content should not match with the courses offered under the curriculum.

2. General Proficiency (General Proficiency shall be assessed based on the participation in NCC, NSS, Conferences (Research paper Publication (Journal/ Conference)), Organizing events, participation in events(conferences/Worksop/training/webinar/seminar) ,competitions (Inter University, State, National, International level) including Music, Debate, Sports, Hackathon and so on.)

General Course Structure of B. Tech. (Mechatronics.)

Major Courses

Sl. No	Course Code	Core Course	L	T	P	Cr
1	TEC101	Basic Electronics Engg.	2	0	0	2
2	TEC102	Basic Electronics Engg. Lab	0	0	1	1
3	TEE101	Basic Electrical	2	0	0	2
4	TEE102	Basic Electrical lab	0	0	1	1
5	TCS101	Computational Thinking and Problem Solving for Software Development (IBM)	2	0	0	2
6	TCS102	Computational Thinking and Problem Solving for Software Development (IBM) Lab	0	0	1	1
7	TEC103	Engineering Graphics & Design	0	0	2	1
8	TEE103	Circuit Theory and Network Theory	2	0	0	2
9	TEE104	Circuit Theory and Network Theory Lab	0	0	1	1
10	TEE105	Introduction to Sensor & Transducer	2	0	0	2
11	TCS110	Programing in C	2	0	0	2
12	TCS111	Programing in C Lab	0	0	1	1
13	TMC203	Machine Design and Manufacturing Processes	3	0	0	3
14	TMC204	Machine Design and Manufacturing Processes Lab	0	0	1	1
15	TMC205	Applied Thermodynamics,	3	0	0	3
16	TMC206	Applied Thermodynamics Lab	0	0	1	1
17	TMC207	Automotive Mechanics for Electric Vehicles	2	0	0	2
18	TEC205	Digital Signal Processing	2	0	0	2
19	TEC206	Digital Signal Processing Lab	0	0	1	1
20	TEE207	Fundamentals microcontroller	2	0	0	2

Sl. No	Course Code	Elective Courses	L	T	P	Cr
1	TMC201	Solid Mechanics/Basic Concepts ofMechatronics	2	0	0	2
2	TMC202	Solid Mechanics Lab/Basic Concepts of Mechatronics lab	0	0	1	1
3	TEC203	Foundations of EV & Hybrid Vehicles (L&T)	2	0	0	2
4	TEC204	Foundations of EV & Hybrid Vehicles Lab	0	0	1	1
5	TMC101	Engg. Mechanics	2	0	0	2
6	TMC102	Engg. Mechanics Lab	0	0	2	1
7	TEE203	Control system-I	2	0	0	2
8	TEE204	Control System-I lab	0	0	1	1
9	TEE207	Advance Control System-1	2	0	0	2
10	TEE208	Advance Control System-1 lab	0	0	1	1
11	TMC301	Fluid Mechanics and Kinematics & Dynamics of Machines	3	0	0	3
12	TMC302	Fluid Mechanics and Kinematics & Dynamics of Machines Lab	0	0	1	1
13	TMC303	Theory of Finite Element Methods,	3	0	0	3
14	TMC304	Theory of Finite Element Methods Lab	0	0	1	1
15	TMC305	EV Mechanical Design, Development & Analysis	2	0	0	2
16	TMC306	EV Mechanical Design, Development & Analysis Lab	0	0	1	1
17	TEE301	Electromagnetic Field Theory	2	0	0	2
18	TEE302	Electromagnetic Field Theory lab	0	0	1	1
19	TMC307	EV FEA Analysis	3	0	0	3

Sl. No	Course Code		L	T	P	Cr
20	TMC308	EV FEA Analysis Lab	0	0	1	1
21	TMC309	Kinematics and Theory of Machines	3	0	0	3
22	TMC310	Kinematics and Theory of Machines lab	0	0	1	1
23	TMC311	EV Product Development, Homologation & Hydrogen FCEV	3	0	0	3
24	TMC312	EV Product Development, Homologation & Hydrogen FCEV	0	0	1	1
25	TMC313	Mechatronics System	2	0	0	2
Sl. No	Course Code	Honours Courses	L	T	P	Cr
1	TMC401	EV Data Analytics & Cyber Security	3	0	0	3
2	TMC402	EV Data Analytics & Cyber Security	1	0	1	1
3	TMC403	Industrial Automation & Robotics	3	0	0	3
4	TMC404	Industrial Automation & Robotics Lab	0	0	1	1
5	TEE303	Power Electronics	3	0	0	3
6	TEE304	Power Electronics Lab	0	0	1	1

Minor courses

Minor (Relevant Discipline Baskets)

Sl. No	Course Code	Minor Course	L	T	P	Cr
		AIML Basket				
1	TAI103	Foundations to AI-ML	3	0	1	4
2	TAI201	Machine learning	3	0	1	4
3	TAI303	Computational lingustics & NLP	3	0	1	4
4	TAI405	Pattern recognition & Anamoly detection	3	0	1	4
		Data science Basket				
1	TDS103	Python for Data science and visualization	3	0	1	4
2	TDS301	Descriptive analytics	3	0	1	4
3	TDS203	Data Warehousing and Multidimensional Modeling	3	0	1	4
4	TDS401	Social and web analytics	3	0	1	4
		Cyber Security Basket				
1	TCC103	Network security	3	0	1	4
2	TCC201	Practical approah to cyber security	3	0	1	4
3	TCC403	Current trends in technology & its security & forensics aspects	3	0	1	4
4	TCC305	Cryptography	3	0	1	4
		Java Full stack Basket				
1	TFS203	UI/UX	3	0	1	4
2	TFS301	Backend Framework and API (Spring Boot & Micro Services)	3	0	1	4
3	TFS303	Adv Js framework using React.js (	3	0	1	4
4	TFS403	Android App Development	3	0	1	4

Minor (General Discipline Baskets)

Sl. No	Course Code	Minor Course	L	T	P	GP	Cr
		Innovation and Entrepreneurship	3	0	0	1	4
1	TMN103	Enterpenureship Development	3	0	0	1	4
2	TMN101	Innovation Management	3	0	0	1	4
3	TMN301	Opportunity Spotting and evaluation	3	0	0	1	4
4	TMN401	Industry and Market Research	3	0	0	1	4
		HR Management					
1		Human Resource Management: HR for People Managers	3	0	0	1	4
2		Senior Professional in Human Resources	3	0	0	1	4
3		HR Management and Analytics	3	0	0	1	4
4		Urban Environmental Governance (Smart and Eco cities)	3	0	0	1	4
		Financial Management					
1		Principles of Accounting	3	0	0	1	4
2		Financial Modeling	3	0	0	1	4
3		Business Intelligence	3	0	0	1	4
4		Managerial Economics	3	0	0	1	4
		Marketing Management					
1		Principles of Marketing Management	3	0	0	1	4
2		Digital and social media Marketing	3	0	0	1	4
3		Business strategy	3	0	0	1	4
4		Social media management	3	0	0	1	4

		General Proficiency					
		(General Proficiency shall be assessed based on the participation in NCC, NSS, Conferences (Research paper Publication (Journal/ Conference)), Organizing events, participation in events(conferences/Worksop/training/webinar/seminar) ,competitions (Inter University, State, National, International level) including Music, Debate, Sports, Hackathon and so on.)					
	TGP101	General Proficiency	0	0	1	1
	TGP102	General Proficiency	0	0	1	1
	TGP201	General Proficiency	0	0	1	1
	TGP202	General Proficiency	0	0	1	1
	TGP301	General Proficiency	0	0	1	1
	TGP302	General Proficiency	0	0	1	1
	TGP401	General Proficiency	0	0	1	1
	TGP402	General Proficiency	0	0	1	1

Skill courses

Sl. No	Course Code	Skill Course	L	T	P	Cr
1	TSE103	Engineering workshop on Automation and Mechatronics	0	0	0	3
2	TSE109	CAD Simulation and Finite Element Analysis (FEA):	0	0	1	3
3	TSE203	Model based Design on Mechatronics and simulation	0	0	1	3
4	TSE206	Minor Project	0	0	2	2
5	TSE301	Major Project	0	0	2	2
6	TSE401	Modelling & Simulation of Mechatronics System	0	0	3	3
7	TSE204	SolidWorks	0	0	3	3
8	TSE205	Troubleshooting and Debugging:	0	0	3	3
9	TSE206	Digital Literacy and Computational Thinking	0	0	3	3
10	TSE207	Foundation Course on MATLAB	0	0	3	3
11	TSE208	Robotics	0	0	3	3
12	TSE304	Circuit Debugging and Troubleshooting	0	0	3	3
13	TSE305	Microcontroller Programming and Interfacing	0	0	3	3
14	TSE306	Digital Embedded System (Foundation)	0	0	3	3
15	TSE307	Digital Embedded System (Advanced)	0	0	3	3

Multi-disciplinary courses

Sl. No	Course Code	Multidisciplinary Course	L	T	P	Cr
		Engineering Mathematics-1	2	0	0	2
		Engineering Mathematics-1 Lab.	0	0	1	1
		Engineering Chemistry	2	0	0	2
		Engineering Chemistry Lab.	0	0	1	1
		Engineering Mathematics-2	2	0	0	2
		Engineering Mathematics-2 Lab.				
		Engineering Mathematics-3	3	0	0	3
		Engineering Physics	2	0	0	2
		Engineering Physics Lab.	0	0	1	1
		General Biology	2	0	0	2
		General Biology Lab	0	0	1	1

Ability courses

Sl. No.	Course Code	Ability Enhancement Course	L	T	P	Cr
1		Communicative English-I	1	0	1	2
2		Arabic Language	1	0	1	2
3		French	1	0	1	2
4		German	1	0	1	2
5	TAE103	Design Thinking	0	0	1	1
6	TAE301	Employability planning & preparation – I	0	0	1	1
7	TAE302	Employability planning & preparation – II	0	0	1	1

Value-added courses

Sl. No	Course Code	Value-added Courses	L	T	P	Cr
1		Essence of Indian knowledge and Tradition (Happiness Connect program)	0	0	2	2
2		Induction program	0	0	0	1
3	TVA101	Sustainable Development Goal	1	0	0	1
4	TVA201	Disaster Management	0	0	1	1
5		Entrepreneurship development	2	0	0	2
6		Environmental Science	2	0	0	2
7		Indian Knowledge system	0	0	1	1
8		Green governance	1	0	0	1
9	TVA202	Constitution of India	0	0	1	1
10	TVA301	Universal Human Value	0	0	0	1
11		Circular Economy	1	0	0	1
12		Vedic mathematics	1	0	0	1

Optional (Any one can be opted)
Second Major
(Computer science and Engineering)

Sl. No.	Course Code	Courses	L	T	P	Cr
1	TCS103	Python Programming	3	0	1	4
2	TCS104	Data structure using 'C'	3	0	1	4
3	TCS201	Computer Organization and Architecture	3	0	1	4
4	TCS203	Object oriented programming using java	3	0	1	4
5	TDS101	Data Analytics	3	0	1	4
6	TCS305	Database Engineering	3	0	1	4
7	TCS207	Computer Networks	3	0	1	4
8	TCS209	Operating Systems	3	0	1	4
9	TCS301	Internet and web technology	3	0	1	4
10	TCS303	Theory Of Computation	3	0	1	4
11	TCS205	Algorithm design and analysis	3	0	1	4
12	TCS307	Project management for professionals	3	0	1	4
13	TAI103	Foundations to AI-ML (IBM)	3	0	1	4
14	TAI201	Machine learning	3	0	1	4
15	TDS203	Datawarehouse and multi-dimentional modeling	3	0	1	4
16	TDS303	Predictive analytics	3	0	1	4

		Second major (Electrical Engineering)				
Sl. No	Course Code	Core Course	L	T	P	Cr
1	TEE303	Power Electronics	3	0	1	4
2	TEE213	Electrical Measurement & Instrumentation	3	0	1	4
3	TEE209	Power System protection and switchgear	3	0	1	4
4	TEE316	Electric Power Transmission and Distribution	3	0	1	4
5	TEE311	Industrial Automation and Control	3	0	1	4
6	TEE317	Vehicle Dynamics	3	0	1	4
7	TEE318	Electric Drives	3	0	1	4
8	TEE319	Renewable Power Generation Systems	3	0	1	4
9	TEE214	Power Systems – I (Apparatus and Modelling)	3	0	1	4
10	TEE215	Power Systems – II (Operation and Control)	3	0	1	4
11	TEE401	Vehicle Dynamics	3	0	1	4
12	TMC403	Automotive Electrical and Electronics System	3	0	1	4
13	TEE407	Automotive Pollution and Control	3	0	1	4
14	TEE408	Vehicle Body Engineering	3	0	1	4
15	TEE307	Design of Vehicle Components	3	0	1	4
16	TEE410	Optimization in Engineering	3	0	1	4

		Second major (Electronics and communication Engineering)				
Sl. No	Course Code	Core Course	L	T	P	Cr
1	TEC213	Signals and Systems	3	0	1	4
2	TEC214	Analog Communication technique	3	0	1	4
3	TEC215	Digital Communication Technique	3	0	1	4
4	TEC216	Telecommunication Network and Optimization	3	0	1	4
5	TEC217	VLSI Design	3	0	1	4
6	TEC314	Mobile Communication and Networks	3	0	1	4
7	TEC315	Microwave Theory and Techniques	3	0	1	4
8	TEC316	Fiber Optic Communications	3	0	1	4
9	TEC317	Digital Audio Processing	3	0	1	4
10	TEC318	Adaptive Signal Processing	3	0	1	4
11	TEC408	Antennas and Propagation	3	0	1	4
12	TEC409	Advanced Mobile Communications	3	0	1	4
13	TEC410	Digital Image Processing	3	0	1	4
14	TEC411	Satellite Communication	3	0	1	4
15	TEC412	High Speed Electronics	3	0	1	4
16	TEC413	Nanoelectronics	3	0	1	4

Breakup of Credits

Sl. No	Category	Breakup of Credits
1	Major Elective	103
2	Minor Elective	32
3	Multidisciplinary	15
4	Ability Enhancement Courses (AEC)	11
5	Skill Enhancement Courses (SEC)	16
6	Value Added Courses common for all UG	9
7	Summer Internship	7
8	General Proficiency	8
	Total	201

(General Proficiency shall be assessed based on the participation in NCC, NSS, Conferences (Research paper Publication (Journal/ Conference)), Organizing events, participation in events(conferences/Worksop/training/webinar/seminar) ,competitions (Inter University, State, National, International level) including Music, Debate, Sports, Hackathon and so on.)