

MINUTES
OF
THE JOINT MEETING OF 120TH IPPC AND 125TH IUPC
OF
INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI



Time: 11.00 A.M.
Date: 27 May, 2022 (Friday)
Venue: Senate Hall

INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
MINUTES OF THE JOINT MEETING OF 120th IPPC AND 125th IUPC HELD ON 27 MAY, 2022

Sl. No.	Items	Page Number	Annexures Page Number
1.	Confirmation of the Minutes of the Joint Meeting of 119th IPPC and 124th IUPC held on 29 April, 2022.	4	Separately provided
2.	Action Taken Report on the decisions of the Joint Meeting of 119th IPPC AND 124th IUPC held on 29 April, 2022..	4	7
Items for Discussion and Approval			
3.	To consider the results of Jan-May 2022 semester	4-5	8-24
Any other matter with the permission of the Chair			
4.	To consider proposals from the Department of Electronics and Electrical Engineering	5-6	25-38

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The Joint meeting of the One Hundred and Twentieth Meeting of the Institute Postgraduate Programme Committee (IPPC) and One Hundred and Twenty Fifth Meeting of the Institute Undergraduate Programme Committee (IUPC) was held on 27th May, 2022 and the following members were present:

1.	Prof. Chitrakleha Mahanta, Dean	Academic Affairs	Chairperson
2.	Prof. K. V. Krishna, Associate Dean (Postgraduate)	Academic Affairs	Vice- Chairman, IPPC
3.	Prof. Biman B. Mandal, Associate Dean (Undergraduate)	Academic Affairs	Vice- Chairman, IUPC
4.	Dr. Kusum K Singh, Assistant Professor	Biosciences and Bioengineering	Member, IUPC
5.	Dr. Rishikesh Kulkarni, Assistant Professor	Electronics and Electrical Engineering	Member, IUPC
6.	Dr. Ramesh K. Sonkar, Associate Professor	Electronics and Electrical Engineering	Departmental Representative
7.	Prof. L. M. Kundu	Chemistry	Member, IUPC
8.	Dr. Poonam Kumari, Associate Professor	Mechanical Engineering	Member, IUPC
9.	Prof. Bulu Pradhan	Civil Engineering	Member, IPPC
10.	Dr. T. Venkatesh, Associate Professor	Computer Science and Engineering	Member, IPPC
11.	Dr. Sanasam Ranbir Singh, Associate Professor	Computer Science and Engineering	Member, IUPC
12.	Dr. Pankaj Kalita, Associate Professor	School of Energy Science & Engineering	Member, IPPC
13.	Dr. Ranjith Thangavel, Assistant Professor	School of Energy Science & Engineering	Member, IUPC
14.	Dr. Siddhartha Singha, Assistant Professor	School of Agro & Rural Technology	Member, IPPC
15.	Dr. Shyamashree Upadhyay, Assistant Professor	Mathematics	Member, IUPC
16.	Prof. Shakuntala Mahanta	Humanities and Social Sciences	Member, IPPC
17.	Dr. Vipul Dutta, Assistant Professor	Humanities and Social Sciences	Member, IPPC
18.	Prof. Sambit Mallick	Humanities and Social Sciences	Member, IUPC
19.	Dr. Pankaj Tiwari, Associate Professor	Chemical Engineering	Member, IPPC
20.	Dr. R. Anandalakshmi, Associate Professor	Chemical Engineering	Departmental Representative
21.	Dr. Sandeep Reddy Basireddy, Asst. Professor, Department of Mechanical Engineering	Center for Intelligent Cyber Physical Systems (CICPS)	Member, IPPC
22.	Dr. Pratyosh Kumar, Associate Professor	Mathematics	Member, IPPC
23.	Dr. Ayon Ganguly, Assistant Professor, Department of Mathematics	Secretary IMPC2021	Member, IPPC
24.	Dr. S. Banerjee, Assistant Professor	Design	Member, IPPC
25.	Dr. Urmi Ravindra Salve, Associate Professor	Design	Departmental Representative
26.	Prof. Siddhartha Pratim Chakrabarty, Department of Mathematics	Mehta Family School of Data Science and Artificial Intelligence	Member, IPPC
27.	Dr. Subhajit Choudhury, Assistant Registrar & HoS	Academic Affairs	Non-Member Secretary

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The agenda for the day is taken up as below:

Item 1: Confirmation of the Minutes of the Joint Meeting of 119th IPPC and 124th IUPC held on 29 April, 2022.

The draft of the Minutes of the Joint Meeting of 119th IPPC and 124th IUPC held on 29 April, 2022 has been circulated for confirmation (Separately provided).

The members had no comments/observations and confirmed the same.

R.120-IPPC/125-IUPC/1/2022: The IPPC/IUPC **RESOLVED** that the Minutes of Joint Meeting of 119th IPPC and 124th IUPC held on 29 April, 2022 be **APPROVED**.

Item 2: Action taken report on the decisions of the Joint Meeting of 119th IPPC and 124th IUPC held on 29 April, 2022.

The IPPC/IUPC examined the Action Taken Report on the decisions of the Joint Meeting of 119th IPPC and 124th IUPC held on 29 April, 2022.

Accordingly, the Action Taken Report as placed at **Annexure 120-IPPC/125-IUPC/2** (Page No. 7) was confirmed.

R.120-IPPC/125-IUPC/2/2022: The IPPC/IUPC **RESOLVED** that the Action Taken Report on the decisions of of the Joint Meeting of 119th IPPC and 124th IUPC held on 29 April, 2022 be **APPROVED**.

Items for Discussion and Approval

Item 3: To consider the results of Jan-May 2022 semester.

The consolidated report regarding results of Jan-May 2022 semester is placed below. The detailed results are placed at **Annexure 120-IPPC/125-IUPC/3** (Page No. 8-24).

Total No. of Courses Floated	AS	AA	AB	BB	BC	CC	CD	DD	FA	FD	FP	I	X	NP	PP
494*	233	3092	5156	5397	3883	2242	1199	759	196	4	272	108	40	23	1001

*Grade reports of some courses were not submitted.

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It was observed that grades of many courses were not submitted by due date. The IPPC noted with concern that the Academic Affairs Section had to request the individual faculty members, HODs/HOCs, IPPC/IUPC secretaries for submission of grades even after 10 (Ten) days of last date of grade submission. The list of courses for which the grades were not received by the time the meeting was conducted were listed in the Annexure. The DPPC/DUPC/CPPC/SPPC secretaries were requested to be proactive.

Following were further observed by the IPPC/IUPC:

- In **CS 348** course, the number of Outstanding grade (**AS**) is quite high (42 out of 117 students).
- In **DD 325** course, the majority is incomplete grade (**X** grade is 35 out of 47 students).
- In **DD 326** course, there are 9 students and all are awarded with **AA**.
- In **DD 214** course, the **BB** grade is too high (44 out of 55 students.)
- In **BT 208** course, the **AA** grade is too high (41 out of 64 students).

The IPPC/IUPC suggested that distribution of grades ideally should be normal and not skewed.

R.120-IPPC/125-IUPC/3/2022: The IPPC/IUPC **RESOLVED** that the results of Jan-May 2022 semester be **APPROVED**.

Any other matter with the permission of the Chair

Item 4: To consider proposals from the Department of Electronics and Electrical Engineering

The IPPC/IUPC examined the proposals from the Department of Electronics and Electrical Engineering as placed at **Annexure 120-IPPC/125-IUPC/4** (Page No. **25-38**) and deliberated the following:

1. The first proposal of new electives has been deferred for taking up in the IPPC meeting dedicated for new courses
2. Revision of the elective course: **EE653 Modeling and Simulation of Dynamic Systems** is accepted and approved (Annexure Page No. 25-26).
3. Revision of the course structure of M Tech Systems, Control and Automation (SCA) specialization be approved and recommended to the Senate subject to the submission of the revised proposal as per suggestions of the IPPC (Annexure Page No. 27-38).

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Further, the IPPC/IUPC reiterated that proposals needed to be accompanied by clear recommendations from concerned Departments/Centres/Schools.

R.120-IPPC/125-IUPC/4/2022: The IPPC **RESOLVED** that the proposal from the Department of Electronics and Electrical Engineering for revision of the elective course EE653 Modeling and Simulation of Dynamic Systems be **APPROVED**. Further, the IPPC **RESOLVED** that revision of the course structure of M. Tech Systems, Control and Automation (SCA) specialization be **APPROVED** and **RECOMMENDED** to place in the Senate subject to the submission of the revised proposal.

The meeting ended with thanks to the chair.

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INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
Academic Affairs Section**Sub.: Follow-up actions in respect of the joint meeting of the 119th IPPC and 124th IUPC**

The action taken/to be taken by the Academic Affairs Section on some of the decisions of the Joint meeting of the One Hundred and Nineteenth Meeting of the Institute Postgraduate Programme Committee (IPPC) and One Hundred and Twenty Fourth Meeting of the Institute Undergraduate Programme Committee (IUPC) held on 29th April, 2022 are as follows:

Resolution No	Item	Status of Action Taken/ Action Needed to be taken
<u>R. 119-IPPC/124-IUPC/1/2022</u>	Confirmation of the Minutes of the 118th Meeting of the Institute Postgraduate Programme Committee (IPPC), held on 16th February, 2022.	Not an item for Action Taken.
<u>R. 119-IPPC/124-IUPC/2/2022</u>	Action Taken Report on the decisions of the 118th Meeting of the Institute Postgraduate Programme Committee (IPPC), held on 16th February, 2022.	Not an item for Action Taken.
<u>R. 119-IPPC/124-IUPC/3/2022</u>	Confirmation of the Minutes of the 123rd Meeting of the Institute Undergraduate Programme Committee (IUPC), held on 16th February, 2022.	Not an item for Action Taken.
<u>R. 119-IPPC/124-IUPC/4/2022</u>	Action Taken Report on the decisions of the 123rd Meeting of the Institute Undergraduate Programme Committee (IUPC), held on 16th February, 2022.	Not an item for Action Taken
<u>R. 119-IPPC/124-IUPC/5/2022</u>	To consider the draft policy for considering the credits for Swayam NPTEL-MOOCs.	The policy has been approved by the Senate in its 161 st meeting and it will be placed in the BOG for further approval.
<u>R. 119-IPPC/124-IUPC/6/2022</u>	To consider the revised proposal for a new MS(R) programme in Polymer Science and Technology from the Centre for Sustainable Polymers.	The proposal has been approved by the Senate in its 161 st meeting and it has been already approved by the BOG.
<u>R. 119-IPPC/124-IUPC/7/2022</u>	To consider the proposal for a new M.Des programme in Electronic Product Design from the Department of Design.	The proposal has been approved by the Senate in its 161 st meeting and it has been already approved by the BOG.
<u>R. 119-IPPC/124-IUPC/8/2022</u>	To consider the proposals of disciplines in the Ph.D Transcript from various departments/centres/schools.	To be implemented from the 24 th Convocation of the Institute.
<u>R. 119-IPPC/124-IUPC/9/2022</u>	To consider the proposal with implementation modalities of Online Master's Degree programmes.	The Senate in its 161 st meeting has approved the modalities as the guidelines for making proposals for Online Master's Degree programmes.

Grades for Jan-May 2022 semester (till 27.05.2022)

Sl. No.	Course No	Course Name	AS	AA	AB	BB	BC	CC	CD	DD	FA	FD	FP	I	X	NP	PP
1	BT 202M	Molecular Biotechnology	1	1		1		1			1						
2	BT 206	Microbiology		1	5	37	12	7	1	1							
3	BT 207	Genetic Engineering	1	1	6	7	8	12	9	16			7				
4	BT 208	Transport Phenomenon in Bioprocesses	4	41	15	2		2									
5	BT 209	Bioreaction Engineering		2	4	12	9	26	8	3							
6	BT 211	Basic Biotechnology Lab	10	29	17	6	1										
7	BT 305	Computational Biology	1	2	10	5	10	10	21	2			1				
8	BT 306	Bioseparation Engineering		20	14	16	7	2	2	2							
9	BT 307	Biological Data Analysis		4	2	11	13	15	8	9							
10	BT 308	Bioengineering		9	17	13	19	7	2	1							
11	BT 402	BTech Project-II	1	16	13	5	3	2	2	2							
12	BT 403	Human Biology and Diseases		1	3												2
13	BT 411	Metagenomics		5	10	9	9	6		1							
14	BT 412	Enzymology		13	9	9	7	3									
15	BT 416	Bioenvironmental Engineering		6	8	10	8	6									1
16	BT 420	Drug Design and Discovery	1	3		1											
17	BT 502	Quantitative Biology		9	20	15	10						1				
18	BT 504	Biomolecular and Cellular Process Engineering	10	16	22	2	2							1			
19	BT 520	Applied Biology and Bioengineering Lab		17	16	15	1						1				1
20	BT 601	Analytical Biotechnology	3	30	17	23	7							4			
21	BT 605	Gene Therapy		3	5	6	9	1	1		1						
22	BT 608	Microbial Biotechnology		17	12	2	4	8	2	1							
23	BT 609	Bioprocess Engineering		6	7	4										1	
24	BT 619	Essentials of Genetics		14	13	5	1				1						
25	BT 621	Advances in Plant Genetic Engineering and Functional Genomics	3	13	7	6											
26	BT 622	Biofuels		8	4		1	1									
27	BT 630	Physical Cell Biology		2	3	8	5	3	4	3							
28	BT 634	Animal Models in Biomedical Research		21	6						1						
29	BT 639	NMR Spectroscopy: Principles and Applications			2						1						1

Sl. No.	Course No	Course Name	AS	AA	AB	BB	BC	CC	CD	DD	FA	FD	FP	I	X	NP	PP
30	BT 640	Neural Imaging and Signal Systems			2	3	3										
31	BT 643	Biointerface Engineering	1	5	1												2
32	BT 651	Quantum Chemistry of atoms and molecules					1								1		
33	BT 699	M. Tech Project II (MTP II)	1	17	5	3	2			1				13			
34	CE 201	Surveying		14	20	40	17	7	1	5	2						
35	CE 205	Structural Analysis I		2	6	6	13	19	29	25			4				
36	CE 206	Geotechnical Engineering		9	20	26	24	11	6	5	2		4				
37	CE 213	Surveying Laboratory		14	39	40	11				2						
38	CE 215	Geotechnical Engineering Laboratory		24	45	19	14	4			2						
39	CE 220	Hydraulics and Hydraulic Structures	5	16	10	20	36	15						1			
40	CE 221	Hydraulics and Hydraulic Structures Laboratory		43	36	26								1			
41	CE 222	Environmental Engineering I		4	17	35	26	13	3		1	3	1				
42	CE 223	Environmental Engineering I Lab		3	32	48	16	2		3							
43	CE 308	Construction Technology and Management		2	3	24	36	14	6								
44	CE 309	Design of Steel Structures	1	19	16	19	23	7									
45	CE 320	Engineering Hydrology	1	14	22	22	17	10	2								
46	CE 321	Hydrology Laboratory		13	26	30	11	6									
47	CE 322	Transportation Engineering II		3	6	14	19	19	19	6							
48	CE 323	Transportation Engineering II - Laboratory		2	25	32	20	4	3		1						
49	CE 324	Mathematical Concepts and Applications in Civil Engineering		17	49	15	4										
50	CE 499	BTP Phase II	2	18	28	9	9	3	8	2			2	4			
51	CE 504	Advanced Structural Design		10	8	1	2	1					3				
52	CE 510	Quality and Safety Management in Construction		1	2	3	1				1						
53	CE 511	Analysis and Design of Bridges	1	7	7	13	12	3	4	2			6				
54	CE 514	Plates, Shells and Elastic Stability		1	3	10	4	2	1				2				
55	CE 524	Biological Process in Environmental Engineering					5	3	7	3			2				

Sl. No.	Course No	Course Name	AS	AA	AB	BB	BC	CC	CD	DD	FA	FD	FP	I	X	NP	PP
56	CE 525	Solids and Hazardous Waste			11	10	2										
57	CE 533	Advance Foundation Engineering	2	5	5	8	2	1			1						
58	CE 534	Seminar Course		3	7	7	2	2			1						
59	CE 544	Project Management Laboratory		2		2					1						
60	CE 552	Water Resources Systems Analysis, planning & Management		3	8	3	5						1				
61	CE 555	Principles of Water Quality and EIA		6	10	2											
62	CE 556	Subsurface Hydrology		9	15	13	7	10	4								
63	CE 559	Watershed Management and Remote Sensing Applications		3	4	11	3	1					2				
64	CE 583	Pavement Analysis and Design		2	3	10	4				1						
65	CE 584	Traffic Engineering		1	3	6	5	4			1						
66	CE 585	Credit Seminar		1	6	7	3				1						
67	CE 594	Geohazards Science and Engineering		6	11	14	5	3	2	9	1						
68	CE 595	Advanced Techniques in Geosciences	1	1	6	4							2				
69	CE 606	Earthquake Engineering	2	7	5	4	4						1				
70	CE 607	Random Vibration		6							1						2
71	CE 608	Reliability based Structural Design		1		2	1	1	2	3			2				
72	CE 610	Computational Structural Mechanics		2		4											
73	CE 612	Advanced Concrete Technology			1	2	2	1			1						
74	CE 614	Financing Infrastructure Projects			2	4	1						1				
75	CE 615	Design of Masonry Structures		5		2					1						
76	CE 618	Mechanics of Unsaturated Soils	1	1	5	4	10	11	20	11			1				
77	CE 623	Pavement Evaluation, Rehabilitation and Maintenance	1	3	4	4	2	1			1						
78	CE 624	Highway construction practise		4	11	10	7	2	1	1	1						
79	CE 628	Traffic Flow Modelling and Simulation		1	4	6	4	1			1						

Sl. No.	Course No	Course Name	AS	AA	AB	BB	BC	CC	CD	DD	FA	FD	FP	I	X	NP	PP
80	CE 642	Subsurface Investigation and Instrumentation	1	9	9	15	8	2	6	7	1		1				
81	CE 646	Rock Mechanics		2	8	11	4	5	2					2			1
82	CE 664	Industrial Wastewater Pollution Control		2	6	11	4		4								
83	CE 665	Water Distribution and Wastewater Collection System Design	1	3	4	5	12	10									
84	CH 211	Industrial Chemistry		10	9	17	6	13	1								
85	CH 222	Applied Organic Chemistry		9	20	16	10	1									
86	CH 223	Chemical Technology Lab - I (Organic)		43	10	2											
87	CH 224	Group Theory		2	1	2	10	5	10	15			11				
88	CH 233	Spectroscopic Techniques in Chemistry		2	6	8	14	10	12	3							
89	CH 323	Polymer Chemistry		6	8	13	12	4	5	1							
90	CH 332	Computational Chemistry		1	13	11	5	3	8	6			2				
91	CH 334	Chemical Technology Lab - III (Physical)		19	24	5											
92	CH 335	Application of Nanomaterials		10	25	5	8	1	2								
93	CH 400	Computers and Chemistry		3	9	3	12	10	15	2	1						
94	CH 411	Inorganic Reaction Mechanism and Organometallics		6	22	7	8	7	4					1			
95	CH 418	Biological Chemistry of Metal Ions		6	9	9	5	7	7				1				
96	CH 419	Consumer Chemistry		80	163	55	3										
97	CH 421	Organic Reactions Mechanisms		11	17	14	11	1			1						
98	CH 425	Organic Chemistry Laboratory		13	24	15	2				1						
99	CH 428	Drug Design and Development		7	17	6	8	3			1						
100	CH 432	Chemical Dynamics and Electrochemistry	1	5	7	23	10	7		1	1						
101	CH 433	Applications of Spectroscopy		5	16	22	11							1			
102	CH 437	Chemical Approaches to Nanoscale Science and Technology		10	21	9	2			1							
103	CH 438	Application to Statistical Mechanics to Chemistry		1		1											
104	CH 499	Project - II		23	14	1	4							1			
105	CH 500	Graduate Seminar		16	19	24											

Sl. No.	Course No	Course Name	AS	AA	AB	BB	BC	CC	CD	DD	FA	FD	FP	I	X	NP	PP
106	CH 600	Project		31	26	2											
107	CH 613	Applied Inorganic Chemistry		13	5	13	4	3					1				
108	CH 617	Organometallics		2	2	1	1										
109	CH 618	Bio-inorganic Chemistry		5							2						
110	CH 621	Modern Reagents in Organic Synthesis		25	11	5	1	1									
111	CH 623	Supramolecular Chemistry		2	11	1										1	1
112	CH 627	New Reagents for Organic Synthesis		5	4	2	1						1				
113	CH 629	Advances in Bio-organic Chemistry	1	3	2	2											
114	CH 636	A Fundamental Approach to Physical Chemistry		2							1						
115	CH 639	Principles and Applications of Molecular Fluorescence	2	9	10	5								4			
116	CH 644	Applied Quantum Chemistry		2	3	2	1				1						
117	CL 205	Mass Transfer Operations I		1	4	43	36	1		1							
118	CL 206	Solid Fluid Operations		16	49	15	5			1							
119	CL 207	Computer Aided Numerical Methods		8	42	20	13	2	1	1							
120	CL 208	Chemical Reaction Engineering I		3	23	35	15	2	8								
121	CL 209	Process Equipment Design I		21	32	16	16										
122	CL 210H	Laboratory 1: Fluid Mechanics		6	27	37	15										
123	CL 211H	Laboratory 2: Heat Transfer		4	20	37	17	5	1	2							
124	CL 304	Chemical Process Technology		9	26	28	3	3		7							
125	CL 305	Transport Phenomena		4	10	25	15	16	5	1							
126	CL 306	Process Engineering & Economics	5	5	10	10	28	7	5	6							
127	CL 312	Computer Aided Process Equipmen Design		12	46	17	2										
128	CL 313	Laboratory 4: Mass Transfer		23	31	18	3	1									
129	CL 314H	Laboratory 5: Reaction Engineering		2	40	26	8	1									
130	CL 315H	Laboratory 6: Process Control		29	32	15											
131	CL 399	General Learning of Chemical Engineering Research Project - II				1					4						

Sl. No.	Course No	Course Name	AS	AA	AB	BB	BC	CC	CD	DD	FA	FD	FP	I	X	NP	PP
132	CL 499	Project II		12	5	1	3	2	1					1			
133	CL 503	Advanced Thermodynamics		11	23	24	1	1			3						
134	CL 504	Advanced reaction Engineering		13	16	19	8	4			1			2			1
135	CL 505	Petroleum Production Engineering		2	4	14	10	2						1			
136	CL 506	Smart Materials		4	9	7	7	1	1								
137	CL 514	Fundamentals of Material Science & Engineering		3	9	8	5	8	2	2							
138	CL 598	Petroleum Laboratory		27	5								1				
139	CL 599	Scientific Communications		3	6	10	23	19						1			
140	CL 612	Colloid and Interface Science		4	20	39	17	3	1				1				1
141	CL 613	Computational Fluid Dynamics		2	1			1			1						1
142	CL 615	Optimization Techniques			1		2			1							
143	CL 619	Refinery process design			2												
144	CL 622	Molecular simulations: Principles and Applications		4	3	1	2							1			
145	CL 625	Fundamentals of micro-nanofluidics & microfabrication	1	7	7	5	2	1									
146	CL 626	Energy Resources		4	18	28	24	7	2								
147	CL 627	Multiphase flow			1	2	2	1									
148	CL 628	Catalysis and adsorbents	1	4	7	13	17	18	3								
149	CL 634	Applied Rheology		3	3	22	11	1								1	2
150	CL 636	Microelectronic fabrication		3	1	3	1										2
151	CL 640	Research Methodology and Scientific Writing		10	9	10	3				2						
152	CL 643	Computer aided applied optimization	3	3		1	1									1	
153	CL 651	Foundations of Data Science for Engineers	2	6	11	63	17	22	3	1			1			1	10
154	CS 205	Formal Languages, Automata Theory, and Computation		5	10	18	15	39	27	9			5				
155	CS 206M	Datastructures and Algorithms	2		2	9	7	11	6	10			3				
156	CS 207	Design and Analysis of Algorithms		16	19	33	37	13	8				3				
157	CS 223	Computer Architecture and Organization		3	28	42	59	19	17	18			18				
158	CS 224	Hardware Lab		14	23	39	22	14	7	5	1						
159	CS 245	Database Management Systems		4	17	68	65	29	14	4			1			1	

Sl. No.	Course No	Course Name	AS	AA	AB	BB	BC	CC	CD	DD	FA	FD	FP	I	X	NP	PP
160	CS 246	Database Management Systems Lab		48	79	28	17	12	7	12							
161	CS 331	Programming Languages Lab		34	67	4	1	1	2	1			1				
162	CS 345	Software Engineering		11	21	19	15	23	14	10	1						
163	CS 346	Software Engineering Lab		27	52	29	5				1						
164	CS 348	Implementation of Programming Languages Lab	42	13	35	13	1	3	6	4							
165	CS 350M	Computer Systems		3	7	16	16	8	4								2
166	CS 361	Machine Learning		15	34	43	19			1						1	2
167	CS 499	Project II	3	14	18	14	5	5	4	5							
168	CS 506	Hierarchical Memory Algorithms	5	10	6	7	11	8	18	5			3				
169	CS 508	Optimization Methods		4	10	19	16	11	6	5			2			1	1
170	CS 528	High Performance Computing		26	58	58	79	32	3	3			1	2			
171	CS 529	Topics and Tools in Social Media Data Mining		5	11	23	37	11						5			
172	CS 534	Approximation Algorithms		1	1	2											
173	CS 544	Topics in Networks		1	9	24	37	8	2	3			1				
174	CS 549	Computer and Network Security		7	6	7	4	2		2			1	1			
175	CS 558	Computer Systems Lab		2	10	36	16		2		1			1			1
176	CS 577	C Based VLSI Design	2	22	20	12	15	4	1		1			1			1
177	CS 595	Data Visualization Lab		3	4	4	6	3	2	3				1			
178	DA 526	Image Processing with Machine Learning		4	4	3	4										2
179	DA 546	Introduction to Statistical Learning		2	7	21	9	2					1			2	
180	DA 671	Introduction to Reinforcement Learning		3	6	5	3									2	1
181	DD 212	Visual Narratives	3	8	11	12	9	8		2			1				
182	DD 214	Design Workshop		9		44					1		1				
183	DD 215	Cognitive Ergonomics		15	21	8	4	4			1						
184	DD 216	BDes Project I	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0
185	DD 220M	Introduction to Ergonomics			3	4	7	8	5	1	3		1				
186	DD 303	Typography and Grid Systems		6	11	20	7	5	2		1						
187	DD 311	Systems approach to Design		1		15	21	13	3	3			3				
188	DD 312	Design Evaluation Methods		1	7	14	11	12	8	5							
189	DD 320M	Product Planning and Strategy		4	9	15					3						

Sl. No.	Course No	Course Name	AS	AA	AB	BB	BC	CC	CD	DD	FA	FD	FP	I	X	NP	PP
190	DD 322	Animation Fundamentals				1									2		
191	DD 324	(PD) Plastics & Composites		1				2		1			1				
192	DD 325	(VC) Graphic Communication	6	4	1	1									35		
193	DD 326	(TD) Introduction to Automobile Design		9													
194	DD 398	BDes Project II		13	7	7	5	2	2					29			
195	DD 411	Design and Entrepreneurship		21	20												
196	DD 499	BDes Project IV	3	8	9	15	1		2				3	1	1		
197	DD 505	Form Studies		7	10	13					1						
198	DD 507	Design Project		8	16	6	1							1			
199	DD 509	Interaction Design		8	12	10					1						
200	DD 514	Collaborative Design Methods in New Product Development	6	16	10	12	8	3		4	1						
201	DD 516	Digital Human Modelling and Simulation in Product Design		6	5	3	1				2						
202	DD 517	Automobile Design				4											
203	DD 524	Graphic Design Studio		1	4	6	4										1
204	DD 532	Motion Graphics	9	18	16	4	1								1		
205	DD 605	Thesis Project (Phase II)	3	10	10	5	1	1						1			
206	DD 606	Product Detailing		1													
207	DD 709	Design-based Project			3	2											
208	DD 710	Research-based Project	1	1	3	4	1										
209	DM 503	Hazards monitoring and prediction	1		7	4											
210	DM 504	Research methodology and field visit		1	1	2	6	2									
211	DM 514	Financing for Disaster Risk Reduction (DRR)		3	3	2											
212	DM 515	Rehabilitation and Retrofitting of RC Structures			2	1	2										
213	DM 697	Project Phase 1			3									6			
214	EE 206	Analog Circuits	1	7	20	36	75	34	6	1			4				
215	EE 207	Analog Circuits Laboratory		37	35	53	33	17	5		1		3				
216	EE 213M	Digital Circuits	3	3	4	11	15	6	4	2							
217	EE 230	Probability and Random Processes	3	1	11	6	13	35	50	59			5				
218	EE 250	Control Systems		7	18	37	79	35	5				4				
219	EE 252	Measurement and Instrumentation		5	27	87	51	9	2		1			1			
220	EE 304	Design Lab						1	2								
221	EE 313	Microelectronics Laboratory		1	1	6	15	43	23	10	2		3				

Sl. No.	Course No	Course Name	AS	AA	AB	BB	BC	CC	CD	DD	FA	FD	FP	I	X	NP	PP
222	EE 314	Flexible and Printable Electronics	1	32	48	29	29	25		1							
223	EE 322M	Signal Processing		5	14	6	8	5	5	4							
224	EE 332	Digital Communication		2	4	18	16	39	20	4							
225	EE 333	Communication and DSP Laboratory		10	29	44	17	3		1							
226	EE 334	Computer networks		2	4	17	34	18	17	3			7				
227	EE 335	Information Theory & Coding	2	4	10	16	31	17	11	12							
228	EE 352	Advanced Control System	2	1	5	9	10	10	9	14			2				
229	EE 360	Power Electronics		8	11	12	16	9	6	1							
230	EE 370	Electrical Power Systems		2	6	14	16	8	11	4			1				
231	EE 371	Advanced Electrical Engg Lab		31	27	3	1										
232	EE 381	Electrical Machines Lab		3	17	24	19										
233	EE 390	Data structure and algorithms		32	95	23	8	5	1								1
234	EE 399	BTP II (New Curriculum)		4	7	1											
235	EE 499	B. Tech Project-IV	1	7	5	1	1	1						1			
236	EE 512	Analog IC Design	1	2	10	9	2				3						2
237	EE 515	VLSI System Design	1	1	9	7					3		2				
238	EE 516	VLSI DSP		3	4	7	6	2	1				4				
239	EE 517	VLSI Lab-II		4	13	4					2						
240	EE 518	VLSI Lab-III		10	6	1					2						
241	EE 521	Digital Signal Processing Lab		2	7	7			1		2						
242	EE 522	Statistical Signal Processing		1	8	7	5			2	2						
243	EE 525	Advanced Topics in Machine Learning		1	5	6	5				2						
244	EE 526	Machine Learning		1	7	9	5	4	2	1			1				2
245	EE 527	Machine Learning Laboratory		5	10	9					2						1
246	EE 533	Wireless Communications		1	8	11	4	1			2						
247	EE 534	Communication System Design Lab		2	7	10		1									
248	EE 535	Data Communication Network		3	4	7	3	2	1								
249	EE 541	Antennas, RF and Microwave Laboratory			3	2	5										
250	EE 543	Computational Electromagnetics		1	2	3	2	2			1						
251	EE 544	Photonics Devices and Circuits		2	4	2	1	2									1
252	EE 553	Optimal Control			4	1	1	1	1	1	2						

Sl. No.	Course No	Course Name	AS	AA	AB	BB	BC	CC	CD	DD	FA	FD	FP	I	X	NP	PP
253	EE 554	Nonlinear Systems and Control		3		3	2				1		2				
254	EE 555	Automation Laboratory	1	1	3	1					1		2				
255	EE 562	Power Electronics Applications in Power Systems		2	3	4	5	2	1		3						
256	EE 572	Power Engineering Laboratory		2	2	4	2				3						
257	EE 580	Electrical Machines and Drive Systems		4	5	2	2	2			1						
258	EE 592	Detection and Estimation Theory		2	4	7	6		4	1	2						
259	EE 595H	Stochastic Models		4	5	8	6						1				1
260	EE 596H	Optimization Techniques		5	7	8	2							1			1
261	EE 613	Radio Frequency Integrated Circuits		6	5	12	4	4	1		2						
262	EE 621	Computer Vision		19	27	71	51	8		2							
263	EE 622	Biomedical Signal Processing	1	2		3	3		2	1							
264	EE 627	Biometrics		9	6	24	17	9									
265	EE 633	Error Control Codes		1		4	3		1	1							
266	EE 634	MIMO Wireless Communications: Fundamentals and Advances			2	4	2	1									4
267	EE 643	Silicon Photonics		3	3	4											
268	EE 655	Mathematical Techniques for Control and Signal Processing		10	14	9			2	1	2						
269	EE 656	Robust Control		1	3	8	5	2		2	3						
270	EE 661	Power Electronics for Renewable Energy Systems				6	4	1			3						
271	EE 665	Power Electronic Systems for Electric Vehicles	2	5	8	26	25	12	20	7	2						
272	EE 674	Synchrophasor Technology		4	3	7	2						7				
273	EE 694	Introduction to Parallel Computing		17	34	36	29	6	3								
274	EN 671	Solar Energy Conversion Technology		11	38	81	69	83	40	5	1						
275	EN 674	Energy Economics, Planning and Management			4	7	6	1			2		1				
276	EN 697	Project 1		4	8	3											
277	HS 107	Problems of Philosophy		4	3	2	9	11	10	4							
278	HS 113	Cognitive Psychology		5	39	28	22	8	2	2							

Sl. No.	Course No	Course Name	AS	AA	AB	BB	BC	CC	CD	DD	FA	FD	FP	I	X	NP	PP
279	HS 114	Cultural Theory and Practice		1	1	2	1				2						
280	HS 119	Sociology of Science		10	22	21	13	9					1				
281	HS 123	Game Theory and Economics		15	16	6	16	8	9	8			3			2	
282	HS 125	Introductory Macroeconomics		10	18	25	5	1	5		2						
283	HS 134	Introduction to Archaeology		4	10	40	57	50	10		1						
284	HS 135	Topics in Bilingualism		26	24	45	42	11	1								
285	HS 136	Introduction to Indian Constitution and Political Processes		3	14	42	17	2									
286	HS 138	Psychology of Well Being		6	10	5	18	8	12	2			2				
287	HS 139	The Short Story: Theory and Perspectives			1	4	3	4	5	9			10				
288	HS 148	Development and its Discontents			8	13	12	11	6	6							
289	HS 217	Social History of Technology in Modern India		8	13	14				1							
290	HS 218	Ecology and Society		8	25	17	17	19	19	15							
291	HS 221	Management of Organization Behaviour		3	7	13	17	14	14	6							
292	HS 222	Philosophy of Science		1	3	2	1	2	1	1				1			
293	HS 229	Environmental Economics		1	5	2	4	8	3				1			1	
294	HS 232M	Linguistic Analysis			1	1	1	2		1	5						
295	HS 233	History of Contemporary India		6	18	22	21	11	9	1			1				4
296	HS 235	Writing Systems of the World		1	4	3	6	3	1								
297	HS 239	Economics of Uncertainty and Information		7	4	3	2	3	4								
298	HS 240	Literature and Science Writing		2	1			2	1	1							
299	HS 244	Indian Business History		3	23	41	35	9	2								
300	HS 251	Social Choice and Welfare		19	46	63	48	25	5	3							
301	HS 320M	Literature and Film: The Word and the Image	1	5	2	1											
302	HS 503	Sociology of Development		2	10	10	11	8	3		2						
303	HS 517	Comparative Politics of Developing Countries		1	13	7	15	7		1	2						
304	HS 523	Economic Development: Theory and Practice		3	12	11	16	2			2						
305	HS 524	Qualitative Research Methods in Social Sciences		21	14	11	9	7	3		2						1

Sl. No.	Course No	Course Name	AS	AA	AB	BB	BC	CC	CD	DD	FA	FD	FP	I	X	NP	PP
306	HS 525	India's Development: Issues and Debates		1	9	19	7	7					2				
307	HS 604	Development and Finance		1	5	5	2	1					1			2	
308	HS 606	Sociology of Gender		2	13	3	3										1
309	HS 699	Dissertation		8	10	10	2	1					1				
310	HS 706	Issues in Indian Economy		1													
311	HS 707	Invisible Exchanges		3	3	3	3										
312	HS 712	Introduction to Western Philosophy			2		1										
313	HS 714	Understanding Organizational Behaviour: Theory and Research				5											
314	HS 716	Research Methodology in Psychology				2	1										
315	HS 719	Philosophy of Religion		1		1	1										
316	HS 724	History in Indian Vernaculars			5												
317	HS 727	Issues in Historical Research		3	4												
318	HS 731	Heritage, Identity and Archaeology		4													
319	HS 732	Issues in Cultural Studies		3	2												
320	HS 733	Issues in Phonological Theory			1												
321	HS 734	Perspectives in Linguistics			1												
322	HS 735	Experimental Phonology			1												
323	HS 740	Issues in Applied Ethics: a multicultural approach		2		1											
324	HS 744	Labour Markets in Developing Countries			1												
325	HS 753	Topics in International Relations			1												
326	HS 763	Research Methods in Political Science				3											
327	HS 768	Bilingualism: language and cognition			1	1											
328	HS 771	Key Texts in Modern Political Thought			2	1											
329	HS 780	Understanding Social Movements			1	1											
330	HS 781	Approaches to Diplomatic and Military History			1												
331	HS 784	Acoustic Analyses of Tone Languages				1											

Sl. No.	Course No	Course Name	AS	AA	AB	BB	BC	CC	CD	DD	FA	FD	FP	I	X	NP	PP
332	IFST 017	Joint Degree Dissertation I		3	1	1											
333	LS 521	Phonetics and Speech												1			
334	LS 551	Introduction to Language Science			2												
335	MA 212M	Mathematical Statistics					2	11	18	17						1	1
336	MA 224	Real Analysis		2	7	8	11	15	24	12			1				
337	MA 252	Design and Analysis of Algorithms		2	5	7	9	36	7	13							5
338	MA 271	Financial Engineering I	2	11	20	10	15	16	4	1							
339	MA 312M	Modern Algebra		2	5	12	10	8		8		1					
340	MA 322	Scientific Computing		15	12	19	13	9	1	1							
341	MA 324	Statistical Inference and Multivariate Analysis		1	3	7	22	21	14	2							
342	MA 351	Theory of Computation		3	3	2	11	19	14	18							
343	MA 373	Financial Engineering II		9	11	14	19	13	2	3							
344	MA 374	Financial Engineering Laboratory		16	19	16	14	3	1	2							
345	MA 477	Financial Risk Management and Modelling		1	3	8	12	10	7	7							
346	MA 499	Project II	1	33	14	10	3	1									
347	MA 510	Combinatorics		1	2			1					1				
348	MA 512	Data Structures and Algorithms		2	9	13	15	14	3	2			6				
349	MA 542	Differential Equations		2	9	17	11	13	4	3							
350	MA 547	Complex Analysis	1	10	8	12	14	9	3	3							
351	MA 562	Mathematical Modelling and Numerical Simulation		14	11	15	16	14	6		1						
352	MA 571	Numerical Linear Algebra		1	4	6	11	13	9	10	2						1
353	MA 573	Numerics of Partial Differential Equations	1	1	4	5	15	15	2	6	1		1				
354	MA 588	R Programming Lab		3	14	4	1				1						
355	MA 590	Probability Theory		10	10	10	12	13	1	2							
356	MA 591	Optimization Techniques	3	2	5	9	10	16	8	2							
357	MA 597	Queueing Theory and Applications	1	2	4	14	22	8		1							
358	MA 601	Graphs and Matrices	3	8	9	21	16	9	2	1							
359	MA 617	Design and Analysis of Algorithms				1											
360	MA 618	Mathematics for Computer Science				1											
361	MA 619	Data Structures Lab		1													

Sl. No.	Course No	Course Name	AS	AA	AB	BB	BC	CC	CD	DD	FA	FD	FP	I	X	NP	PP
362	MA 621	Rings and Modules	2	1	2		5	2		5			2				1
363	MA 623	Introduction to Algebraic Geometry		1													
364	MA 625	Linear Algebra-I				1	2	1			1						
365	MA 642	Real Analysis A			4						2						
366	MA 645	Introduction to C* Algebras			1		1										
367	MA 650	Advanced Course on Hardy Spaces		2	2												
368	MA 651	Distributed Algorithms		2	8	7	5	4	3								
369	MA 652	Approximation Algorithms		4	4	7	7	4	5	3							
370	MA 662	Differential Equations			1		2				1						
371	MA 699	Project		19	20	6	5				2						
372	MA 746	Fourier Analysis		1		3	1	1			2						
373	ME 202M	Mechatronics		5	8	5											3
374	ME 221	Fluid Mechanics II		1	4	5	15	32	49	19			1				
375	ME 222	Manufacturing Technology I	1	1	15	16	60	26	3	3			3				
376	ME 223	Solid Mechanics II	1	3	23	40	33	14	5	2	3		2				
377	ME 224	Kinematics of Machinery	2	14	28	38	23	15	2	1			2				
378	ME 225	Mechanical Workshop II		58	45	15	4				2						
379	ME 226	Mechanical Engineering Lab II		12	39	49	22						3				
380	ME 302M	Fundamentals of Artificial Intelligence		2	1	2											
381	ME 321	Applied Thermodynamics	3	11	35	20	27	11		1							
382	ME 322	Machine Design		14	47	44	2		2								
383	ME 323	Mechanical Measurements		13	24	32	22	13	2	2							
384	ME 324	Industrial Engineering and Operations Reseach.		8	19	17	26	21	8	7			2	1			
385	ME 325	Control Systems		6	16	40	34	9	3				1				
386	ME 326	Mechanical Engineering Lab IV		15	55	33	7						1				
387	ME 399	BTech Project-II		28	39	34	4	1	1					2			
388	ME 499	Project-II		23	29	23	8		2	1				8			
389	ME 511	Engineering Materials and Characterization		2	7	17	17	1			7						
390	ME 513	Physics of Deformation Processes		5	7	12	10	9	4	3			5				
391	ME 515	Manufacturing Laboratory		12	10								3				
392	ME 522	Convective Heat Transfer		6	8	9	9	3					3				
393	ME 541	Continuum Mechanics			4	5	3	1	1	2							1
394	ME 542	Numerical Analysis		4	5	8	10	5	2				1				

Sl. No.	Course No	Course Name	AS	AA	AB	BB	BC	CC	CD	DD	FA	FD	FP	I	X	NP	PP
395	ME 544	Computational Mechanics Laboratory		3	3	2											
396	ME 552	Aircraft Propulsion		2	7	5		1			2						
397	ME 553	Gas Dynamics		5	4	4					2						
398	ME 554	Rocket Propulsion		1	5	4					2						
399	ME 605	Fracture Fatigue and Failure Analysis		5	15	21	12	1					7				
400	ME 607	Introduction to Composite Materials		2	8	12	4	3	1				6				
401	ME 612	Nuclear Energy: Concepts and Applications		2	4	9	10	8	5	2	1						
402	ME 615	Rotor Dynamics		7	10	5	1						6			1	2
403	ME 619	Fundamentals of Microfluidics	1	2	2	3	5										
404	ME 621	Refrigeration and Air conditioning		2	2	7	3	1	1				1				
405	ME 628	Additive Manufacturing		3	13	13	19	4	2				5				
406	ME 648	Viscous Fluid Flow		3	4	11	9	2					3				
407	ME 657	Two Phase Flow and Heat Transfer		2	1	4	5	3		1							
408	ME 668	Sports Biomechanics		1	2	1	2	1					1				
409	ME 670	Advanced Computational Fluid Dynamics		2	1	1											
410	ME 674	Soft Computing in Engineering	3	9	35	21	7	6		1			4			2	
411	ME 683	Computational Gas Dynamics		3	4	2											1
412	ME 688	Advanced machining processes		18	23	34	20	15	7	7	1						
413	NT 705	Recent Advances in Nanotechnology		6	2												
414	PH 202	Electromagnetics		2	4	11	12	17	8	2	1		1				
415	PH 204	Quantum Mechanics-I	2	4	1	3	7	14	11	15							
416	PH 206	Computational Physics	1	8	20	25	2	1									
417	PH 208	Digital electronics & microprocessors		4	6	3	15	13	14	4							
418	PH 210	General Physics Laboratory-I	1	9	27	16	4	1	1								
419	PH 282M	Engineering optics		1		3				1	6						
420	PH 302	Solid state physics		3	12	15	18	4		1							
421	PH 304	Measurement techniques		7	4	10	11	14	4	2			1				
422	PH 306	Lasers and Ultra Fast Optics		4	4	16	15	5	8								
423	PH 308	Nuclear science & technology		2	3	10	5	8	12	10	5						
424	PH 310	Advance Physics Laboratory		6	31	11	2	1		1							
425	PH 312	Mini Project	4	14	18	8	3	1	1	2			1	1			

Sl. No.	Course No	Course Name	AS	AA	AB	BB	BC	CC	CD	DD	FA	FD	FP	I	X	NP	PP
426	PH 402	Mathematical Physics-II	1	2	7	15	17	5	4	1	1						
427	PH 404	Statistical Mechanics		2	4	13	11	13	6	6			1				
428	PH 406	Quantum Mechanics-II			3	6	9	17	8	7			3				
429	PH 408	Measurement techniques		7	6	12	14	7	2	2			3				
430	PH 410	Electrodynamics-I				2	11	13	10	15	3						
431	PH 412	General Physics Laboratory-I		5	21	18	1	3	3	2							
432	PH 422	Project-II				1											
433	PH 442	Theory and Simulation of Nanostructures	1	2	4												
434	PH 451	Plasma Physics		1	3	12	5	6	7	2							
435	PH 452	Magnetic Recording	7	16	6	1	1			3							
436	PH 458	Applied superconductivity	2	5	7	9	8	8	4								
437	PH 464	Fundamentals of cosmology	2	4	3	9	9	3	5	7							
438	PH 466	Advanced Statistical Mechanics	1	1	2		1										
439	PH 499	Project II		8	9	2								2			
440	PH 516	Advance Physics Laboratory	4	12	21	8		1									
441	PH 518	Project-II	1	10	15	14	4										
442	PH 524	Thin Film Phenomena		3	5	5	10	5	1	2	1						
443	PH 527	Nanostructured Materials		13	8	6	7	1									
444	PH 541	Quantum computation & Quantum information	1	7	9	10	5	8	2							1	
445	PH 544	High Energy Physics		3	3	6	4		1	1			1			1	
446	PH 551	Nonlinear Dynamics and Chaos	1	2	1	5	1		1								1
447	PH 702	Electrodynamics		3	4	15	1										
448	PH 704	Fourier and waveguide optics			2	2	2										
449	PH 706	Experimental and Numerical Techniques		3	3	4	4	6	6	6			3				
450	PH 708	Mini project	1	23	11	2					2						
451	RA 505	Robot Sensing and Vision		31	190	163	36	3	1				2	1			2
452	RA 506	Machine Learning		2	6	10	10	5			2						1
453	RT 514	Water Resources Management		3	5	3	1				2						
454	RT 515	Natural Resources Management	0	4	3	2	2	1	0	0	0	0	0	0	0	0	0
455	SA 315	Yoga-4															924
		Total	233	3092	5156	5397	3883	2242	1199	759	196	4	272	108	40	23	1001

Grade not submitted till 27.05.2022

Sl. No.	Course Code	Course Name	Name of The Course Instructor
1.	CL 650	Quantum technologies in chemical engineering	Prof. Tapas Kumar Mandal
2.	DD 213	Art and Aesthetics in Design	Mr. Mriganka Madhukalya
3.	DD 216	BDes Project I	Ms. Shakuntala Acharya
4.	DD 506	Graphic Design	Prof. Utpal Barua
5.	EE 253	Instrumentation Laboratory	Prof. Harshal B. Nemade
6.	MA 498	Project-I	DUPC Maths
7.	PH 382M	Laser Physics	Prof. Alike Khare
8.	RT 512	Livelihood and Entrepreneurship	Dr. Siddhartha Singha
9.	RT 517	Agri-horticultural Produce Processing Technology	Dr. Siddhartha Singha
10.	RT 520	Field Work and Communication	Dr. Meena Khwairakpam

Indian Institute of Technology Guwahati
Proposal for a New Course / Revision of a Course

Course Number & Title: EE653 Modeling and Simulation of Dynamic Systems	
L-T-P-C: 3-0-0-6	
Type of Letter Grading (Regular Letter Grades / PP or NP Letter Grades): Regular Letter Grades	
Kind of Proposal (New Course / Revision of Existing Course): Revision of Existing Course	
Offered as (Compulsory / Elective): Elective	
Offered to: 4th year B. Tech., M. Tech. and PhD	
Offered in (Odd/ Even / Any): Any	
Offered by (Name of Department/ Center): EEE	
Pre-Requisite: EE250 Control Systems or Equivalent	
Preamble / Objectives (Optional):	
Course Content/ Syllabus <i>Dynamic systems, Types of dynamic models, Frequency domain based modelling, Time domain based modelling, State space modelling of discrete time systems, Modelling examples of various practical systems. Simulation diagrams of state space models, Simulation of dynamic systems using MATLAB SIMULINK toolboxes.</i>	
Books (In case UG compulsory courses, please give it as "Text books" and "Reference books". Otherwise give it as "References".	
Texts: (Format: Authors, <i>Book Title in Italics font</i> , Volume/Series, Edition Number, Publisher, Year.)	
1.	
2.	
3.	
References: (Format: Authors, <i>Book Title in Italics font</i> , Volume/Series, Edition Number, Publisher, Year.)	
1.	N. S. Nise, <i>Control Systems Engineering</i> , John Wiley & Sons, 2008
2.	A. Johnson and H. Moradi, <i>New Identifications and Design Methods</i> , Springer-Verlag, 2005
3.	S.Majhi, <i>Advanced Control Theory-Relay Feedback Approach</i> , Cengage Asia/India Pvt.Ltd, 2009.
4.	

Detailed Course Content (Optional)		
It will not be included in the Courses of Study Booklet		
Sl. No.	Broad Title / Topics	Number of Lectures
1		
2		
3		
4		
5		
Total Number of Lectures =		

In case of revision of existing course, please provide below the details of existing course.
EXISTING COURSE
Course Number, Title, L-T-P-C: EE653 Modeling and Simulation of Dynamic Systems, 3-0-0-6
Pre-Requisite (if any): None
<p>Contents:</p> <p><i>Review of ordinary differential equations. State space modeling of linear time invariant systems, Partial differential equations, State space modeling of time varying systems, Solution of state equations, matrix inversion, SVD, Difference equations, State space modeling of discrete time systems, Modeling of stochastic systems, Modeling examples of various practical systems. Simulation diagrams of state space models, Simulation of dynamic systems using MATLAB SIMULINK toolboxes.</i></p>
<p>References:</p> <ol style="list-style-type: none"> 1. C.T. Chen, Linear System Theory and Design, Oxford University Press, 3/e, 1999. 2. R. L. Woods and K. L. Lawrence, Modeling and Simulation of Dynamic Systems, Prentice Hall, 1999 3. G. Allaire, Numerical Analysis and Optimization: An Introduction to Mathematical Modelling and Numerical Simulation, Oxford University Press, 2007

Proposal for Course structure revision of M. Tech in “Systems, Control and Automation (SCA)” specialization in the Department of Electronics and Electrical Engineering

Preamble: The primary change in the MTech course structure of SCA Specialization, EEE Department is the introduction of a core course in lieu of an elective course in the second semester of MTech. In the present course structure EE590 Linear Algebra and Optimization is a core course in the first semester. The content of this course consists of two important courses Linear Algebra and Optimization. Both these two courses form the bedrock of other MTech courses in SCA specialization. Hence, we propose to teach both these courses as separate core courses. Since the optimization course requires notions from Linear Algebra, we propose to keep Linear Algebra as a core course in first semester of MTech and Optimization as a core course in the second semester. Further, we have revised the syllabus for few of the courses. In particular, the course content of EE 552 was completely outdated (as it was last revised in the then Power and Control Specialization) and needed a revision.

Existing Course Structure for M Tech in “Systems, Control and Automation”

Semester 1

Code	Name	L-T-P	Credits
EE 550	Linear Systems Theory	3-0-0	6
EE 590	Linear Algebra and Optimization	3-0-0	6
EE 551	Estimation and Identification	3-0-0	6
EE 5/6xx	Elective I	3-0-0	6
EE 5/6xx	Elective II	3-0-0	6
EE552	Applied Control Lab	0-0-3	3
		15-0-3	33

Semester 2

Code	Name	L-T-P	Credits
EE 553	Optimal Control	3-0-0	6
EE 554	Nonlinear Systems and Control	3-0-0	6
EE 5/6xx	Elective III	3-0-0	6
EE 5/6xx	Elective IV	3-0-0	6
EE 5/6xx	Elective V	3-0-0	6
EE 555	Automation Lab	0-0-3	3
		15-0-3	33

Semester 3

Code	Name	L-T-P	Credit
EE 698	Project Phase-I	0-0-24	24

Semester 4

Code	Name	L-T-P	Credit
EE 699	Project Phase-II	0-0-24	24

Proposed Course Structure for M Tech in “Systems, Control and Automation”

Semester I			
Code	Course Name	L-T-P	Credits
EE 550	Linear Systems Theory	3-0-0	6
EE 551	Estimation and Identification	3-0-0	6
EE 552	Applied Control Lab	0-0-3	3
EE 556	Linear Algebra	3-0-0	6
EE 6xx	Elective I	3-0-0	6
EE 6xx	Elective II	3-0-0	6
	Total credits	15-0-3	33

Semester II			
Code	Course Name	L-T-P	Credits
EE 553	Optimal Control	3-0-0	6
EE 554	Nonlinear Systems and Control	3-0-0	6
EE 555	Automation Lab	0-0-3	3
EE 557	Optimization	3-0-0	6
EE 6xx	Elective III	3-0-0	6
EE 6xx	Elective IV	3-0-0	6
	Total credits	15-0-3	33

Semester III			
Code	Course Name	L-T-P	Credits
EE 698	Project Phase-I	0-0-24	24

Semester IV			
Code	Course Name	L-T-P	Credits
EE 699	Project Phase-II	0-0-24	24

Proposed Changes:

- (i) EE590 Linear Algebra and Optimization in Semester-I has been replaced by EE556 Linear Algebra. This will be a core-course in Semester-I of M. Tech in EEE (SCA Specialization).
- (ii) One of the three elective courses in Semester-II from the previous course structure is replaced by a core course viz., EE557 Optimization. Now Semester-II will have 4 core courses and 2 electives, similar to Semester-I.
- (iii) The syllabus for existing courses EE550, EE552, EE554, EE555, and EE653 have been revised.

Indian Institute of Technology Guwahati
Proposal for a New Course / Revision of a Course

Course Number & Title: EE556 Linear Algebra	
L-T-P-C: 3-0-0-6	
Type of Letter Grading (Regular Letter Grades / PP or NP Letter Grades): Regular Letter Grades	
Kind of Proposal (New Course / Revision of Existing Course): New Course	
Offered as (Compulsory / Elective): Compulsory	
Offered to: M.Tech in Electronics and Electrical Engineering (SCA Specialization)	
Offered in (Odd/ Even / Any): Odd	
Offered by (Name of Department/ Center): EEE	
Pre-Requisite: None	
Preamble / Objectives (Optional):	
Course Content/ Syllabus <i>Vector spaces, linear independence, bases and dimension, linear maps and matrices, fundamental subspaces, rank-nullity theorem, eigenvalues, invariant subspaces, inner products, norms, orthonormal bases, spectral theorem, unitary and orthogonal transformations, operators on real and complex vector spaces, singular value decomposition, annihilating polynomials, characteristic polynomial, minimal polynomial, Jordan canonical form of matrices, sign-definite matrices, basic iterative methods for solutions of linear systems and their rates of convergence, iterative methods for eigenvalue problems, least squares using linear algebra.</i>	
Books (In case UG compulsory courses, please give it as "Text books" and "Reference books". Otherwise give it as "References".	
Texts: (Format: Authors, <i>Book Title in Italics font</i> , Volume/Series, Edition Number, Publisher, Year.)	
1.	K. Hoffman and R. Kunze, <i>Linear Algebra</i> , Pearson Education Inc., 2 nd Edition, 2013.
2.	G.H. Golub and C.F. Van Loan, <i>Matrix Computations</i> , Johns Hopkins University Press, 4 th Edition, 2013.
References: (Format: Authors, <i>Book Title in Italics font</i> , Volume/Series, Edition Number, Publisher, Year.)	
1.	S. Axler, <i>Linear Algebra Done Right</i> , 3 rd Edition, Springer, 2015.
2.	G. Strang, <i>Introduction to Linear Algebra</i> , Wellesley-Cambridge Press, U.S., 5 th Edition, 2016.
3.	D.S. Watkins, <i>Fundamental of Matrix Computations</i> , Wiley, 3 rd Edition, 2010.
4.	N. Johnston, <i>Introduction to Linear and Matrix Algebra</i> , Springer, 1 st Edition, 2021

Detailed Course Content (Optional)		
It will not be included in the Courses of Study Booklet		
Sl. No.	Broad Title / Topics	Number of Lectures
1	Vector spaces	8
2	Linear Maps	10
3	Annihilating polynomials and canonical forms	8
4	Iterative methods for solutions of linear systems	8
5	Iterative methods for eigenvalue problems	8
Total Number of Lectures =		42

In case of revision of existing course, please provide below the details of existing course. EXISTING COURSE
Course Number, Title, L-T-P-C:
Pre-Requisite (if any)
Contents:
References:

Indian Institute of Technology Guwahati
Proposal for a New Course / Revision of a Course

Course Number & Title: EE550 Linear Systems Theory		
L-T-P-C: 3-0-0-6		
Type of Letter Grading (Regular Letter Grades / PP or NP Letter Grades): Regular Letter Grades		
Kind of Proposal (New Course / Revision of Existing Course): Revision of Existing Course		
Offered as (Compulsory / Elective): Compulsory		
Offered to: M.Tech in Electronics and Electrical Engineering (SCA and PE Specializations)		
Offered in (Odd/ Even / Any): Odd		
Offered by (Name of Department/ Center): EEE		
Pre-Requisite: None		
Preamble / Objectives (Optional):		
Course Content/ Syllabus <i>Maths Preliminaries: Vector Spaces, Change of Basis, Similarity Transforms, Introduction: Linearity, Differential equations, Transfer functions, State Space representations, Evolution of State trajectories Time Invariant and Time Variant Systems, Controller Canonical Form, Transformation to Controller Canonical form SI, MI, State Feedback Design SI, MI, Discrete time systems representation, reachability and state feedback design, Observability: Grammian, Lyapunov Equation, Output Energy, Observability matrix Observer canonical form (SO, MO), Unobservable subspace, Leunberger Observer (SO, MO), State Feedback with Leunberger Observers, Minimum order observers, Stabilizability and Detectability.</i>		
Books (In case UG compulsory courses, please give it as "Text books" and "Reference books". Otherwise give it as "References".		
Texts: (Format: Authors, <i>Book Title in Italics font</i> , Volume/Series, Edition Number, Publisher, Year.)		
1.	T. Kailath, <i>Linear System</i> , Prentice-Hall, Inc., 1st Edition, 1980	
2.	C.T. Chen, <i>Linear System Theory and Design</i> , Oxford University Press, 4 th Edition, 2013.	
References: (Format: Authors, <i>Book Title in Italics font</i> , Volume/Series, Edition Number, Publisher, Year.)		
1.	L. A. Zadeh and C. A. Desoer, <i>Linear System Theory: The State Space Approach</i> , Springer-Verlag, 2008.	
2.	W. Rugh, <i>Linear System Theory</i> , Prentice Hall, 2 nd Edition, 1995.	
3.	S. Lang, <i>Introduction to Linear Algebra</i> , Springer-Verlag, 2 nd Edition, 1997.	
4.	W. M. Wonham, <i>Linear Multivariable Control, A Geometric approach</i> , Springer-Verlag, 1985.	
5.	J.P. Hespanha, <i>Linear Systems Theory</i> , Princeton University Press, 2 nd Edition, 2018.	

Detailed Course Content (Optional)		
It will not be included in the Courses of Study Booklet		
Sl. No.	Broad Title / Topics	Number of Lectures
1		
2		
3		
Total Number of Lectures =		

In case of revision of existing course, please provide below the details of existing course.
EXISTING COURSE
Course Number, Title, L-T-P-C: EE550 Linear System Theory, 3-0-0-6
Pre-Requisite (if any): None
<p>Contents:</p> <p><i>Maths Preliminaries: Vector Spaces, Change of Basis, Similarity Transforms, Introduction: Linearity, Differential equations, Transfer functions, State Space representations, Evolution of State trajectories Time Invariant and Time Variant Systems, Controller Canonical Form, Transformation to Controller Canonical form SI,MI, State Feedback Design SI, MI, Discrete time systems representation, reachability and state feedback design, Observability: Grammian, Lyapunov Equation, Output Energy, Observability matrix Observer canonical form (SO, MO), Unobservable subspace, Leunberger Observer (SO, MO), State Feedback with Leunberger Observers, Minimum order observers, Stabilizability and Detectability, Output feedback and Output Stabilizability, Disturbance Decoupling Problem.</i></p>
<p>References:</p> <ol style="list-style-type: none"> 1. S. Lang, <i>Introduction to Linear Algebra</i>, Springer-Verlag, 2/e, 1997. 2. L. A. Zadeh and C. A. Desoer, <i>Linear System Theory: The State Space Approach</i>, Springer-Verlag, 2008. 3. C.T. Chen, <i>Linear System Theory and Design</i>, Oxford University Press, 3/e, 1999. 4. W. Rugh, <i>Linear System Theory</i>, Prentice Hall, 2/e, 1995 5. W. M. Wonham, <i>Linear Multivariable Control, A Geometric approach</i>, Springer-Verlag, 1985.

Indian Institute of Technology Guwahati
Proposal for a New Course / Revision of a Course

Course Number & Title: EE552 Applied Control Lab	
L-T-P-C: 0-0-0-3	
Type of Letter Grading (Regular Letter Grades / PP or NP Letter Grades): Regular Letter Grades	
Kind of Proposal (New Course / Revision of Existing Course): Revision of Existing Course	
Offered as (Compulsory / Elective): Compulsory	
Offered to: M.Tech in Electronics and Electrical Engineering (SCA Specialization)	
Offered in (Odd/ Even / Any): Odd	
Offered by (Name of Department/ Center): EEE	
Pre-Requisite: None	
Preamble / Objectives (Optional):	
Course Content/ Syllabus	
<p><i>Familiarization with Simulink/MultiSim, setting of model configuration parameters, Development of Simulink/MultiSim based control circuit, Design of automatic gain control (AGC) circuit, Limitations of proportional (P) control, offset error, Design of PI control for offset error improvement, PI control circuit-based speed and disturbance control of coupled DC motor.</i></p>	
Books (In case UG compulsory courses, please give it as "Text books" and "Reference books". Otherwise give it as "References".)	
Texts: (Format: Authors, <i>Book Title in Italics font</i> , Volume/Series, Edition Number, Publisher, Year.)	
1.	Norman. S. Nise, <i>Control systems engineering</i> , Wiley India Edition, 2018
2.	
3.	
References: (Format: Authors, <i>Book Title in Italics font</i> , Volume/Series, Edition Number, Publisher, Year.)	
1.	
2.	

Detailed Course Content (Optional)		
It will not be included in the Courses of Study Booklet		
Sl. No.	Broad Title / Topics	Number of Lectures
1		
2		
3		
4		
5		
Total Number of Lectures =		

In case of revision of existing course, please provide below the details of existing course.	
EXISTING COURSE	
Course Number, Title, L-T-P-C: EE552 Applied Control Lab, 0-0-3-3	
Pre-Requisite (if any): None	
Contents:	
1. <i>DC Motor Speed Control: Using PLC to control the speed of DC Motor to understand the principles of feedback control, PWM and PLC programming. The objective is to study the following:</i>	

- a. Open loop speed control*
- b. Close loop speed control*
- c. Use of PLC for speed control*
- d. Acceleration and deceleration ramps programming in PLC*
- e. To Monitor the duty cycle of the motor*

2. AC Machine Control: The objective will be to study:

- a. Open loop speed control*
- b. Close loop speed control*
- c. Frequency converter and its control*
- d. Acceleration and deceleration ramps programming in the controller*
- e. PWM programming*

3. Process Measurement and Control: The objective of this experiment is to understand:

- a. Industrial measurements*
- b. The control systems used in industry*
- c. The programming techniques of the controller to achieve specific purpose*
- d. Process supervision through PC*
- e. Various transducers and sensors used in the industry*

References:

Indian Institute of Technology Guwahati
Proposal for a New Course / Revision of a Course

Course Number & Title: EE557 Optimization	
L-T-P-C: 3-0-0-6	
Type of Letter Grading (Regular Letter Grades / PP or NP Letter Grades): Regular Letter Grades	
Kind of Proposal (New Course / Revision of Existing Course): New Course	
Offered as (Compulsory / Elective): Compulsory	
Offered to: M.Tech in Electronics and Electrical Engineering (SCA Specialization)	
Offered in (Odd/ Even / Any): Even	
Offered by (Name of Department/ Center): EEE	
Pre-Requisite: None	
Preamble / Objectives (Optional):	
Course Content/ Syllabus	
<p><i>Concepts from geometry, calculus, and set theory required in optimization; Unconstrained Optimization: Conditions for local minimizers, gradient methods, Newton's method, Least squares; Duality theory; Constrained Optimization: Lagrange multipliers, KKT condition; Convex optimization problems; Semi-definite programming; Applications to various fields of engineering; Numerical software for optimization; Introduction to advanced topics in optimization;</i></p>	
Books (In case UG compulsory courses, please give it as "Text books" and "Reference books". Otherwise give it as "References".)	
Texts: (Format: Authors, <i>Book Title in Italics font</i> , Volume/Series, Edition Number, Publisher, Year.)	
1.	E. K. P. Chong and S. H. Zak, <i>An Introduction to Optimization</i> , 4 th Edition., Wiley India Pvt. Ltd., 2013.
2.	S. Boyd and L. Vandenberghe, <i>Convex Optimization</i> , Cambridge: Cambridge University Press, 2004.
3.	
References: (Format: Authors, <i>Book Title in Italics font</i> , Volume/Series, Edition Number, Publisher, Year.)	
1.	D. G. Luenberger and Y. Ye, <i>Linear and Nonlinear Programming</i> , 5 th Edition., Springer, 2021.

Detailed Course Content (Optional)		
It will not be included in the Courses of Study Booklet		
Sl. No.	Broad Title / Topics	Number of Lectures
1	<i>Concepts from Geometry, Calculus, and set theory</i>	6
2	<i>Unconstrained Optimization</i>	7
3	<i>Constrained Optimization</i>	9
4	<i>Convex Optimization</i>	10
5	<i>Applications, Software, and Advanced Topics</i>	10
Total Number of Lectures =		42

In case of revision of existing course, please provide below the details of existing course.	
EXISTING COURSE	
Course Number, Title, L-T-P-C:	
Pre-Requisite (if any)	
Contents:	
References:	

Indian Institute of Technology Guwahati
Proposal for a New Course / Revision of a Course

Course Number & Title: EE554 Nonlinear Systems and Control		
L-T-P-C: 3-0-0-6		
Type of Letter Grading (Regular Letter Grades / PP or NP Letter Grades): Regular Letter Grades		
Kind of Proposal (New Course / Revision of Existing Course): Revision of Existing Course		
Offered as (Compulsory / Elective): Compulsory		
Offered to: M.Tech in Electronics and Electrical Engineering (SCA Specialization)		
Offered in (Odd/ Even / Any): Even		
Offered by (Name of Department/ Center): EEE		
Pre-Requisite: None		
Preamble / Objectives (Optional):		
Course Content/ Syllabus		
<p><i>Introduction: state-space representation of dynamic al systems, phase-portraits of second order systems, types of equilibrium points; Existence and uniqueness of solutions; Features of nonlinear dynamical systems; Stability analysis: Lyapunov stability of autonomous systems, Lyapunov theorem of stability, LaSalle invariance principle, input/output stability of non-autonomous systems, passivity theorem, small gain theorem, Kalman-Yakubovich-Popov lemma, Aizermann conjecture, circle/Popov criteria; Limit cycles: Bendixson criterion, Poincare-Bendixson criterion; Describing functions method, methods of integral quadratic constraints; Introduction to manifolds.</i></p>		
Books (In case UG compulsory courses, please give it as “Text books” and “Reference books”. Otherwise give it as “References”).		
Texts: (Format: Authors, <i>Book Title in Italics font</i> , Volume/Series, Edition Number, Publisher, Year.)		
1.	H. K. Khalil, <i>Nonlinear systems</i> , Prentice Hall, 3rd Edition, 2002.	
2.	M. Vidyasagar, <i>Nonlinear systems analysis</i> , 2nd Edition, Society of Industrial and Applied Mathematics, 2002.	
3.		
References: (Format: Authors, <i>Book Title in Italics font</i> , Volume/Series, Edition Number, Publisher, Year.)		
1.	H. Marquez, <i>Nonlinear Control Systems</i> , Analysis and Design, Wiley, 2003.	
2.	A. Isidori, <i>Nonlinear Control Systems</i> , Springer, 3rd Edition, 1995.	
3.	F. Verhulst, <i>Nonlinear Differential Equations and Dynamical Systems</i> , Springer, 2 nd Edition, 1996.	
4.		
5.		

Detailed Course Content (Optional)		
It will not be included in the Courses of Study Booklet		
Sl. No.	Broad Title / Topics	Number of Lectures
1		
2		
5		
Total Number of Lectures =		

In case of revision of existing course, please provide below the details of existing course.
EXISTING COURSE
Course Number, Title, L-T-P-C: EE 554 Nonlinear Systems and Control, 3-0-0-6
Pre-Requisite (if any): None
Contents:
<p><i>Introduction: state-space representation of dynamic al systems, phase-portraits of second order systems, types of equilibrium points: stable/unstable node, stable/unstable focus, saddle; Existence and uniqueness of solutions: Lipschitz continuity, Picard's iteration method, proof of existence and uniqueness theorem, continuous dependence of solutions on initial conditions; Features of nonlinear dynamical systems: multiple disjoint equilibrium points, limit cycles, Bendixson criterion, Poincare-Bendixson criterion; Linearization: linearization around an equilibrium point, validity of linearization: hyperbolic equilibrium points, linearization around a solution; Stability analysis: Lyapunov stability of autonomous systems, Lyapunov theorem of stability, converse theorems of Lyapunov theorem, construction of Lyapunov functions: Krasovskii method and variable gradient method, LaSalle invariance principle, region of attraction, input/output stability of non-autonomous systems, L-stability; Control of nonlinear systems: describing functions method, passivity theorem, small gain theorem, Kalman-Yakubovich-Popov lemma, Aizermann conjecture, circle/Popov criteria, methods of integral quadratic constraints and quadratic differential forms for designing stabilizing linear controllers, multiplier techniques.</i></p>
References:
<ol style="list-style-type: none"> 1. H. K. Khalil, <i>Nonlinear systems</i>, Prentice Hall, 3rd Edn., 2002. 2. M. Vidyasagar, <i>Nonlinear systems analysis</i>, 2nd Edn., Society of Industrial and Applied Mathematics, 2002. 3. H. Marquez, <i>Nonlinear Control Systems: Analysis and Design</i>, Wiley, 2003. 4. A. Isidori, <i>Nonlinear Control Systems</i>, Springer, 3rd Edn., 1995. 5. F. Verhulst, <i>Nonlinear Differential Equations and Dynamical Systems</i>, Springer, 1990.

Indian Institute of Technology Guwahati
Proposal for a New Course / Revision of a Course

Course Number & Title: EE555 Automation Lab	
L-T-P-C: 0-0-0-3	
Type of Letter Grading (Regular Letter Grades / PP or NP Letter Grades): Regular Letter Grades	
Kind of Proposal (New Course / Revision of Existing Course): Revision of Existing Course	
Offered as (Compulsory / Elective): Compulsory	
Offered to: M.Tech in Electronics and Electrical Engineering (SCA Specialization)	
Offered in (Odd/ Even / Any): Even	
Offered by (Name of Department/ Center): EEE	
Pre-Requisite: None	
Preamble / Objectives (Optional):	
Course Content/ Syllabus	
<i>Introduction to ROS, Familiarization with platforms for simulating robotic systems in open-loop and in closed-loop, Controller design for robotic systems, Experiments on swarm behavior of networked UGVs, AI-based simple robotic experiments.</i>	
Books (In case UG compulsory courses, please give it as "Text books" and "Reference books". Otherwise give it as "References".)	
Texts: (Format: Authors, <i>Book Title in Italics font</i> , Volume/Series, Edition Number, Publisher, Year.)	
1.	Peter Corke, <i>Robotics, Vision and Control</i> , Springer Cham, Second Edition, 2017.
2.	
3.	
References: (Format: Authors, <i>Book Title in Italics font</i> , Volume/Series, Edition Number, Publisher, Year.)	
1.	
2.	

Detailed Course Content (Optional)		
It will not be included in the Courses of Study Booklet		
Sl. No.	Broad Title / Topics	Number of Lectures
1		
2		
3		
4		
5		
Total Number of Lectures =		

In case of revision of existing course, please provide below the details of existing course.
EXISTING COURSE
Course Number, Title, L-T-P-C: EE 555 Automation Lab, 0-0-3-3
Pre-Requisite (if any): None
Contents:
<i>DC motor characteristics, modeling using transfer function and state variable methods, position control of DC motor using PID controller, speed control of DC motor using pulse width modulation; Kinematic modeling and assembling of a differential drive automated wheeled robot, various sensors and their use in mobile robot localization and obstacle detection; Robot motion control and navigation.</i>
References: