भारतीय प्रौद्योगिकी संस्थान भिलाई
Indian Institute of Technology Bhilai

शिक्षा-परिषद
Senate

शिक्षा-परिषद की बैठक संख्या ४००२३ / २३०२२०२४ का कार्यवृत
Minutes of the Senate Meeting no. 40023/23022024

(शिक्षा-परिषद की तेइसहवीं बैठक, २३ फ़रवरी २०२४ का कार्यवृत)
(Minutes of 23rd Meeting of the Senate, 23 February 2024)

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Science and Data Analytics, Executive MTech in Advanced Electrical Vehicle Systems, and Executive MTech in Applied Mechatronics and Robotics. 11

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B. . Permission to drop 2023-24-M and 2023-24-W semesters - Mr. Harsh Kumar (12340880). 11

C. Thesis supervisor allocation to Ms. Namita Gochhayat (ID 12010040) and Mr. Vinay Kumar (ID 12110210), and Ms. Sushree Subhadra (ID 12210220), PhD Scholars in the Department of Liberal Arts. 11

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E. Permission to declare compensatory instructional day on November 18, 2023 (Saturday) to compensate for the loss of academic activities in view of the declared holiday on November 17, 2023, for election in the Ahiwara constituency of Durg District. 11

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I. Permission to drop 2023-24-M semester - Mr. Arulnithi P (12210280) a MTech student in the discipline of DSAI. 12

J. Medical leave of Ms. Minal Bisen (12110100), a PhD student

in the department of EE. 12

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    A.   To consider the proposal of the Electronics & Communication Engineering (EC) department to offer the MTech program in two different specializations and to discontinue the MTech program in Electronics & Communication Engineering. 12

    B.   To consider the proposal to offer Joint courses and degree programs. 12

Minutes of the 23rd meeting (40023/23022024) of the Senate

Date: **February 23, 2024**
Time: **11:00 hrs – 14:45 hrs**
Venue: **L107, IIT Bhilai, Durg-491001 / VC**

Members Present	Special Invitees Present
Prof. Rajiv Prakash, Chairman	Dr. Soumya Gangopadhyay
Prof. R K Ghosh, Retired Professor, IIT Kanpur	Dr. Souradyuti Paul
Prof. Santosh Biswas	Dr. Arzad Alam Kherani
Dr. Anil Kumar Sao	Dr. Nitin Khanna
Dr. Dhruv Pratap Singh	Dr. Sanjib Banerjee
Wing Commander Dr. Jayesh Chandra S Pai (Retd.), Secretary	Dr. Avijit Pal
	Dr. Raghavender Medishetty
	Dr. Rukmankesh
	Dr. Avishek Adhikari
	Dr. Anindita Ghosh
	Dr. Balkrishna Mehta
	Dr. Lakshmi Kanta Patra
	Dr. Anshul Faye
	Dr. SK Subidh Ali
	Dr. MD Mehboob Alam
	Dr. Sreejith T V
	Dr. Kuldeep Kumar Kataria
	Dr. Kaushik Bandyopadhyay
	Dr. Nagesh D Patil
	Dr. I Vinod Reddy
	Dr. Purnendu Das
	Dr. Praveen Kumar
	Dr. Hathiram Nenavath
	Dr. Shashank Kurm
	Mr. Mratunjay Singh, MTech

Welcome and Announcements: Secretary welcomed the chairman, Prof. Rajiv Prakash to the 23rd senate meeting of the Institute.

Chairman, at the onset, welcomed all members to the 23rd meeting of the senate and introduced all the new members and special invitees to the senate. He then thanked all the outgoing members, and their valuable contribution was acknowledged by him. He then made the following announcements:

1. Dr. Souradyuti Paul, Dr. Arzad Alam Kherani and Dr. Avishek Adhikary who have been appointed as Associate Head of Computer Science and

Engineering; Electronics & Communication Engineering; and Mechatronics Engineering respectively shall be invitees of the senate.

2. Dr. Shashank Kurm, and Dr. Sruthi Vinayan who have taken over the responsibility of DPGC Convener of Electric Vehicle Technology; and Liberal Arts respectively shall be special invitees of the senate.

3. Dr. Hathiram Nenavath who has taken over the responsibility of DUGC Convener of Electronics & Communication Engineering shall be special invitee of the senate.

4. Several new faculty members have joined the institute, and few others are also going to join. On behalf of the senate, Chairman welcomed all the newly joined faculty member.

The chairman then requested the Secretary to proceed with the agenda items.

Item No 23. 1: To confirm the minutes of the 22nd meeting of the senate held on 07 November 2023 (40022/07112023).

The minutes of 22nd meeting of the senate held on 07 November 2023 (40022/07112023) were circulated to all members of the senate on November 16, 2023. No comment was received on the circulated minutes. Comments were then invited on the floor.

In the absence of any comment, the minutes of the meeting were confirmed.

Item No 23. 2: To note the action taken report of the 22nd meeting of the Senate.

The Secretary presented a report on the actions taken for the items deliberated in the 22nd meeting of the Senate.

The senate noted the action taken report.

Item No 23. 3: To appraise the academic report of the 2023-24-M semester.

Faculty-in-Charge, DoAA presented the academic report of the 2023-24-M semester (**Annexure 1**).

After deliberation, the Senate noted the same.

Item No 23. 4: To appraise the 2023-24-M & 2023-24-W semesters admission report.

Faculty-in-Charge, DoAA, presented the admission report of various programs for students admitted in the 2023-24-M & 2023-24-W semesters (**Annexure 2**).

After deliberation, the Senate noted the same and suggested the following measures to reduce the vacant seats in MTech and PhD program.

i. Departments to reach out to the Government / reputed private

colleges/institutions to advertise the unique features of our programs to increase the number of applicants for the said programs.

ii. *Exploring the feasibility of entering a Memorandum of Understanding with NITs/IISERs for absorbing their students for the said programs.*

Item No 23. 5:   To apprise and consider the students' program completion.

Faculty-in-Charge, DoAA presented the list of students (2 students in BTech and 05 students in Ph.D.) who have completed their respective credit requirements for the award of degree after the 22nd Meeting of the senate held on 07 November 2023 as follows.

A.   BTech - 02

ID Number	Name	Program	Discipline	Credits Cleared
11940390	Diwakar Kumar Singh	BTech	Mechanical Engineering	247
11940890	Pranay Agrawal	BTech	Mechanical Engineering	242

B.   PhD – 05

ID Number	Name	Program	Credits Cleared	Thesis Title
11810150	Sumit Singh Rajput	PhD	300	Development of Ag-doped CrAlN as hard solid lubricant coating for high-performance cutting applications
11810050	Atul Kumar Choudhary	PhD	300	Numerical simulation and experimental analysis of friction stir welding to investigate the mechanism of defect formation and its influence on weld quality.
11810060	Bhoopendra Choudhary	PhD	300	Development of a virtual sweating thermal manikin framework (human simulator) based on an improved thermoregulation model for performance evaluation of ventilation garments
11810170	Tomesh Kumar Sahu	PhD	300	Parametric Study of Sugar Extraction from Lignocellulosic Biomass and Combustion Stability Investigation in High Compression Ratio CI Engine fuelled with Ethanol-Diesel Blend.

ID Number	Name	Program		Discipline	Course
11710070	Yogendra Sao	PhD	234		SDFT: Secure design for testability

The senate recommended the above-mentioned list of students to BoG for the approval of the award of a degree.

Item No 23. 6: To consider the termination of the program for non-registered students.

Faculty-in-Charge, DoAA presented a proposal to consider the termination of program for the following students, who have not registered in the previous semester or who have requested for withdrawal of admission.

ID Number	Name	Program	Discipline	Reason/Remarks
12140240	Ankesh Meena	BTech	ME	Academic Registration was not completed, and no response was received to our communication.
12311100	Tangi Siva	MTech	MT	Personal Health Issues.
12310100	Jyoti Sharma	PhD	CS	Govt. Job and unable to acquire NOC from current organisation.

After deliberation, the senate approved the proposal to terminate the program of above-mentioned students.

Item No 23. 7: To consider the curriculum of the BTech program in Electronics & Communication Engineering.

DUGC Convener, Electronics & Communication Engineering presented the curriculum of the BTech program in Electronics & Communication Engineering (***Annexure 3***).

After deliberation, the Senate in principle approved the course curriculum of BTech program in the department with following suggestions.
  i. Expression of Interest from faculty members shall be sought by the Associate Head, EC to contribute towards the course structure and curriculum.
  ii. The department shall submit a detailed course curriculum to Faculty-in-Charge, DoAA after considering the overlap and pre-requisite of all the courses being proposed in the structure.
Further, the Senate authorized the Chairman to consider the detailed curriculum, and the same shall be reported in the next Senate.

Item No 23. 8: **To consider the revised course structure of the MTech program in the discipline of Electric Vehicle Technology.**

DPGC Convener, Electric Vehicle Technology, presented the revised curriculum of the MTech program in Electric Vehicle Technology *(Annexure 4)*.

After deliberation, in principle, the Senate approved the revised course curriculum of the MTech program in Electric Vehicle Technology with the following suggestions.
   i. Expression of Interest from faculty members shall be sought by the Associate Head, EE, to contribute towards the course structure and curriculum.
   ii. The department shall submit a detailed course curriculum to the Faculty-in-Charge, DoAA, after considering the overlap and prerequisites of all the courses proposed in the structure.
Further, the Senate authorized the Chairman to consider the detailed curriculum, and the same shall be reported in the next Senate.

Item No 23. 9: **To consider the Mechatronics Engineering department's proposal to continue with the existing structure for all the programs.**

The Associate Head of Mechatronics Engineering informed me that Mechatronics Engineering was made an independent department. Also, in its 22nd meeting, the Senate recommended that for at least two years, the Department of Mechanical Engineering and Electrical Engineering shall provide academic and administrative support for the smooth functioning of the programs offered in the discipline of Mechatronics Engineering. In this regard, the proposal of the Department of Mechatronics Engineering to continue with the existing structure for all the programs as recommended by IPGC was presented.

After deliberation, the Senate approved the Department of Mechatronics Engineering's proposal to continue with the existing structure for all the programs recommended by IPGC.

Item No 23. 10: **To consider the policy related to submitting a PhD thesis.**

Faculty-in-Charge, DoAA, presented the following policy related to PhD thesis submission, as recommended by IPGC.

(a) Institute-level criteria:

   (i) The student must have at least one first-author paper published in SCI-indexed journals for Science and Engineering students and in Scopus-indexed journals for liberal arts.

(b) Department/Discipline Specific Policy:

(i) The department shall adopt additional criteria for PhD thesis submission to preserve the program's quality.

After deliberation, the Senate approved the following policy related to PhD thesis submission, and the same shall apply to the students admitted from the 2023-24-M semester onwards.

(a) Institute-level criteria:

(i) The student must have at least one paper accepted/published in SCI/ SCI-expanded journals for Science and Engineering students and in Scopus-indexed journals for Liberal Arts.

OR

(ii) At least one accepted patent.

OR

(iii) Paper accepted in an A* Conference

The work presented in paper/patent/conference proceeding must be outcome of the PhD thesis work.

(b) Department/Discipline Specific Policy:

(i) The department shall adopt additional criteria for PhD thesis submission, if any, to preserve the quality of the program.

Item No 23. 11: To consider the PG manual.

Faculty-in-Charge, DoAA presented PG manual as recommended by the IPGC.

*After deliberation, the Senate approved the PG manual (**Annexure 5**) and suggested to apply this from the 2023-24 M semester. Further, the senate acknowledged the efforts put in by the PG manual committee. The senate also suggested to prepare an exit policy in line with NEP 2020.*

Item No 23. 12: To consider the policy to fund the PhD students to attend the conference within/outside India.

Faculty-in-Charge, DoAA presented the policy to fund the PhD students to attend the conference within/outside India.

*After deliberation, the senate with following minor modification approved the proposed policy to fund PhD students to attend conferences (**Annexure 6**).*

(i) Students are permitted to attend one international level summer/winter schools/ workshops organized within India during the entire tenure of program and it shall be considered against conferences within India.

(ii)   Students shall be encouraged to find sponsors to fund their travel to attend international conferences.

(iii)   The proposed policy shall be over and above the support received from other funding agencies.

Item No 23. 13: To consider the guidelines for utilizing Annual Research Grants by sponsored PhD Scholars.

Faculty-in-Charge, DoAA, presented the guidelines for utilizing Annual Research Grants by sponsored PhD Scholars (**Annexure 7**).

After deliberation, the Senate approved the guidelines for utilizing Annual Research Grants by sponsored PhD Scholars. It shall be applicable in the absence of any guidelines the funding the agency.

Item No 23. 14: To apprise on the guidelines for the mid-session entry of CSIR-JRF or similar sponsored fellows.

It was informed that some funding agencies, e.g., CSIR, allow the candidates to join an institute and work as JRF. Such candidates are eligible to draw fellowship from the date of joining the institute. In such cases, the fellows must register for the institute's PhD program within a defined period. In this regard, the following policy, as approved by the Chairman Senate to host the fellows, was placed for the Senate's consideration.

i.   Any fellowship (CSIR JRF or similar) holder may approach the Department, or the Department may advertise for such positions and receive applications from interested candidates who have qualified for the CSIR or similar fellowships.
ii.   The Department will ensure that joining JRF fellows (before the PhD registration) follows the funding agency's guidelines.
iii. As the fellows will be encouraged to apply for the PhD program, it is suggested that the Departments will admit only those fellows who meet the minimum eligibility criteria followed by the departmental selection criteria for the Ph.D. admissions.
iv.   The Departments should inform the candidates in writing that the current process is only for admission to the JRF position. The candidate must apply for PhD registration whenever the department/institute takes the admissions. The PhD admission of the candidate will be subject to qualifying for the entrance examination.
v.   The Department may sign the formal documents required by the funding agencies to confirm the hosting institute, supervisor allocation, etc. The department may contact the academic office to obtain approval or endorsement letters if some funding agency urges.

After deliberation, the senate approved the above guidelines for the mid-session entry of CSIR-JRF or similar sponsored fellows.

Item No 23. 15: **To consider the proposal to offer online executive MTech courses in three areas, namely Executive MTech in Data Science and Data Analytics, Executive MTech in Advanced Electrical Vehicle Systems, and Executive MTech in Applied Mechatronics and Robotics.**

Faculty in-Charge, Resources Generation and Planning presented the proposal to offer online executive MTech courses in three areas, namely Executive MTech in Data Science and Data Analytics; Executive MTech in Advanced Electrical Vehicle Systems; and Executive MTech in Applied Mechatronics and robotics (**Annexure 8**)

After deliberation, the senate recommended placing the proposal to offer online executive MTech and e-UG/PG courses before BoG for its consideration.

Item No 23. 16: To ratify the items approved by the chairman, senate.

The following items, as approved by the Chairman Senate, were placed for the Senate's ratification.

A. Termination of the program for Mr. Vishal Sathawane (11810270), a Ph.D. student in the Department of Computer Science Engineering.

B. . Permission to drop 2023-24-M and 2023-24-W semesters - Mr. Harsh Kumar (12340880).

C. Thesis supervisor allocation to Ms. Namita Gochhayat (ID 12010040) and Mr. Vinay Kumar (ID 12110210), and Ms. Sushree Subhadra (ID 12210220), PhD Scholars in the Department of Liberal Arts.

D. Permission to declare a non-instructional day till 14:30 on January 22, 2024, to celebrate the Ram Lalla Pran Pratishtha at Ayodhya and reschedule these classes on January 27, 2024 (Saturday).

E. Permission to declare compensatory instructional day on November 18, 2023 (Saturday) to compensate for the loss of academic activities in view of the declared holiday on November 17, 2023, for election in the Ahiwara constituency of Durg District.

F. Conversion of the program from BTech to MTech for R Prathamesh (ID Number - 12041170) in the department of CSE.

G. Conversion of the program from MSc to Dual Degree (MSc-PhD) for the AY 2023-24 - Mr. Swarup Maity (12242340), Chemistry.

H. Academic leave request of Mr. Abhishek Kumar Ojha (12210250) a MTech

student in the department of MT.

I. Permission to drop 2023-24-M semester - Mr. Arulnithi P (12210280) a MTech student in the discipline of DSAI.

J. Medical leave of Ms. Minal Bisen (12110100), a PhD student in the department of EE.

The senate ratified all the above items.

Item No 23. 17: Any other item, with the permission of the chair.

A. **To consider the proposal of the Electronics & Communication Engineering (EC) department to offer the MTech program in two different specializations and to discontinue the MTech program in Electronics & Communication Engineering.**

The associate head of EC informed that the department of EC is proposing to offer an MTech program in two different specializations, namely microelectronics and VLSI and communication and signal processing. Further, it was noted that the IPGC did not recommend the proposal.

After deliberation, the senate did not recommend the proposal and suggested that the department reconsider the proposal and submit it to IPGC. Further, the Senate authorized Chairman to consider the proposal as recommended by IPGC, and the same shall be reported in the next senate.

B. **To consider the proposal to offer Joint courses and degree programs.**

The chairman informed that the departments may explore offering joint courses, degree programs, and PhDs with universities outside the country. Also, he stated that during the recent visits to academic institutions in Germany and the USA, institutes expressed their interest in offering joint courses and degree programs with IIT Bhilai and discussion is going on to start PG programs first.

After deliberation, the senate suggested exploring joint courses and degree programs with foreign academic institutions and plae in the BoG alongwith e-Degree program agenda.

As there was no other matter, the meeting ended with a vote of thanks to the chair.

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Academic report 2023-24-M

BTech

Disciplines	Batch	No of registered Students	No. of Students who are awarded with F grade				F grade in AA/NCN
			One	Two	Three	More than Three	
CS	2020	58	-	-	-	-	-
	2021	59	7	-	-	1	-
	2022	59	-	2	1	-	-
	2023	55	-	-	-	-	10
DSAI	2020	22	-	-	-	-	-
	2021	22	1	-	-	-	-
	2022	22	1	2	-	-	-
	2023	38	-	-	-	-	6
EE	2019	1	-	-	-	-	-
	2020	49	-	-	-	-	-
	2021	51	1	-	-	-	-
	2022	45	4	3	-	-	-
	2023	52	-	-	-	-	9
ME	2019	3	-	1	-	-	-
	2020	38	3	1	1	-	-
	2021	39	7	1	1	1	-
	2022	39	6	3	1	1	-
	2023	45	-	-	-	-	10
MSME	2023	15	-	-	-	-	3
MT	2022	15	5	2	-	-	-
	2023	19	-	-	-	-	2

Note: 1- Term "AA" has been used for Additional Activity and "NCN" is use for Non Credited courses.

2- One student (12340880_Harsh Kumar) was allowed semester drop.

MSc

Disciplines	Batch	No of registered Students	No. of Students with at least one "F" grade
CY	2022	8	-
	2023	11	-
MA	2022	8	-
	2023	9	-
PH	2022	5	-
	2023	8	1

MTech

Disciplines	Batch	No of registered Students	F Grade	Registered in Thesis only
Bio	2023	8		
CS	2019	1*	-	1
CS	2022	5	1	4
CS	2023	13	3	
DSAI	2022	3	-	3
DSAI	2023	18	-	
EVT	2022	1	-	1
EVT	2023	4	-	
ECE	2023	2	-	
EE	2022	2	-	1
EE	2023	7	1	
ME	2022	3	-	3
ME	2023	10	-	
MSME	2023	2	-	
MT	2022	4	1	4
MT	2023	3	-	

Note: 1- * (BTech - MTech) dual degree program
   2- One student (12210280_Arulnithi P) was allowed semester drop.

PhD

Disciplines	No of registered Students	F Grade	Registered in Thesis only
BSBM	3	-	
CY	28+2#	-	16+2#
CS	22	5	9
DSAI	9	1	2
ECE	3	-	
EE	10+1*	1	4+1*
EVT	2	-	2
MA	19	-	12
MT	3	-	1
ME	23+2*	2	13+2*
PH	19+2#	-	13+2#
LA	12	-	11

Note: * (MTech – PhD) dual degree program.

#(MSc – PhD) dual degree program.

Admission Report for 2023-24-M semester

BTech			
Disciplines	**Approved Seats**	**Allotted Candidates**	**Admitted Candidates**
CS	55	55+1*	55+1*
DSAI	40	40	38
EE	54	54	52
ME	54	53+1#	45
MSME	20	19	15
MT	20	20	19
Total	**243**	**243**	**225**

* Preparatory student of 2022 admitted this session

Preparatory student of 2023

MSc			
Disciplines	**Approved Seats**	**Allotted Candidates**	**Admitted Candidates**
Chemistry	12	12	12
Mathematics and Computing	12	9	9
Physics	12	9	8
Total	**36**	**30**	**29**

MTech					
Discipline	Seat Matrix	Applications received	Shortlisted	Admission Offered	Admission Accepted	Admitted
BE	10	129	108	50	9	8
CI	10	79	52	43	5	5
CSE	20	440	431	132	13	12
DM	10	172	172	79	7	6
DSAI	20	579	543	101	19	18
ECE	10	209	207	92	2	2
EVT	10	181	181	76	4	4
MSME	10	91	90	38	4	3
MT	10	105	93	60	4	3
PSPE	10	101	56	47	2	2
TF	10	141	141	85	4	4
Total	130	2227	2074	803	73	67

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Disc	PhD Allotted Seat for PhD		Applications Received	Candidates		Provisional Admission		Joined Candidates	
	Inst.	Spons.		Shortlisted	Appeared	Offered	Accepted	Inst.	Spons.
BE	2	5	119	117	27	4	3	2	1
CS	8	10	61	59	17	13	11	5	6
DSAI	3	5	46	45	12	5	5	3	2
EE	4	8	46	41	15	6	5	3	2
ME	8	7	68	63	21	8	6	4	2
MT	1	4	6	5	3	2	0	0	0
PHY	2	4	96	90	25	4	4	2	2
CY	9	13	86	79	25	13	12	8	4
MTH	3	4	134	113	35	5	5	3	2
MSME	2	5	17	15	5	0	0	0	0
ECE	2	4	26	26	8	3	3	1	2
Total	113		705					54	

PhD Admission Report 2023-24 W Semester

Discipline	Sanctioned Strength		Applications Received		Candidates Called for Selection Process		Candidates appeared in the Selection Process		Admission Offered		Admitted Candidates	
	Institute	Sponsered	Institute	Sponsered	Institute	Sponsered	Institute	Sponsered	Institute	Sponsered	Institute	Sponsered
BSBME	1	5	21	6	18	5	7	4	0	6*	0	5
CY	6	16	17	4	16	4	5	3	3	3	2	2
CS	5	10	20	12	16	11	9	4	2	4	2	3
DS	3	10	19	8	19	8	4	3	0	1	0	1
ECE	1	2	10	4	10	4	4	3	0	3*	1	1
EE	4	5	5	6	5	6	2	3	0	0	0	0
LA	1	1	9	8	9	7	2	2	1	1	1	1
MA	3	3	37	23	35	23	6	6	0	0	0	0
ME	9	12	23	6	23	6	11	4	1	4	1	4
MT	3	6	3	0	3	0	3	0	1	0	1	0
MSME	3	5	7	1	7	1	2	1	1	1	1	1
PH	3	9	26	7	26	7	4	4	2	1	1	1
Total	42	84	197	85	187	82	59	37	11	24	10	19

* Number of Admission offered may be higher that the sanctioned strenght due to the offer having issued in multiple round based on the offer acceptance status in the previous round.

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(i) B.Tech in Electronics and Communication Engineering

● **The eligibility criteria:** IIT JEE Advanced (B.Tech.)
● **Seat Matrix:** 40

Tentative curriculum of B.Tech in Electronics and Communication Engineering

Course category	Minimum credits
Institute core (IC) courses	40.5
Program linked (PL) courses	4
Program core (PC) courses	53.5
Program elective (PE) courses	21
Open elective (OE) Courses	15
Liberal art (LA) courses	10
Non-graded core (NC) courses	**12 units**
Minimum credit requirement	**144 + 12 non-graded core units**

Institute core (IC) courses

Course code	Course Name	L-T-P-C
BML101	Biology for Engineers	3-0-0-3
CYL100	Applied Chemistry	3-0-0-3
CYP102	Chemistry lab	0-0-3-1.5
PHP102	Physics lab	0-0-3-1.5
PHL101	Physics for Engineers	3-1-0-4
MAL100	Mathematics-I	3-1-0-4
MAL101	Mathematics-II	3-1-0-4
CSL100	Introduction to programming	2-1-3-4.5
MEP102	Digital fabrication	1-0.5-3-3
CYL101	Environmental Science	1-0-0-1
EEL101	Basic Electrical Engineering	3-0-2-4
ECL101	Basic Electronics Engineering	3-0-2-4
LAL100	Introduction to Communication Skills	1-1-0-2
LAL101	Introduction to Finance	1-0-0-1

Program linked (PL) Courses

MAL403	Probability & Statistics	3-1-0-4

Program core (PC) courses

ECL201	Digital Electronics and Circuits	**3-0-0-3**
ECL202	Signals and Systems	**3-0-0-3**
ECL203	Introduction to Electronics	**3-0-0-3**
ECL204	Network Theory	**3-0-0-3**
ECL211	Microcontroller and Embedded Systems	**3-0-0-3**
ECL212	Digital Signal Processing	**3-0-0-3**
ECL213	Communication Systems	**3-0-0-3**
ECL214	Electronic Devices and Circuits	**3-0-0-3**
ECL301	Digital Communication	**3-0-0-3**
ECL302	Electromagnetic Theory	**3-0-0-3**
ECL303	Control System Engineering	**3-0-0-3**
ECL304	Analog Electronic Circuits	**3-0-0-3**
ECL311	VLSI Technology	**3-0-0-3**
ECL312	FPGA for Digital Design	**2-0-2-3**
ECP211	Microcontroller and Embedded Systems Lab	**0-0-3-1.5**
ECP212	Digital Signal Processing lab	**0-0-3-1.5**
ECP311	Analog Electronics Lab	**0-0-3-1.5**
ECP312	Communication Lab Lab	**0-0-3-1.5**
ECP313	Digital Electronics Lab	**0-0-2-1**
ECP411	VLSI Lab	**0-0-3-1.5**

			B.Tech in Electronics and Communication Engineering					
Semester	Course-1	Course-2	Course-3	Course-4	Course-5	Course-6	Course-7	Course-8	Credits
I	**CSL100**	**CYP102 / PHP102**	**MAL100**	**CYL100**	**PHL101**	**CYL101**	**NCN100**		**18**
	Introduction to programming	Chemistry lab/ Physics lab	Mathematics-I	Applied Chemistry	Physics for Engineers	Environmental Science	Practices for Comprehensive wellbeing		
	2-1-3-4.5	0-0-3-1.5	3-1-0-4	3-0-0-3	3-1-0-4	1-0-0-1	-		
II	**MEP102**	**EEL101**	**PHP102 / CYP102**	**MAL101**	**ECL101**	**BML101**	**LAN103**		**19.5**
	Digital fabrication	Basic Electrical Engineering	Physics lab/ Chemistry lab	Mathematics-II	Basic Electronics Engineering	Biology for Engineers	Professional Ethics		
	1-0.5-3-3	3-0-2-4	0-0-3-1.5	3-1-0-4	3-0-2-4	3-0-0-3	-		
III	**ECL201**	**ECL202**	**ECL203**	**ECL204**		**MAL 403**	**LAL100**		**19**
	Digital Electronics and Circuits	Signals and Systems	Introduction to Electronics	Network Theory	LA Courses	Probability and Statistics	Introduction to Communication Skills		
	3-0-0-3	3-0-0-3	3-0-0-3	3-0-0-3	x-x-x-1	3-1-0-4	1-1-0-2		
IV	**ECL211**	**ECL212**	**ECL213**	**ECL214**		**ECP211**	**LAL101**	**ECP212**	**17**
	Microcontroller and Embedded Systems	Digital Signal Processing	Communication Systems	Electronic Devices and Circuits	LA Courses	Microcontroller and Embedded Systems Lab	Introduction to Finance	Digital Signal Processing lab	
	3-0-0-3	3-0-0-3	3-0-0-3	3-0-0-3	x-x-x-1	0-0-3-1.5	1-0-0-1	0-0-3-1.5	
V	**ECL301**	**ECL302**	**ECL303**	**ECL304**		**ECP311**	**ECP312**	**ECP313**	**18**
	Digital Communication	Electromagnetic Theory	Control System Engineering	Analog Electronic Circuits	LA Courses	Analog Electronics Lab	Communication Lab Lab	Digital Electronics Lab	
	3-0-0-3	3-0-0-3	3-0-0-3	3-0-0-3	x-x-x-2	0-0-3-1.5	0-0-3-1.5	0-0-2-1	
VI	**ECL311**	**ECL312**		**UGQ301**					**18**
	VLSI Technology	FPGA for Digital Design	PE	Interdisciplinary Undergraduate Project	LA Courses		OE		
	3-0-0-3	2-0-2-3	x-x-x-3	0-0-6-3	x-x-x-3		x-x-x-3		
VII	**ECP411**								**17.5**
	VLSI Lab		PE		LA Courses		OE		
	0-0-3-1.5		x-x-x-9		x-x-x-1		x-x-x-6		
VIII									**17**
			PE		LA Courses		OE		
			x-x-x-9		x-x-x-2		x-x-x-6		

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Potential Instructors for program core courses:

Name of course	Semester	Potential Instructors
Digital Electronics and Circuits	III	Dr. Manish Pandey/ Dr. Vivek Raghuwanshi
Signals and Systems	III	Dr. Hathiram Nenavath/ Dr. Sreejith TV
Introduction to Electronics	III	Dr. Manish Pandey/ Dr. Vivek Raghuwanshi
Network Theory	III	Dr. Arzad Alam K./ Dr. Vivek Raghuwanshi
Microcontroller and Embedded Systems	IV	Dr. Arzad Alam K.
Digital Signal Processing	IV	Dr. Hathiram Nenavath/ Dr. Sreejith TV
Communication Systems	IV	Dr. Sreejith TV/ Dr. Arzad Alam K.
Electronic Devices and Circuits	IV	Dr. Manish Pandey/ Dr. Vivek Raghuwanshi
Electromagnetic Theory	V	Dr. Arzad Alam K./ Dr. Hathiram Nenavath
Control System Engineering	V	Dr. Arzad Alam K./ Dr. Manish Pandey
Digital Communication	V	Dr. Arzad Alam K./ Dr. Sreejith TV
Analog Electronic Circuits	V	Dr. Sreejith TV/ Dr. Arzad Alam K.
VLSI Technology	VI	Dr. Manish Pandey/ Dr. Vivek Raghuwanshi
FPGA for Digital Design	VI	Dr. Arzad Alam K./ Dr. Manish Pandey

Faculty Members with expression of interest in the department:
1. Dr. Arzad Alam K.
2. Dr. Sreejith TV
3. Dr. Manish Pandey
4. Dr. Hathiram Nenavath
5. Dr. Vivek Raghuwanshi

List of preferable Electives: The department encourages students to choose departmental electives from the following buckets according to the choice of the **minor** specialization.

Electives in the domain of Microelectronics and VLSI	Communication and Signal Processing	Microwave and RF
Digital IC Design	Wireless and Cellular Communication	Antenna Theory and Design
Microcontroller and Embedded Systems	Information theory and Coding,	Sub THz Design
VLSI Lab	Wireless MAC modelling	RF Engineering
Analog IC design	Machine Learning for Wireless Communication,	Microwave Devices and Systems
Mixed Signal Circuits	Physical layer Aspects	Advanced Antenna
VLSI Technology	Mobile Communication Systems	Microwave Systems
Solar Cells and Photo Voltaic	Advanced Computer Networks	RF Microelectronics
CMOS Image sensors	Multi Antenna Communication System	Electromagnetic Waves
Low Power VLSI	Digital Image Processing	MEMS
Design and Verification of VLSI circuits	Digital Speech Processing	Transmission Lines
VLSI CAD	Wireless Communication Security with SDRS	Broadband Antenna Array and Beamforming

Electronic System Design	Computer Vision	Computational Electromagnetics
Device simulation and compact Modeling	Advanced Topics in Digital Signal Processing	Millimeter Wave Components and System
Sensors and Instrumentation	Estimation and Detection	Electromagnetic Interference and Compatibility
Physics of Transistors	Fundamentals of MLOps	Radar Systems
Semiconductor Physics	Math of Machine Learning	
Digital System Design	Application of Stochastic Geometry in Wireless Networks	
Process Simulation	Multi-Antenna Digital Communications	
Software Embedded Systems	Advanced Computer Networks	
Power Electronics	Machine Learning Applications for Wireless Communications	
RF Microelectronics	Machine Learning for Signal Processing	
Semiconductor Device Modeling		
BTech Project-I		
BTech Project-II		

Laboratories:

Name of the Lab	Approx. Budget Required	Instruments Required
Microcontroller and Embedded Systems Lab	2.5 Lakhs	NXP FRDM-KL25Z Boards
Signal Processing Lab	50 Lakh	DSP Boards, Computer Systems, SDRs, FPGAs
Electronics Lab	1.5 Cr	Bread Boards, DSO, Power supplies, Multimeters, Function Generators, ICs, Discrete Components, Spectrum Analyzers, Vector Signal Generators, PCB machines, Arbitrary function Generators
Communication Lab	50 Lakh	USRP kits, DSP Kits
Digital Electronics Lab	30 Lakh	FPGA Boards, Computer Systems
VLSI Lab	2 Cr	Softwares + EDA tools + FPGA Boards+ Characterization setups including high performance MSOs, power supplies, Function generators, Spectrum Analyzers, Vector Signal Generators, PCB machines, Arbitrary function Generators
RF and Microwave Lab	3 Cr	Softwares, High Frequency RF Kits, DSP Boards, Power supplies, Multimeters, Function Generators, ICs, Discrete Components, Spectrum Analyzers, Vector Signal Generators, PCB machines, Arbitrary function Generators, DSO, Anechoic Chamber

Placement Statistics: The placement in ECE department in all IITs (including IIT KGP, IIT Roorkee, IIT BHU, IIT Guwahati) are almost 100%. All technology giants, like Samsung, Apple, Sony, Intel, Qualcomm, Broadcom, AMD, NVidia, LG, Cisco, Cadence, Synopsis, TSMC, ISRO, BEL, DRDO, and startups etc., all seek to hire students from Electronics and Communication Engineering.
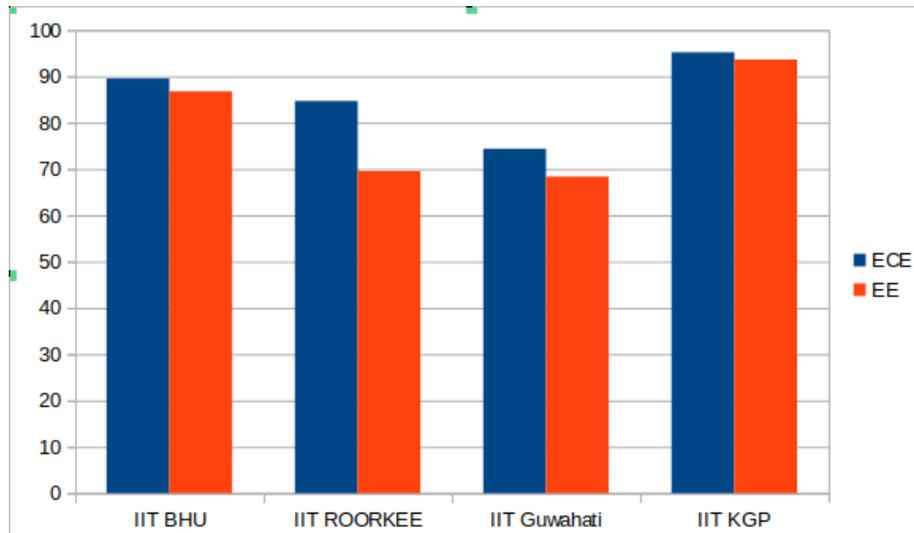
Tentative Course Contents

Courses offered in the Discipline of Electronics and Communication Engineering

ECL201 Digital Electronics and Circuits
3 Credits (3-0-0)
Prerequisite(s): None
Overlap with: TBD

Number Representations: binary, integer and floating-point- numbers. Combinatorial circuits: Boolean algebra, minimization of functions using Boolean identities and Karnaugh map, logic gates and their static CMOS implementations, arithmetic circuits, code converters, multiplexers, decoders. Sequential Circuits: latches and flip-flops, counters, shift-registers, finite state machines, propagation delay, setup and hold time, critical path delay. Data Converters: sample and hold circuits, ADCs and DACs.

ECL202 Signals and Systems
3 Credits (3-0-0)
Prerequisite(s): None
Overlap with: TBD

Representation of continuous and discrete time signals, operation on signals, classification of systems, linear time-invariant (LTI) systems, properties of LTI systems, convolution and correlation, Fourier series representation of continuous and discrete time periodic signals, Fourier Transform for continuous and discrete-time signals, Hilbert Transform, Laplace Transform, Z transform, Sampling theorem.

ECL203 Introduction to Electronics
3 Credits (3-0-0)
Prerequisite(s): None
Overlap with: TBD

Introduction to Electronic devices: passive devices, diode, bipolar junction transistor (BJT), metal oxide semiconductor field-effect transistor (MOSFET); Diode: basic structure and operating principle, current-voltage characteristic, large and small-signal models, iterative and graphical analysis; Diode Applications : rectifier circuits (half-wave and full-wave rectifiers, rectifiers with capacitor filter), voltage regulator (using Zener diode), clipper (limiter) circuits, clamper circuits; Bipolar Junction Transistors and their Applications: structure and modes of operation; n-p-n and p-n-p transistor in active mode, DC analysis of both transistor circuits; BJT as an amplifier, small-signal equivalent circuits, single-stage BJT amplifier (common-emitter mode); BJT as a switch; Metal Oxide Semiconductor Field-Effect Transistors and their Applications: structure and physical operation of n-type and p-type MOSFET; DC analysis of MOSFET circuits; MOSFET as an amplifier, small-signal equivalent circuits, single-stage MOSFET amplifier (common-source mode); MOSFET as a switch; Operational Amplifier (Op Amp) : ideal op amp; inverting amplifier, amplifier with a T-network, effect of finite gain, summing amplifier; non-inverting configuration, voltage follower; op amp applications like current-to-voltage converter, voltage-to-current converter, difference amplifier, instrumentation amplifier, integrator and differentiator; Feedback: basic concepts of negative feedback; four ideal feedback topologies; Oscillators: basic principles of sinusoidal oscillation; Example circuits; Digital Electronics: Boolean algebra and rules of simplification; combinational circuits like adder, decoder, encoder, multiplexer and demultiplexer; sequential circuits like flip-flops, counters and shift registers.

ECL204 Network Theory
3 Credits (3-0-0)
Prerequisite(s): None
Overlap with: TBD

Graphs of networks; current and voltage spaces of graphs and their representations: incidence, cutset and circuit matrices; Tellegen's Theorem. Formal study of methods of analysis such as nodal, modified nodal, cutset, loop analysis for linear networks. Multiport representation for networks with particular emphasis on 2-ports. Time domain analysis of R, L, M, C, controlled sources, networks using state space methods. Introduction to s-domain methods.

ECL211 Microcontroller and Embedded Systems
3 Credits (3-0-0)
Prerequisite(s): None
Overlap with: TBD

Introduction to the general structure of advanced microprocessors and microcontrollers. Discussions on architectures, instruction sets, memory hierarchies, pipelining and RISC principles. Introduction to Embedded Systems Design, Software Design Basics, ARM Cortex-M Processor Core, C Code as Implemented in Assembly Language, Interrupts, General Purpose Digital Interfacing, Analog Interfacing, Timers, Serial Communication.

ECL212 Digital Signal Processing
3 Credits (3-0-0)
Prerequisite(s): ECL202
Overlap with: TBD

DSP:(Prerequisite Signals and Systems) Introduction to signal space, orthogonal basis and signal representation using unitary transforms, Discrete Fourier Transform (DFT), Properties of DFT, circular convolution, linear convolution using DFT, overlap add and save methods, Fast Fourier Transform (FFT), Digital Filters, lowpass, bandpass, allpass, etc, Filter structures for IIR and FIR filters, linear phase FIR filters. Digital filter design techniques, FIR and IIR filter design, transformation of digital filters, Introduction to multirate DSP, decimation and interpolation, polyphase decomposition.

ECL213 Communication Systems
3 Credits (3-0-0)
Prerequisite(s): ECL202
Overlap with: TBD

Representation of signals and systems in a communication system: Discrete and continuous spectra of signals, concepts of modulation and frequency translation, lowpass and bandpass signals and channels, concept of complex envelope, Hilbert transform and phase shifting; Continuous wave (CW) modulation: AM, DSB/SC, SSB, VSB, methods of generation; Demodulation techniques of CW modulation: coherent and noncoherent; Nonlinear modulation techniques: FM and PM, narrowband FM, wideband FM, methods of generation; FM spectrum; Demodulation techniques for FM; Frequency Division Multiplexing (FDM); Radio transmitters and receivers; Sampling a signal by periodic pulse stream: spectra of ideally sampled signal, Nyquist sampling theorem, flat-top sampling, sampling of bandpass signals, examples of sampling circuits; PAM, PWM, PPM, PFM â spectra, generation and demodulation schemes; Time-division multiplexing; Performance of analog modulation schemes in AWGN : CNR, post-demodulation SNR and figure of merit for AM, DSB/SC,

SSB, FM, threshold effect in FM, pre-emphasis and de-emphasis in FM, FMFB. Noise in receivers; Noise figures; Radio link design.

ECL214 Electronic Devices and Circuits
3 Credits (3-0-0)
Prerequisite(s): ECL203
Overlap with: TBD

Semiconductor fundamentals, crystal structure, Fermi level, energy-band diagram, intrinsic and extrinsic semiconductor, carrier concentration, scattering and drift of electrons and holes, drift current , diffusion mechanism, generation and recombination and injection of carriers, transient response, basic governing equations in semiconductor, physical description of p-n junction, transport equations, current âÂÂ voltage characteristics and temperature dependence, tunneling current, small signal ac analysis.BJT equivalent circuits and modeling frequency response of transistors, pnpn diode, SCR, MOS structure, flat-band threshold voltages, MOS static characteristics, small signal parameters and equivalent circuit, charge sheet model, strong, moderate and weak inversion, short channel effects, scaling laws of MOS transistors, LDD MOSFET, NMOS and CMOS IC technology, CMOS latch phenomenon, ideal Schottky barrier, current voltage characteristics, MIS diode heterojunctions devices, optical absorption in a semiconductor, photovoltaic effect, solar cell, photoconductors, PIN photodiode, avalanche photodiode, LED, semiconductor lasers; negative conductance in semiconductors, transit time devices, IMPATT, Gunn device, BiCMOS devices.

ECL301 Digital Communication
3 Credits (3-0-0)
Prerequisite(s): ECL213
Overlap with: TBD

Concepts of information and entropy; Source coding: Coding theorem, fixed length codes; variable length codes; Quantization of signals; Waveform coding techniques: PCM, DPCM, ADPCM, DM, ADM; Baseband transmission: inter symbol interference, noise, eye pattern, BER analysis, Optimum filtering, equalization techniques; Clock recovery; Line coding techniques: Binary and multilevel line codes; Digital modulation schemes: Binary modulation schemes- ASK, PSK, FSK, DPSK; Mary modulation schemes: QPSK, MSK; QAM: generation and demodulation schemes, carrier recovery techniques, BER analysis of digital modulation systems; Shannon capacity theorem and spectral efficiency of digital modulation schemes.

ECL302 Electromagnetic Theory
3 Credits (3-0-0)
Prerequisite(s): None
Overlap with: TBD

Electrostatics and Magnetostatics, Faraday's law of electromagnetic induction, Maxwell's Equations: differential and integral forms and their interpretation, boundary conditions, Finite-difference time-domain method, Time-harmonic fields, wave equation and plane waves, Poynting vector.Plane Waves and Properties: reflection and refraction, polarization, phase and group velocity, propagation through various media, skin depth. Transmission Lines: equations, characteristic impedance, impedance matching, impedance transformation, S-parameters, Smith chart. Rectangular and circular waveguides, light propagation in optical fibers, dipole and monopole antennas, and linear antenna arrays.

ECL303 Control System Engineering
3 Credits (3-0-0)
Prerequisite(s): None
Overlap with: TBD

Introduction to Feedback Control, Differential Equations, Laplace Transforms, Transfer Function, Modelling Electrical, Mechanical, and Electro-mechanical Systems, Block Diagrams, Signal Flow Graph, State Space Representations, Non-linearities, Stability, Routh-Hurwitz Theorem, Steady State Error, Static Error Constants, Type Classification of Transfer Functions, Root Locus: Qualitative Sketching Rules, Root Locus: P, PI, PD, PID, Lag, Lead, and Lag-Lead Compensator Design, Notch Filters, Frequency Response: Bode Plots, Nyquist Stability Criterion, Gain Margin, Phase Margin, Sensitivity, Design Using Frequency Response, State Space Methods: Pole Placement, Observer Design, and Separation Principle.

ECL304 Analog Electronic Circuits
3 Credits (3-0-0)
Prerequisite(s): ECL203, ECL214
Overlap with: TBD

Scope and applications of analog electronic circuits. Amplifier models: Voltage amplifier, current amplifier, transconductance amplifier and transresistance amplifier. Biasing schemes for BJT and FET amplifiers, bias stability, various configurations (such as CE/CS, CB/CG, CC/CD) and their features, small signal analysis, low frequency transistor models, estimation of voltage gain, input resistance, output resistance etc., design procedure for particular specifications, low frequency analysis of multistage amplifiers. High frequency transistor models, frequency responseof single stage and multistage amplifiers, cascode amplifier. Various classes of operation (Class A, B, AB, C etc.), their power efficiency and linearity issues. Feedback topologies: Voltage series, current series, voltage shunt, current shunt, effect of feedback on gain, bandwidth etc., calculation with practical circuits, concept of stability, gain margin and phase margin. Oscillators: Review of the basic concept, Barkhausen criterion, RC oscillators (phase shift, Wien bridge etc.), LC oscillators (Hartley, Collpit, Clapp etc.), non-sinusoidal oscillators. Current mirror: Basic topology and its variants, V-I characteristics, output resistance and minimum sustainable voltage (VON), maximum usable load. Differential amplifier: Basic structure and principle of operation, calculation of differential gain, common mode gain, CMRR and ICMR. OP-AMP design: design of differential amplifier for a given specification, design of gain stages and output stages, compensation. OPAMP applications: review of inverting and non-inverting amplifiers, integrator and differentiator, summing amplifier, precision rectifier, Schmitt trigger and its applications. Active filters: Low pass, high pass, bandpass and bandstop, design guidelines. Digital-to-analog converters (DAC): Weighted resistor, R-2R ladder, resistor string etc. Analog-to-digital converters (ADC): Single slope, dual slope, successive approximation, flash etc. Switched capacitor circuits: Basic concept, practical configurations, application in amplifier, integrator, ADC etc. Other semiconductor devices: UJT, SCR, diac, triac etc., device characteristics and application circuits. Case study: practical circuits of typical electronic systems.

ECL311 VLSI Technology
3 Credits (3-0-0)
Prerequisite(s): None
Overlap with: TBD

Introduction: History of Integrated circuits, CMOS Process flow starting from Substrate selection to multilevel metal formation, Modern CMOS Technologies. Wafer Manufacturing: Single crystal growth, Czochralski and FZ growth methods, Wafer preparation and specifications, SOI Wafer manufacturing. Cleaning Processes: Clean Rooms, Wafer Cleaning. Thermal oxidation of silicon: Wet and Dry oxidation, growth kinetics and models, electronic defects, characterization methods. Optical lithography: Light sources, Wafer exposure systems, Photo resists, Mask making, Mask Engineering, Limits and future trends. Solid state diffusion: Various Models for diffusion, Manufacturing and Characterization methods, Future trends. Ion implantation: Basic concepts, High/Low energy implants, Limits and future trends, RTA Process & dopant activation. Thin Film Deposition: Physical and chemical vapor deposition techniques. Etching: Wet and dry etching, Reactive and plasma etching. Back-end Technology: Backend Technology and VLSI/ULSI process integration, Multilevel Interconnects, Silicide formation, planarization, and packaging. Novel Processes: Fabrication processes for large area and flexible electronics systems, challenges and future trends.

ECL312 FPGA for Digital Design
3 Credits (2-0-2-3)
Prerequisite(s): ECL201
Overlap with: TBD

Introduction to FPGA and Hardware Description Languages (HDLs), Combinational Circuits-Logic gates, Boolean Algebra, gate-level minimization, Circuit design and implementation, Adders, Comparators, Multiplexers, Decoders/encoders, Applications, Data storage elements – Latches, Flip-Flops, Register, Memory, Applications, Sequential Circuits – State tables and diagrams, State representation in HDLs, Timing in sequential circuits, Shift register, Counters.

ECQ401 B.Tech Project-I
3 Credits (0-0-6)
Prerequisite(s): Instructor's consent
Overlap with: NA

To be offered by multiple faculty members. Research and development-oriented projects based on problems of practical and theoretical interest of student/faculty. Students are generally expected to work towards the goals set by the project supervisor (if faculty members' project)/mentor (if students' proposed project). Evaluation is done based on regular presentations, written reports, as per department-level policy.

ECQ402 B.Tech Project-II
3 Credits (0-0-6)
Prerequisite(s): Instructor's consent, ECQ401
Overlap with: NA

To be offered by multiple faculty members. Research and development-oriented projects based on problems of practical and theoretical interest of student/faculty. Students are generally expected to work towards the goals set by the project supervisor (if faculty members' project)/mentor (if students' proposed project). Evaluation is done based on regular presentations, written reports, as per department-level policy.

Information received from the Academic Section

M.Tech (Current structure)

S. No	Category	Minimum Credits
1.	IC	6
2.	DE	18
3.	Thesis	48
Total (Minimal requirement)		**108**

M.Tech (Proposed structure)

Category	Credits
PC	12
DE	09
DE/OE	03
Thesis/DE/OE*	06
Thesis	24
Total (Minimum requirement)	**54**

- Credit load for first two semesters is 12
- Credit load in other two semesters is 15
- Credit requirement for the MTech program is 54
- Minimum 4 semester registration is mandatory
- Minimum credit from the thesis is 24
- Minimum credit from the course work is 24
- Thesis can be credited from the 2nd semester
- Supervisor selection is mandatory for the thesis credits registration

- *One audit course (0 credit compulsory): Professional communication & Research Methodology (tentative name)*

MTech Program in EVT

Lectures-Tutorials-Practicals/Project/Lab-Total credits (L-T-P-C)

<mark>**Core courses**</mark>

1. Introduction to EV and HEV (3-0-0-3)   (Sem-I)
2. Motor Drives for EV (3-0-0-3)   (Sem-I)
3. Energy Storage Technologies (3-0-0-3) (Sem-II)
4. Power Electronics for EV, Lab (0-0-3-1.5)   (Sem-II)
5. Motor Drives Lab (0-0-3-1.5)   (Sem-II)

Total PC credits = 12 (3 courses of 3 credits each and 2 labs of 1.5 credits each)

<mark>**Departmental Electives**</mark>

1. Advance Power Electronics (3-0-0-3)
2. Renewable and Distributed Energy Systems (3-0-0-3)
3. Power Quality (3-0-0-3)
4. Advanced Sensing Techniques (3-0-0-3)
5. Optimal Control (3-0-0-3)
6. Advanced Control Theory (3-0-0-3)
7. Machine Learning and Statistical Modeling (3-0-0-3)
8. Solar Photovoltaic Devices and Systems (3-0-0-3)
9. Data Analytics in Power Systems (3-0-0-3)
10. Application of Power Electronics in Electric Vehicles and Smart Grids (3-0-0-3)
11. Power Electronic Converters for Renewable Energy Systems (3-0-0-3)
12. Advanced Photovoltaics (3-0-0-3)
13. Advanced Power Systems Analysis (3-0-0-3)

Note:

1. In the modified course structure, the courses will require new syllabus design, even though some of them have similar names as the existing courses in EVT.
2. The presently running curriculum of MTech EVT has "Introduction to EV and HEV" course of 2 credits and another course of "EV Policies and Regulations" of 1 credits. The course in the new curriculum "Introduction to EV and HEV" will be a combined version of these two courses, so a new syllabus of "Introduction to EV and HEV" will need to be proposed and approval needs to be obtained.
3. Energy Storage Technologies: This course will be a updated version of the presently running course "Electrochemical Energy Conversion and Storage Technologies" adapted for EV applications.

4. In addition to 9 credits as DE from the following bucket of courses, as per the institute norms, upto 9 additional credits are required as Open Electives. These open electives can be taken from any of the departments as per the availability of relevant courses in different departments across the institute such as "Machine Learning", "Electrochemical Energy Conversion and Storage Technologies" and "Battery Chemistry-Components and Manufacturing".

MTech EVT

Semester	Courses (Number, Title, L-T-P)					Theory courses	Contact hours per week				Credits
							L	T	P	Total	
I	Introduction to EV and HEV (3-0-0)	Motor Drives (3-0-0)	PE (3-0-0)	PE/OE (3-0-0)		4	12	0	0	12	12
II	Energy Storage Technologies (3-0-0)	Power Electronics for EV, Lab (0-0-3)	Motor Drives Lab (0-0-3)	OE/PE (3-0-0)	PE (3-0-0)	3	9	0	6	15	12
Summer											
III	PE/OE (3-0-0)	Thesis									15
IV	PE/OE (3-0-0)	Thesis									15

* Minimum course and thesis credits should be 24 each

Course content for new courses(Tentative):

Introduction to EV and HEV (3-0-0-3):

This 3 credit course will be a replacement for existing EVL501 and EVL502

Introduction: Need for electrification and challenges, Past present and future of EV, Dynamics of automobile, EV sizing and placement; Architecture of Hybrid and Electric Vehicles: Series, Parallel and series-parallel HEV, Types of xEV (BEV, PHEV, FCEV, strong and mild hybrid), IC engine for HEV, transmission in HEV, Electrical systems in automobiles, Design considerations: aerodynamics, rolling resistance, vehicle mass,

transmission efficiency; Power electronics for Evs: DC/DC converters (Buck, boost, full bridge, flyback, DAB), Voltage source inverters - topology and PWM techniques, Multi level inverters; Electrical Machines and drives for Hybrid and Electric Vehicles: Induction machines, Permanent Magnet synchronous motor, Switched reluctance motor. Guidelines and Standards for EV adoption; Battery Electric Vehicles; Charging Infrastructure and protocols; Battery Charging/Swapping Stations, ; Demand-side Incentives for EV, Supply-side Incentives for EV, Development of Manufacturing EV Manufacturing Ecosystem, Recycling ecosystem - Battery and EVs.

Energy storage Technologies (3-0-0-3):

This course will be a replacement of EVL500 and EVL600 tailored for students with non-chemistry background

Introduction to Battery materials, Battery chemistries and Battery components; Comparison between different battery chemistry w.r.t. specific power, specific energy, safety, lifespan, performance, cost etc ; Mechanism of metal-ion transport, change in oxidation-reduction state and structural features, Charge balancing during charging and discharging of the metal-ion battery; Different electrode materials for Liion, Li-S, Na-ion and K-ion batteries ; State of the art cathode and anode electrode materials ; Selection criteria for electrolytes, separator, conductive additives, binder, current collector and other components of the battery ; Manufacturing or processing constraints ; Manufacturing of batteries of different formats including Coin cell, Pouch cell, Prismatic cell, cylindrical battery, Hexagonal prism battery, Tab-less battery etc.; Different testing protocols and battery terminologies such as Capacity, Cycle life, SOH, SOC, SOD, DOD, DOC, BMS, C-rate, Ragone plots, Energy density, Power density, Volumetric capacity etc., Factors influencing the performance of batteries like temperature, cycling speed, voltage etc. Fuel cell, Battery management systems, Supercapacitors, Battery management systems: requirement, circuits and protocols. Battery protection systems. Battery terminologies, Battery design parameters for several Electric Vehicles, Battery Architecture and Engineering; Manufacturing technologies of batteries, Sustainable design of batteries, Hybridization of battery, Battery applications for stationary and secondary use.

Power Electronics Lab for EV (0-0-3):

Gate pulse generation for DC-DC converter using microcontroller and power transfer: Phase Shift Full Bridge and Dual Active Bridge converter, Control of a Totem pole converter for EV charging application, Simulation of Series, parallel and Series-Parallel HEV throughout drive cycle, V2G operation. The charge and discharge characteristics of a supercapacitor, Li-ion battery and Fuel cell.

Motor drives Lab (0-0-3)

Vector control of PMSM and IM drives over complete drive cycle of EV, Characterization of power, torque and efficiency for EV, Power flow in EV power train during charging, V2G feeding, motoring and braking, Forward & backward motoring and regenerative braking of EV consisting of multiple motordrives, Synchronized PWM techniques for high-power and high-speed IM drives

References:

1. **Course of study, Centre for Automotive Research and Tribology, IIT Delhi, page no. 378- 380** https://beb.iitd.ac.in/Courses-of-Study-2022-2023.pdf
2. **IIT Hyderabad, Online MTech Admission in Electric Vehicle (EV) Technology,** Link: https://mae.iith.ac.in/files/Online_MTech_EV_Final_2_March_2022.pdf
3. **IIT Indore, Master of Technology In Electric Vehicle Technology** Link: https://www.iiti.ac.in/public/storage/new_mtech/MTech%20Electric%20Vehicle%20Technology.pdf
4. **Department of Electrical Engineering, Indian Institute of Technology Roorkee.** Link: https://acad.iitr.ac.in/Varsity/Academic_Programmes/PG/EE/Structure_MTech_Electric_Vehicle_Technology.pdf
5. **Master of Technology in Electric Transportation, IIT Mandi** Link: https://www.iitmandi.ac.in/pdf/admissions/Electric_Transportation_0.pdf

Annexure I

1 **Terms Used**
2 **Scope**
3 **Introduction**
4 **Academic administrative structure**

    4.1   Postgraduate committee (*Academic Advising /faculty advisor for specialization in the field (new proposal, representative for each specialization*)
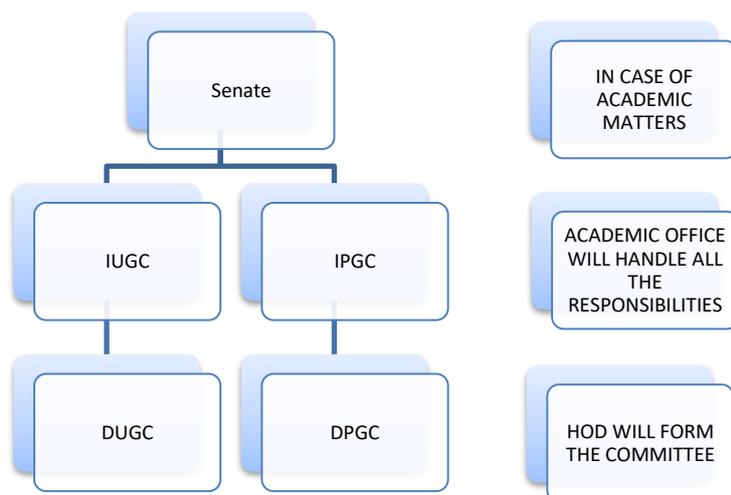
Senate: The Senate shall act as the highest authority to decide in all such matters related to academic activities. The Director of the institute shall be the ex-officio chairperson of the Senate.

Institute Post-Graduate Committee (IPGC): IPGC shall be responsible for dealing with the issues related to the PG program. The chairman of IPGC is appointed by the chairman of the Senate.

Department Post-Graduate Committee (DPGC): DPGC shall look after the activities related to the PG program of the department. The Head of the Department shall appoint the committee. The committee shall be composed of a minimum of two faculty members from the department and at least one PG student representative (invited member) from the department nominated by CoSA. One of the faculty members shall be appointed as convenor of the committee by the Head of the department. Convenor-DPGCs shall be members of IPGC.

    5   **Academic Programs**

5.1 Postgraduate programs, M.Sc., M.Tech., PhD, dual degree and conversion (part-time full-time, regular, sponsored, external)

Program	Offered in Discipline	Offered by department(s)
Master of	Chemistry	Chemistry

Science (M.Sc.)	Mathematics and Computing	Mathematics
	Physics	Physics
Master of Technology (M.Tech.)	Bioengineering	Bioscience and Biomedical Engineering
	Computer Science and Engineering	Computer Science and Engineering
	Data Science and Artificial Intelligence	
	Control and Instrumentation	Electrical Engineering
	Power Systems and Power Electronics	
	Electric Vehicle Technology	
	Electronics & Communication Engineering	Electronics & Communication Engineering
	Materials Science and Metallurgical Engineering	Materials Science and Metallurgical Engineering
	Design and Manufacturing	Mechanical Engineering
	Thermal and Fluids Engineering	
	Mechatronics Engineering	Mechatronics Engineering
Doctor of Philosophy (Ph.D.)	Bioscience and Biomedical Engineering	Bioscience and Biomedical Engineering
	Chemistry	Chemistry
	Computer Science and Engineering	Computer Science and Engineering
	Data Science and Artificial Intelligence	
	Electrical Engineering	Electrical Engineering
	Electric Vehicle Technology	
	Electronics & Communication Engineering	Electronics & Communication Engineering
	Liberal Arts	Liberal Arts
	Materials Science and Metallurgical Engineering	Materials Science and Metallurgical Engineering
	Mathematics	Mathematics
	Mechanical Engineering	Mechanical Engineering
	Mechatronics Engineering	Mechatronics Engineering
	Physics	Physics

5.2 Min. Duration (in terms of credits), Max. Duration and Acad. Requirements

	Credits
M.Sc.	72
M.Tech.	54
PhD (Engineering discipline)	72 (Students with a PG degree in Engineering)
	84 (Students with a UG degree Engineering or PG in Science)
PhD (Science or Liberal Arts discipline)	72

MSc Program-

The M.Sc. program offered at IIT Bhilai is a fully residential program with a nominal duration of 2 years (i.e., four semesters). Accordingly, the minimum credit requirements for students in various categories of courses to become eligible for the award of an M.Sc. Degree from IIT Bhilai is as follows.

Course Category	Credits
Program core (PC) courses	33 to 48
Program elective (PE) courses	3 to 15
Project/Program elective (PE)/Open elective (OE) courses	0 to 18
Thesis	0 to 24
Minimum Credit Requirement	**72**

Credit requirements for various categories of courses can be different for different MSc programs. Program-specific requirements can be found in the Course of Study booklet.

MTech Program-

The M.Tech. program at IIT Bhilai had a nominal duration of two years (i.e., four regular semesters) with a minimum residential requirement of two regular semesters. The minimum credit requirements for students in various categories of courses for the award of an MTech Degree from IIT Bhilai is provided in the following table.

Course Category	Credits
Program core (PC) courses	12 to 15
Program elective (PE) courses	9 to 12
Project/Program elective (PE)/Open elective (OE) courses	0 to 3
Thesis/ Project/Program elective (PE)/Open elective (OE) courses	3 to 9
Thesis	24
Minimum Credit Requirement	**54**

Credit requirements for various categories of courses can be different for different MTech programs. Program-specific requirements can be found in the Course of Study booklet.

PhD Program-

Candidates are admitted to PhD program in IIT Bhilai either after completion of Undergraduate (UG) or Postgraduate (PG) program subject to fulfilling the other eligibility criteria defined by the Institute. The minimum credit requirements for students in various categories of courses for the award of PhD Degree from IIT Bhilai is provided in the following tables:

PhD (Engineering discipline)-

Course Category	Minimum Credits (Students with PG degree in Engineering)	Minimum Credits (Students with UG degree in Engineering or PG

		in Science)
Program elective (PE) courses	-	12
Project/Program elective (PE)/Open elective (OE) courses	12	12
Thesis/ Project/Program elective (PE)/Open elective (OE) courses	06	06
Thesis	54	54
Minimum Credit Requirement	**72**	**84**

PhD (Science or Liberal Arts discipline)

Course Category	Minimum Credits (Students with PG degree in Science/LA or UG/PG in Engineering)
Project/Program elective (PE)/Open elective (OE) courses	12
Thesis	60
Minimum Credit Requirement	**72**

Credit requirements for various categories of courses can be different for different PhD programs. Program-specific requirements can be found in the Course of Study booklet.

Application categories for PhD admission
Applicants meeting the eligibility criteria may apply for admission to the PhD program under any of the following categories.

- A. Institute Fellowship
- B. Sponsored full-time.
- C. Sponsored part-time.
- D. External full-time.
- E. External part-time.

A. Institute Fellowship: Applicant applying under this category has to be a full-time scholar at IIT Bhilai and needs to be present on the campus for the duration of PhD program as per the rules of IIT Bhilai. A student enrolled in this category (i.e., category A) receives the Institute Fellowship as per the norms defined by the Ministry of Education, Govt. of India.

B. Sponsored full-time: An applicant who is either an awardee of a research fellowship from some recognized funding agency (CSIR/ UGC/ NBHM/ DBT/ ICAR/ ICMR/ ICPR etc. or DST INSPIRE Fellowship) or is sponsored by his/her employer for the duration of PhD tenure may apply under this category. A sponsored full-time student needs to be present on the campus for the entire duration of PhD and be involved in full-time research as per the rules of IIT Bhilai. A certificate/declaration of sponsorship from the sponsoring body must be submitted by the applicant at the time of applying for admission. In case the applicant is employed by an organization, he/she shall submit an undertaking of the employer endorsing that he/she shall be relieved for staying on the campus for the

nominal duration of the program.

C. **Sponsored part-time:** Professionally employed personnel (with minimum of 2 years of experience in the same organization) such as working engineers, scientists, and teachers who can, while employed, attend regular classes as per the schedule of IIT Bhilai may apply for admission to PhD program under the sponsored part-time category. The applicant must be an employee of a recognized organization and be engaged in professional work in the relevant area. The organization must be situated within the close proximity of 75 Km radius of IIT Bhilai. The student must be available in person on a regular basis for discussion/meeting with the supervisor. The applicant shall give an undertaking at the time of application duly endorsed by the employer (No Objection Certificate) that he/she will be relieved for the course work.

D. External full-time: An applicant working in a reputed and recognized industry / academic establishment/research laboratory (Outside of IIT Bhilai) having R&D facilities for a period of minimum of 2 years may apply under this category. An external full-time student needs to be involved in full-time research at the organization employing the student. Such a student is expected to carry out all/major part of the research work in the organization employing the student. The employer must explicitly undertake to relieve the applicant for staying on the campus to complete the required course work. A certificate (No Objection Certificate) to that effect from the sponsoring organization must be provided by the applicant at the time of applying for admission. The applicant shall provide the CV of the prospective supervisor(s) who would supervise the applicant's work at his/her organization. Students shall have a supervisor (see the guidelines) from his/her parent organization and a co-supervisor from IIT Bhilai.

E. External part-time: An applicant working in a reputed and recognized industry / academic establishment / research laboratories having R&D facilities for a period of minimum of 2 years may apply for admission to PhD programs under this category. An external part-time student may be involved in his/her regular job assignments along with the research for PhD. Such a student is expected to carry out all/major part of the research work in the organization employing the student. The employer must explicitly undertake to relieve the applicant for staying on the campus to complete the required course work. A certificate (No Objection Certificate) to that effect from the sponsoring organization must be provided by the applicant at the time of applying for admission. Student shall have a supervisor (see the guidelines) from IIT Bhilai and a co-supervisor from his/her parent organization. The applicant shall provide the CV of the prospective co-supervisor(s) who would supervise the applicant's work at his/her organization.

6   Academic regulations

   6.1   Extension of Programme

      a) No student who has completed the prescribed maximum duration (M.Tech. and M.Sc. 6 semester; for Ph.D. 15 semesters) in the program shall be allowed to register in the subsequent semesters unless he/she has been granted an extension of the program by the Senate on the recommendations of the DPGC and the IPGC.

      b) A student may apply for an extension to the Chairman Senate through the proper channel in the last semester according to the maximum duration of his/her programme, not later than the last instructional day.

      c) If a student fails to apply for an extension as per clause 6.1. (b), his/her program will be auto-terminated from the last day of the grades submission. However, the student may appeal to the Chairman Senate for the reinstation of his/her programme within 15 days from the last day of the grades submission of that semester.

      d) Ph.D. students who have submitted their theses and are waiting for their defense will be treated automatically as registered unless they apply for leave.

   6.2   Advance Standing

a. On the recommendation of the DPGC and approval of the IPGC, a student admitted to a postgraduate program after partial completion of such or a similar program elsewhere may be granted an exemption up to 50 percent of the minimum course credits requirements of IIT Bhilai.

b. A Ph.D. student who has completed the two-year M.Sc./M. Tech program at IIT Bhilai can transfer their PG course credits *(level 5 & above)* earned during the M.Sc./M.Tech program, towards the fulfillment of his/her course requirement for the Ph.D. program on the recommendation of the DPGC and approval of the IPGC, provided these credits were in excess of the minimum requirement for earning the M.Sc./M.Tech. degree.

   6.3   Credits, Grades, Semester, and Cumulative Performance Index

      a) In each course a student is registered, he/she earns certain approved credits and is awarded a letter grade indicating his/her overall performance in that course. There are ten letter grades: A+, A, A-, B, B-, C, C-, D, FS, F, S, X and I. The correspondence between grades and points (on a 10-point scale)/rating is given below: A+: 10 (outstanding); A: 10; A-: 9; B: 8; B-: 7; C: 6; C-: 5; D: 4;; FS: 0; F: 0; S: Satisfactory; X: Unsatisfactory; I: Incomplete.

      b) The thesis for the Ph.D. students shall be graded as satisfactory (S) or unsatisfactory (X). M.Tech. and M.Sc. thesis shall be graded from the letter A, B, C, and F as mentioned in 6.3 (a).

      c) All students shall appear in all examinations (including the mid-semester and end-semester examinations). Failure to appear in any examination will cause 0

(zero) marks to be awarded in that examination and the grading to be carried out accordingly. A student who fails to appear in any written examination (mid-semester or end-semester examination) due to genuine medical or unavoidable reasons may be permitted by the course instructor to take make-up examination subject to certification by the Institute doctor on the severity of the medical condition. The student should make a request for this purpose supported by all documents. Such a request shall reach the course instructor within two days of last date of mid-semester examination or end-semester examination (whichever exam is missed by the student). In exceptional circumstances, course instructors may also allow students to appear in the make-up examination to provide them with an additional chance to improve their performance. Students who are permitted to appear in the make-up examination shall be awarded FS grade. If the student fails to appear in the make-up examination as per the academic calendar, the FS grade is converted to regular grade. The make-up examination shall be used to substitute the marks of the examination missed by the student and the grading shall be carried out by the instructor as per the regular class grading.

d) If a student does not complete all the requirements for a course for a genuine reason, the instructor may award a grade I (Incomplete). An I grade must be converted by the instructor to a regular letter grade by the last date for such conversion specified in the Academic Calendar, failing which it is automatically converted to an F grade.

e) A student getting an 'F' grade in a course must either repeat it or substitute it, depending upon the nature of the course (core or elective), by another course as suggested by DPGC/Thesis Supervisor.

f) A student getting a grade less than or equal to C in a course (excluding thesis course) may be allowed to repeat it or substitute it with another course, depending upon the nature of the course (core or elective), by another course as suggested by DPGC/Thesis Supervisor, provided that:

    his/her CGPA is less than the prescribed minimum, and the student is allowed to continue in the program **(as mentioned in the table 17.1)** or the repetition/substitution is for a maximum of one course in the program such that it does not lead to any increase in the semester load.

g) In case a course is repeated or substituted, the old grade will also appear on the transcript, although it will not be taken into account while computing the CGPA/SGPA.

h) If a student is on leave for a part of the semester or submits his/her thesis in the middle of a semester, the IPGC may reduce his/her thesis/ project credits appropriately.

i) Computation of the SGPA and CGPA: The SGPA is an indicator of the overall academic performance of a student in all the courses he/she has registered during a given semester. It is computed as follows: If the grades awarded to a student are G1, G2 etc in courses with corresponding credits C1, C2 etc, the

SGPA is given by $SGPA = (C_1 G_1 + C_2 G_2 + \ldots) / (C_1 + C_2 + \ldots)$.

j) In the above computation, courses with S and X grades are ignored.

6.4 Exit from PG programs:

a) A Ph.D. student may exit from the programme with an appropriate degree/diploma as per the institute policy enforced, provided:

i. a request to this effect is made not before the student has completed two-and-half years (excluding the period of sanctioned leave, if any) in the programme.
ii. the request is approved by the Senate on the recommendations of DPGC and IPGC.

b) A postgraduate student may withdraw anytime from his/her academic programme, provided he/she makes a written request to this effect, and his/her request is endorsed by DPGC and approved by IPGC.

6.5 Policy for registering/ award of grades for NPTEL/ SWAYAM/MOOCS etc.

1. It is proposed that maximum of **06 credits** (equivalent of two full semester course credits, against 3 credits of PE and 3 credit of OE, incase any department doesn't have the provision of OE may opt for 6 credit PE on approval of IPGC) of course may be earned through online courses offered/available at NPTEL/ SWAYAM/MOOCS and courses offered at other IITs and academic institutions similar in repute to IITs in India and abroad provided:

(a) the prior approval from Chairman IPGC has to be taken for registering a course through online mode.

o PG Student(s) who wish to credit a course through online mode shall make a request in the standard format to the convenor DPGC of the respective department.

o Convenor DPGC, in consultation with the DCRC, shall assess/evaluate the proposed course content, its credit as per the IIT Bhilai norm, its usefulness for the student, and the non-availability of similar courses in the institute. Upon the positive feedback/recommendation of DCRC, Covenor-DPGC shall forward this course approval of Chairman IPGC. After approval only, a student is allowed to register for the online course.

o In case of large number of proposed online courses, DCRC may recommend to limit the number of courses to be adopted through online mode.

o Online courses can only earn the credits against the department elective (PE/OE) courses.

o Course performance evaluation must be done by the department as per the institute norms (see policy document).

o No core course credits and thesis credits in any circumstances shall be allowed to earn through online mode.

6.8 Compensatory time to PwD students: Compensatory time not less than 20 minutes per hour of the examination should be allowed for persons with specified disabilities covered under the definition of Section 2(s) of the RpwD Act, 2016 but not covered under the definition of section 2(r) of the said Act i.e. persons having less than 40%

disability and having difficulty in writing. In case the duration of the examination is less than an hour, then the duration of the compensatory time should be allowed on pro-rata basis. Compensatory time should not be less than 5 minutes and should be in the multiple of 5.

6.9 Audit courses: A student has the option of auditing upto 3 credits in a semester with consent from the course instructor(s). Grades obtained in audit courses are not counted for computing SGPA/CGPA although the grade earned by the student is reflected in the grade card or transcript. However, a pass grade (other than F grade) is essential for completing an audit course.

6.10 Exchange Semester (exchange programme) in another Institution: see the policy document.

9   Academic Year and Semesters

The academic session of the Institute is divided into three parts: two regular semesters: Monsoon and Winter. The Monsoon semester will normally commence in the last week of July every year, and the Winter in the last week of December.

10   Academic Calendar

The office of academic affairs shall release the academic calender mentioning the academic activities of the institute well in advance of the start of the academic year.

11   Change of Program or Nature of Program

11.1   Change of Registration from M.Tech./MSc Programme to Ph.D. Programme: A MTech/MSc student can be allowed to convert his/ her program to dual degree MTech/Msc- PhD as per the institute norms. A detailed policy in this regard shall be formulated in due course of time.

12   Registration
12.1   Late Registration
12.2   Summer Registration (conditional)
12.3   Adding/Dropping of Courses
12.4   Change of Registration from Part-Time to Full-Time or *vice-versa (as per the enforced institute policy)*
*Concurrent registration of any PG degree at another not allowed etc

13   Residential Requirements
13.1   Attendance

14   *Leave of Absence*
14.1   Leave rules
   a. Normally the leave shall be discouraged for those students doing the course work during the semester.
   b. Postgraduate students who are entitled to vacation leave/casual leave as per the rules, shall be required to take appropriate leave prior to leaving the campus.
   c. No student shall be allowed more than 9 days of absence from the Institute (including prefix or suffix of the Institute holidays) if part of the duration of absence falls outside of inter-semester or intra-semester break.
   d. A PhD student who has submitted the thesis and is waiting for defense shall be permitted to go on leave and stay off-campus if he/she so desires.

14.2   Vacation Leave and Casual Leave: Sanctioned or approved by DPGC

14.2.1 A postgraduate student may take a maximum of 30 days of vacation leave in an academic year (including summer-winter break and mid-semester breaks). Leave not availed in one academic year may be carried over to the next academic year up to a maximum of 15 days. However, a student cannot take more than 30 days of continuous leave during the vacations.

14.2.2. In addition, a student may be allowed casual leave for up to 8 days for an academic year. The casual leave cannot be carried over.

14.2.3 There will be no loss of financial assistantship for students going on personal or casual leave.

14.2.4 Weekends or gazetted holidays falling within the period of the leave will be counted if vacation leave is utilized but will not be counted in case of casual leave. Suppose if a student applies for vacation leave from Friday to Monday, then Saturday and Sunday will be counted in the leave period, i.e., a total of four days will be counted as leave. However, if a student applies for casual leave from Friday to Monday, then Saturday and Sunday will not be counted in the leave period, i.e., a total of two days will be counted as leave.

14.3   Medical Leave and certificate: Sanctioned or approved by HoD/DPGC

Leave on medical ground, duly supported by a medical certificate, may be granted in lieu of the vacation leave.

If a student falls ill while on the IIT Bhilai campus, the medical certificate must be obtained from the Institute's medical officer/doctor. If the student falls ill outside the campus while on sanctioned leave, the medical certificate must be obtained from a registered medical practitioner.

14.4   Maternity/Paternity Leave: Approved by chairman senate with recommendation of chairman IPGC.

It would be adopted and implemented for the students of IIT Bhilai as per the GOI norms for employees.

14.5   Semester Leave/Term Leave: Approved by chairman senate with recommendation of chairman IPGC.

Semester leave for up to a maximum of two semesters for M.Tech. and Ph.D. students may be sanctioned for bonafide reasons. Except for medical reasons, such leave would not normally be sanctioned before a student has completed his/her minimum total credit requirements and in no case before the student has spent two semesters in the programme. However, on medical considerations such leave may be sanctioned after his/her stay of one semester. Leave for more than one semester /term at a time will not be granted.

14.6   Absence without Sanctioned Leave

Absence without sanctioned leave may result in the termination of the student's program. Absence without sanctioned leave may also entail loss of financial assistantship/scholarship or loss of academic credits or both for the period of absence or more. All such matters should be reported and discussed in IPGC.

14.7   Academic leave
The current policy on academic leave may be looked upon: short term in nature to attend conference, short term courses on the recommendation of supervisor and DPGC approved by Head/ DoAA/Director.

15 *Permission for academic and non-acad activity outside the IIT Bhilai*

15.1. Permission for academic activity outside the IIT Bhilai such as Fieldwork, data collection, equipment access, industrial training, etc.

The PG students can be permitted to proceed for academic activities outside IIT Bhilai to carry out field work, data collection, library work, computational work, experimental work, and Lab works, and to attend conference, short term courses, workshop, as recommended by the department. The student shall apply at least two weeks before the date of travel for permission. The application shall be made to DOAA through supervisor (if already assigned) and DPGC.

A student may also be permitted to proceed to another academic or research organization or to an industry for carrying out research with if it is in the interest of the research. The student shall apply at least two weeks before the date of travel for permission. The application shall be made to DOAA through supervisor and DPGC.
(Up to 15 days : HoD; more than 15 days and up to 30 days: Chairman IPGC; more than 30 days: Chairman Senate)

15.2. Permission to attend non- academic activities outside IIT Bhilai

The PG students can be permitted to proceed for non-academic activities outside IIT Bhilai to carry participate in training and competition in sports and other extracurricular activities. The student shall apply at least two weeks before the date of travel for permission. The application shall be made to DOAA through supervisor (if already assigned), faculty-in-charge of respective events, and DPGC. Student shall be responsible for academic loss during the period of absence. Absence of this type without permission may lead to serious disciplinary action up to termination of the program. Approved by chairman IPGC or Chairman Senate upon the recommendation of DPGC and HoD.

16   Course Structure
16.1   *Course Credit Structure (LTPC):Already done in curriculum*
16.3   Crediting advanced level UG Course

17   Program Structure
17.1 Minimum SGPA/CGPA requirements

Sl No.	Program	Minimum SGPA and CGPA
1	M.Sc.	SGPA ≥ 5.5 and CGPA ≥ 5.5
2	M.Tech.	SGPA ≥ 5.5 and CGPA ≥ 5.5
3	PhD*	SGPA ≥ 7.0 and CGPA ≥ 7.0

*Course work

17.2 Academic probation

(a) If, in two consecutive semesters, the CGPA of a student falls below the minimum criteria of CGPA mentioned in 17.1, his/her program will be auto-terminated.

(b) If a student scores CGPA below 4.0 in any semester of his/her MSc/MTech/PhD program, his/her program will be auto-terminated.

(c) If a student in a semester does not fulfill the minimum criteria of CGPA mentioned in 17.1, he/she will be put on academic probation and an intimation has to be sent by the academic office to the department where the student is registered. He/she will be allowed to register for the next semester only if his/her CGPA ≥ 4.0 for MSc, MTech, PhD on the recommendation of DPGC and with the approval of IPGC. A letter of warning will be issued to the student by the HoD regarding the academic probation if his or her CGPA falls in the range of 4.0 ≤ CGPA< 5.5) for MSc/MTech and 4.0, ≤ CGPA<6 for PhD, and the same is intimated to the academic office.

(d) During the academic probation period, a student is not allowed to represent the institute/department in any extracurricular activities being organized outside of the institute. If it is found that the student has represent the institute/department in any of such events, his program will be terminated.

(e) A student will normally not be allowed to register and program will be auto terminated if

(i) his/her CGPA falls below 4.0 for MSc, M.Tech. and PhD

(ii) his/her CGPA falls below 5.5 for MSc, and M.Tech. and 6.0 for PhD for two consecutive semesters.

(iii) a MSc student accumulates more than 2 'F' grades and a M.Tech student accumulates more than 3 'F' grades in thesis units during the program.

(iv) a PhD student accumulates 8 or more thesis unit 'X' grades in the program or 6 or more thesis unit 'X' grades in two consecutive semesters.

(v) a PhD student secures 'X' in all thesis units in two consecutive semesters.

(f) A letter of warning will be issued to students by the Head of the Department of the student whenever he/she accumulates an X grade in the thesis unit. Subsequent warnings will be issued if this further accumulates.

(g) There is a provision for a student who is terminated from her/his program to appeal for reinstatement of the program. Appeals, if any, should be addressed to the Chairman, Senate, IIT Bhilai. The concerned student may submit an appeal along with all supporting documents to the office of DoAA. However, such an appeal has to be made within one month of his termination order. If the student is sending his/her appeal by post, it is his/her responsibility to ensure that appeals are delivered before the deadline mentioned. All such requests should be sent by Chairman, IPGC to the department for the recommendation.

17.3 Candidacy examination for PhD

(a) Students registered in the PhD programme must pass a candidacy examination designed to test the overall comprehension (analytical and research comprehension) of the student in various subjects.

(b) The candidacy examination must be passed as early as possible but only after finishing the coursework requirement with a minimum CGPA as mentioned in 17.1. A student must appear for candidacy at least once in the subsequent semester after completing the coursework requirements.

(c) In case of backlog in a course when the minimum coursework requirement is not fulfilled, the student can register for thesis credits in the subsequent semesters; limited to the credits, that remain after taking the due course works against fulfilling the minimum coursework requirement. For example, if N credits worth of coursework is remaining to fulfill the minimum coursework requirement of a student, then the student may be allowed to register for a maximum of 12-N (9-N in case of part-time) thesis credits.

(d) The candidacy examination shall be conducted in written and/ororal test mode.

(e) The committee of candidacy examination will consist of 3 faculty members, out of which a maximum of 1 faculty members may be from the outside of the department/discipline of the student. The Convener, DPGC shall propose the committee to the head for approval. The approval of the committee shall be intimated to the academic office for record keeping. (Annexure form …)

(f) When a student has not passed the candidacy examination in his/her first attempt, a second candidacy examination will be conducted (within six months from the date of the first candidacy exam) by the same committee that was constituted earlier unless otherwise approved by the Chairman, IPGC.

(g) A student will not be allowed to appear in the candidacy examination more than twice. All such cases shall be brought to the notice of the Senate with a clear recommendation from the IPGC about the action to be taken. The normal action would be to terminate the PhD programmes of all such Students who fail to clear the candidacy in two attempts.

17.4 State of the art seminar for PhD

(a) Every Ph.D. student who has passed the candidacy examination and the minimum thesis credit load of one regular semester is required to give a general seminar in the department covering the State of Art of the area of research and propose the research problem(s) of his/her PhD thesis.

(b) This seminar must be given before the end of the fourth semester from the date of first registration. For part time students the seminar must be given before the end of the fifth semester from the date of first registration. A report of satisfactory completion of this requirement is to be communicated to the Chairman, IPGC by the thesis supervisor through the Convener, DPGC. (Annexure form …)

(c) A PhD student who has passed the candidacy exam but fails to give the state of the art seminar by the end of the fourth semester, an extension of 3 months can be provided by the Chairman, IPGC. There should be proper justification from the student and thesis supervisor to seek the extension. The extension request should be forwarded by the Convener, DPGC to the Chairman, IPGC.

(d) Failing to give the state of the art seminar within the time even after the extension will automatically terminate the PhD program.

(e) The state of the art seminar shall be evaluated by the Research Progress Committee (RPC). Refer 17.6.1 for the more details regarding RPC.

17.5 Assignment of Thesis Supervisor(s) and/or administrative supervisor (Arrangement of Temporary Research Supervisor when the Main Supervisor is on leave)

Notice from the institute will be reviewed and modified

17.5.1 Change of supervisor (NOC from the current supervisor, No NOC, then there will be new research problem), rules for supervisor and co-supervisor, administrative supervisor

Notice from the institute will be reviewed and modified

17.6   Thesis and Thesis examination for PhD

(a) Thesis and Thesis examination for PhD

17.6.1 Research Progress Committee

A Research Progress Committee (RPC) should necessarily be formed for each PhD student within two weeks after he/she passes the candidacy exam. The RPC shall be formed by DPGC in consultation with the supervisor. The RPC for each PhD student should comprise of his/her supervisor(s), atleast one faculty member of the department/discipline and one faculty member of the institute outside the department. The student must submit an annual progress report and present it before the RPC in an Annual Progress Seminar (APS) every year in the month of January/August based on which the RPC submits its recommendation on the progress of the work of the student. The student shall give his/her first APS after completing four regular semesters and successfully delivering the state of the art seminar. If the progress of the student is found to be unsatisfactory then he/she shall have to reappear for the APS within six months

as per the recommendation of the RPC. As far as possible, the subsequent committees of a PhD student should include at least one RPC member other than supervisor(s).

17.6.1 Open synopsis seminar

Before proceeding to finalize the thesis, each PhD student must deliver a seminar open to faculty members and students in which the research work will be presented. The open synopsis seminar shall be evaluated by RPC. Notice of the seminar must be communicated to all concerned by the supervisor at least one week in advance. A thesis can be submitted only after the satisfactory fulfillment of this requirement. The intimation that the open seminar has been given should be communicated by the thesis supervisor through the Convener, DPGC to the Academic Section. The maximum time duration for the submission of the thesis after the delivery of the open seminar will be four months. In exceptional circumstances, the students may request to DoAA through DPGC for an extension up to two months with proper justification with the recommendation of the supervisor. However, if the thesis is not submitted within the desired period including the extension, the open seminar already delivered will stand cancelled and the student will be required to give a fresh open seminar before he/she submits his/her thesis.

17.6.2   Submission and processing of Thesis to the academic office

General guidelines

(a) The thesis should contain a signed "Declaration" by the student about the work to be plagiarism free. The "Declaration" is available in the link ****

(b) The student must submit a signed "Certificate" to be placed within the thesis. The "Certificate" is also available in the link ***(IPGC, Chairman seal and sign with date)

(c) Soft copy of the thesis is subjected to a plagiarism check by Turnitin. Only if the similarity index (excluding the similarity with papers published by the student) is below a minimum threshold of 20% or the supervisor certifies that the index cannot be meaningfully reduced below 20%, a clearance form will be issued by the Chairman, IPGC. No thesis will be allowed to be submitted without this clearance form. Detailed procedure is available in the link ***

(d) The thesis must follow the Institute recommended formatting guidelines, with particular adherence to consistency across the entire thesis. Detailed guidelines for the same are available in the link ***

PhD Thesis

PhD thesis can be submitted only after the thesis board has been duly approved and the intimation of the satisfactory completion of the open seminar has been received. One soft copy of the PhD thesis should be submitted to the academic office.

The Academic office will arrange to send the copies of the thesis to the examiners over email.

(b) Thesis and Thesis examination for MTech/MSc Thesis

After the formation of M.Tech/MSc. oral examination committee a soft copy of the thesis should be submitted to the academic office.

17.7   Constitution of Committee/Board for Thesis and Oral Examination

17.7.1   PhD   Thesis   Board
The thesis board shall consist of three members in addition to the thesis supervisor(s) and should be approved by the Chairman, Senate. Unless some special circumstances make it impractical, at least two members of the thesis board (other than the supervisor(s)) must be from outside the Institute and at least one of these two must be from within the country.

The procedure for constituting the thesis board is given below.

i) The thesis board may be proposed at the most 4 weeks before the submission of the thesis.

ii) The thesis supervisor(s) in consultation with the Head of the Department shall propose a list of examiners (in addition to the thesis supervisor(s)) consisting of at least five extra names (external examiners) over and above the required number of members for the thesis board. This list along with adequate number of copies of synopsis (prepared according to the format prescribed in ****) shall be forwarded by the Convener, DPGC to Chairman, IPGC.

iii) The Chairman, Senate in consultation with the Chairman, IPGC will select the members of the thesis board from this list. If considered necessary, the Chairman, Senate may require additional names of experts to be submitted. In case Chairman, Senate is the supervisor/co-supervisor of the student concerned, Chairman, IPGC will select the members of the thesis board. In case Chairman, IPGC is the supervisor of the student concerned, Chairman, Senate may consult Chairman, IUGC for the selection of the thesis board.

iv) The names of the members of the thesis board shall be kept confidential till successful completion of the oral examination.

17.7.2   Oral Board (PhD, MTech, MSc)

MTech/MSc Thesis Oral Examination Committee

The thesis will be examined by an oral examination committee formed by the thesis supervisor(s) in consultation with the Head of the Department. It must be recommended by the DPGC and approved by the Chairman, IPGC.

The committee shall consist of the thesis supervisor(s) and at least two but not more than four other members, one of whom should belong to a department other than the student's department/discipline (MT/EVT) . The thesis supervisor will act as the Convener of the Committee.

PhD Oral Board

The oral board shall consist of all the RPC members and one shall be from among the members of the thesis board outside the institute but preferably within the country.

The Chairman, IPGC shall propose the constitution of the oral board to the Chairman, Senate for approval.

17.8   PhD Thesis Evaluation by the Thesis Board

17.8.1 After the synopsis has been submitted and the thesis board constituted, the Chairman, IPGC will communicate to each member of the thesis board enclosing a copy of the synopsis and requesting him/her to serve as an examiner for the thesis. If the examiner refuses or no response is received for two weeks (with a reminder being sent after one week), then steps will be taken to appoint another examiner.

17.8.2 On receipt of the acceptance of examinership, a soft copy of the thesis along with a thesis evaluation form for the examiner's report will be sent to each examiner.

17.8.3 When an examiner's report is received, the Chairman, IPGC will place it in one of the following three categories:

i) Category I: If an examiner suggests corrections regarding punctuation, grammar, spelling or language, the supervisor(s) can use their discretion regarding incorporation of such suggestions.

ii) Category II: If an examiner points out typographical errors other than those in (i) above, or minor technical mistakes, raises some queries or suggests modifications but does not imply that the acceptance of the thesis is subject to addressal of the above to the examiner's satisfaction. The supervisor will communicate the student's response to the Chairman, IPGC and the same will be incorporated in the thesis to the satisfaction of the oral board. The examiner(s) concerned should be informed of the changes made on the basis of his/her suggestions.

iii) Category III: If an examiner outright rejects the thesis or raises technical points or suggests major modifications which must be answered/carried out to the examiner's satisfaction before the thesis is accepted. The supervisor will communicate to the Chairman, IPGC the changes made in the thesis, if any, in response to the examiner's comments along with an explanatory note which will be sent to the examiner with a request to respond within two weeks. If the examiner's response is not received within this period, a reminder will be sent and if no reply is received within one week time, further action will be initiated by the Chairman, IPGC.

17.8.4 Copies of the categorized report (without the identity of the examiner) will be sent to the thesis supervisor(s) and the Head of the Department.

17.8.5 On receipt of two positive reports (Category I or II), the third reviewer is given a final deadline to submit his/her report. This deadline will be two weeks from the receipt of the second positive report or the original deadline whichever is later. If the third report is not received within this deadline, permission is sought from Chairman, IPGC to proceed forward with two reports. On the grant of this permission, the subsequent steps are initiated. However, the Chairman, IPGC may ask to wait for the third report based on his assessment of the comments raised in the existing reports.

17.8.6 Irrespective of the category marked in clause 17.8.4, the student through the supervisor submits a "response to referee comments" along with a soft copy of the revised thesis clearly highlighting the revisions incorporated (e.g. in different font colors/track changes for each of the examiner).

17.8.7 On completion of the process detailed above, the Chairman, IPGC will intimate the supervisor the concurrence of the Chairman, Senate, if given, to initiate the constitution of the oral board. This concurrence of Chairman, Senate will be given if all the examiners recommend acceptance of the thesis. If one of the examiners rejects the thesis, the matter will be referred to the Chairman, Senate for further review by another examiner from the approved list of examiners. If two or more examiners reject the thesis, the thesis will be rejected.

17.8.8 In case the Chairman, IPGC is the supervisor of the student concerned, above processing (detailed in paras 17.8.1 to 17.8.7) will be done by the Chairman, IUGC. In the exceptional case, where both Chairman, IPGC and Chairman, IUGC being the supervisor(s) of the concerned student, the above processing will be handled by the Dean of R&D.

17.9   PhD/MTech/MSc Oral Examination (to revise according to the comments by the examiners)

PhD Oral Examination

17.9.1 The PhD oral examination will be an open examination. In consultation with the supervisor(s), the Academic Section will fix the date of the oral examination.

17.9.2 In exceptional situations, if none of the external members (outside the institute) of the thesis board are available to be a part of the Oral board, the Chairman, Senate may appoint a substitute in consultation with the Head of the department and Chairman, IPGC.

17.9.3 Each member of the oral board will be given a soft copy of the thesis along with the entire technical correspondence with the thesis examiners at least one week before the date of the oral examination. This includes a copy of the report of the thesis examiners (without the identity of the examiner), a soft copy of the highlighted revised thesis and "response to referees' comments".

17.9.4 The oral board shall

i) examine the thesis reports,

ii) examine whether necessary modifications indicated by the thesis examiners have been incorporated,

iii) evaluate the candidate's replies to the questions raised by the thesis examiners,

iv) authenticate the work as the student's own,

v) evaluate whether the presentation of the work by the student and the answers to the questions asked have been satisfactory, and

vi) give a report of the examination, which will be communicated by the supervisor(s) to the Chairman, IPGC through the Convener, DPGC.

17.9.5 If all, except at most one member excluding the external member (outside the institute), declare the student as passed, the student shall be deemed to have passed.

17.9.6 If a candidate has not passed, the oral board will specify whether

i) the candidate may be given another chance to appear in the oral examination and will specify the approximate date for re-examination. The original oral board will conduct the re-examination unless a different oral board is approved by the Chairman, Senate. In the re-examination, the board will declare whether the student has passed or failed as per the criteria laid down above but will not recommend holding a third oral examination.

ii) the candidate is declared to have failed.

17.9.7 On receipt of the report that the student has passed the oral examination, the Chairman, IPGC will recommend to the Senate for award of the PhD degree.

17.9.8 If the candidate has failed, the matter will be brought to the attention of the Senate for further action.

MTech/MSc Oral Examination

The oral examination will be conducted within one month from the date of submission of the thesis. If a student does not appear in the oral examination within this time period, his/her programme would be deemed to have been terminated. The request for reinstatement in the programme by such a student should be addressed to the Chairman, Senate. The request may be considered by the Senate and in case the Senate grants the request it shall specify the requirements that the student must fulfill for the award of the degree.

The thesis supervisor will intimate the date of the oral examination to the Academic Section.

The oral examination committee will evaluate the thesis, conduct the oral examination and send a report of the examination to the Chairman, IPGC through the Convener, DPGC.

A thesis will be considered to have been accepted if all members of the oral examination committee recommend its acceptance. A thesis, which is not accepted, will be considered to have been rejected.

If a thesis is rejected along with a recommendation for resubmission after incorporating any modification/correction suggested by the oral examination committee, oral examination of the resubmitted thesis will be conducted by the original committee unless a different committee is approved by the Chairman, IPGC. If the re-submitted thesis is rejected, the matter will be reported to the Senate for appropriate action.

Acceptance of thesis will be reported to the Senate for approval.

17.10 Final submission

As per existing policy.

19 Code of conduct of Students

19.1   Punishment to the students who indulge in unfair means during quizzes/mid semester/end-semester examinations: as per enforced institute policy.

19.2   Academic Integrity

20 Plagiarism Policy

Definitions

pla·gia·rism (noun \ ˈplā-jə-ˌri-zəm \): the act of using another person's words or ideas without giving credit to that person

pla·gia·rize (verb \ ˈplā-jə-ˌrīz \): to use the words or ideas of another person as if they were your own words or ideas

(http://www.merriam-webster.com/dictionary/plagiarize)

Students copying from each other or from any other sources (including Internet, books, monographs, research papers etc.) for their academic activities without giving proper reference to the original source falls under plagiarism. This defeats the purpose of doing academic activities which is to learn and grow academically and professionally. Performing academic activities by copying is counterproductive as students invest time and learn almost nothing. Plagiarism discourages hard work among students and faculty both.

At IIT Bhilai, plagiarism is strictly prohibited. In all respect, students are expected to do their academic work with integrity, and with proper acknowledgement if material from other sources is included in their own work. Plagiarism, whether intended or not, is an act of academic dishonesty and will be penalized as such.

A case of plagiarism will be dealt by DUGC/DPGC and the matter could be referred to the institute wide disciplinary action committee. The committee, depending upon the severity of the case may give FS/F in the related course, suspend the student for a certain period or may expel the student from the institute. A faculty has the right to check the students' submission at any time and take necessary action.

It is the responsibility of students to ensure originality of their work, be aware of this policy and abide by it. If there is any doubt about what constitutes plagiarism, students should consult their instructors to ensure the maintenance of academic honesty in their work.

Policy To Fund PhD Students to Attend Conferences Within India/ Outside India

The following proposal is made for funding PhD students with institute fellowship to attend conferences within India/outside India.

Eligibility:

➢ The student must have cleared the candidacy exam before applying for funding.

➢ Each student is eligible to apply for funding of maximum 2 conferences per Academic year.

➢ The student must submit the letter of acceptance {abstract or full paper) of paper/poster for the conference along with the application. The submitted paper/poster must be an outcome of the research work done at IIT Bhilai.

➢ Students are permitted to attend one conference without any accepted paper/poster during the entire tenure of program.

➢ Students shall be funded up to a maximum 'eight conferences within India' or 'Three conferences within India and one International Conference (after three years of his/her program in lieu of five conferences within India)' during the entire tenure of program.

(A) Various Heads for funding within India:

The funding will be granted to students under various heads subject to fulfilling the criteria as mentioned hereunder.

Registration fee:

Students shall avail special rates for registration applicable to students-only and/or early-bird registration to the possible extent. The registration fee paid by the student would be refunded subject to an upper ceiling of 15,000INR for conference organized within India. The Payment receipt needs to be provided for processing the refund.

Travel:

Students attending conference within India are eligible to claim the expense of travel by train in II Tier AC or lower class up to the nearest railway station to the conference venue by the shortest route.

Refund will be provided only on production of the copy of travel ticket. If the student travels by any mode other than train, refund would be provided as per actuals subject to an upper ceiling of II-Tier AC Train charges.

Local travel from IIT Bhilai to nearest Railway Station/Airport and return and from railway Station/Airport to Conference venue/place of stay and return would be refunded as per actual expenditure subject to an upper ceiling of 500INR per trip on production of bills.

Lodging:

Lodging charges incurred in booking Hostel/Guest House/Hotel would be refunded for the conference days and one additional day each prior to and after the completion of conference subject to an upper ceiling of 1,500 INR per day in X and Y class cities, and 1,000 INR per day in other cities. Refund will be provided only on production of bills.

Dearness Allowance:

Dearness Allowance would be provided for the number of conference days and one additional day each prior to and after the completion of conference at the rate of 500 INR per day. No bill is required to claim the refund for dearness allowance.

Poster Charges:

For students giving poster presentation in any conference, the cost incurred in printing poster would be refunded subject to an upper ceiling of 1,500 INR. Refund will be provided only on production of bills.

(B) **Various Heads for funding outside India**:

Funding up to a maximum amount of 1,25,000/- shall be reimbursed to a PhD scholar for presenting a paper/poster outside India under various heads subject to fulfilling the criteria as mentioned hereunder.

Registration fee:

Students shall avail special rates for registration applicable to students-only and/or early-bird registration to the possible extent. The registration fee paid by the student would be refunded for conference organized outside India. The Payment receipt needs to be provided for processing the refund.

Travel:

Students attending conference outside are eligible to claim the expense of travel by train in II Tier AC or lower-class for travel within India, Economy class air fare for international travel by the shortest route.

Refund will be provided only on production of the copy of travel ticket. Boarding pass needs to be produced in case of air travel.

Local travel from IIT Bhilai to nearest Railway Station/Airport and return and from railway Station/Airport to Conference venue/place of stay and return would be refunded as per actual expenditure subject to an upper ceiling of 500INR per trip on production of bills.

Lodging:

Lodging charges incurred in booking Hostel/Guest House/Hotel would be refunded for the conference days and one additional day each prior to and after the completion of conference subject to an upper ceiling of 3,000 INR per day. Refund will be provided only on production of bills.

Dearness Allowance:

Dearness Allowance would be provided for the number of conference days and one additional day each prior to and after the completion of conference at the rate of 1000 INR per day. No bill is required to claim the refund for dearness allowance.

Poster Charges:

For students giving poster presentation in any conference, the cost incurred in printing poster would be refunded subject to an upper ceiling of 1,500 INR. Refund will be provided only on production of bills.

S u b : Guidelines for the utilization of Annual Research Grant by sponsored PhD Scholars-reg.

A guidelines for the utilization of Annual Research Grant by sponsored PhD Scholars was approved vide Note IITBhilai/Acad/353 dated January 12, 2021. The same was reviewed by the IPGC in its meeting held on December 15, 2023 and a revised guidelines as proposed by the IPGC for the same is as follows.

1. Sponsored PhD Scholars can utilize their annual contingency grant over following expenses in concurrence with the Supervisor and the Head of the Department:

   i. Support for travel, registration and accommodation to participate in conferences, symposiums, workshops, seminars, training, short-term courses, fieldwork and other programs aiding the research work of the student.
   ii. Support for conferences within/outside India shall be available only after completion of candidacy Examination.
   iii. Entitlement of travel and accommodation charges would be as per prevailing rules for the PhD students of the IIT Bhilai.
   iv. Purchase of one PC/ laptop permitted once during the entire fellowship period.
   v. Purchase of one tablet/e-reader permitted once during the entire fellowship period.
   vi. Purchase of hard disk, pen drive, CD and mouse as and when required.
   vii. Purchase of one printer/scanner or all in one, webcam, keyboard and stylus pen permitted once during the entire fellowship period.
   viii. Payment of publication charges in reputed SCI indexed journals including color page charges, extra page charges, payment of PhD thesis submission fee.
   ix. Life membership charges of professional bodies or societies, limited to one membership of national and one international body in an academic year.
   x. Purchase of books, conference proceedings, e-books, reprints of research articles and journal subscription charges.
   xi. Purchase of minor equipment/accessories/ lab chemicals/ consumables and other items related to their research.
   xii. Minor repair, maintenance, and warranty extension of electronic gadgets such as PC, laptop, tablet, e-reader, printer, scanner, etc. procured using contingency grant.
   xiii. Purchase stationery items maximum up to Rs 5000/- in a financial year.

2. Also the following rules will also be followed:

   i. Unspent balances can be carried forward to the next academic/financial year subject to the terms and condition of the funding agency.
   ii. All items must be entered in the relevant stock register(s) of the lab/discipline/department.
   iii. All bills/ cover notes shall be countersigned by the PhD supervisor and the PhD scholar.

iv. Institute accounting practices/ purchases manual is to be followed for all purchases (Conformity with the GFR rules as amended from time to time). All the purchases are to be carried out as per the rules and regulations of the latest general financial rule of the Government of India.

v. Bills/Receipts are to be submitted within one month.

vi. Travel advance for an international conference outside India may be given subject to a maximum of 80% of the costs involved or the balance amount in the grant, whichever is lower.

vii. Experimental setups, apparatus, instruments, software, books, hard drive, etc. Purchase of all inventory items would be through the supervisor. The inventory of these items would be that of the Supervisor/concern department.

viii. Scholars desiring to retain non-consumable items, mentioned at point 1 (iv), (v) & (vi), acquired from their contingency grant may do so at the end of their program or while leaving the institute. This can be done by paying the book value of the item(s), i.e. value after charging applicable depreciation or 5% of the acquisition cost of the item(s) whichever is higher to the Institute account, and by following the institute norms.

ix. No advance can be provided for the purchases.

The Competent Authority may kindly accord approval/advise on the above mentioned guidelines for the utilization of Annual Research Grant by sponsored PhD Scholars as proposed by IPGC.

Online Executive Master Courses and Certificate Programs

Proposal to Offer Online Executive Master Degree Course

1. Executive MTech in Applied Mechatronics & Robotics
2. Executive MTech in Data Science & Data Analytics
3. Executive MTech in Advanced Electrical Vehicle Systems

The Overall Coordinator:
Dr. Nagesh D. Patil, FIC − Resource Generation and Planning

The coordination committee.
1. Executive MTech in Data science & data analytics
Faculty members: 1. Dr. Subhajit Sidhanta
                    2. Dr. Vinod Reddy
                    3. Dr. Dhruv Pratap Singh

2. Executive MTech in Applied Mechatronics & robotics
Faculty members: 1. Dr. Kaushik Bandyopadhyay
                    2. Dr. Soumajit Pramanik
                    3. Dr. Balkrishna Mehta

3. Executive MTech in Advanced electrical vehicle systems
Faculty members: 1. Dr. Nagesh D. Patil
                    2. Dr. Katchala Nanaji
                    3. Dr. Satyajit Gupta

PROGRAM REQUIREMENTS AND GENERAL STRUCTURE

- Core Courses: 12 Credits

- Electives Courses: 12 Credits + 4 credits if Campus immersion program not chosen

- Campus Immersion Program: 4 Credits (optional)

- Project: 8 Credits

- Total Credits: minimum 36 Credits

Courses for respective degree program:

1. Executive MTech in Applied Mechatronics & Robotics

Semester	Course Code	Course Name	L-T-P-C	Credits
I	MRL501	Fundamentals of Mechatronics (Core)	2-0-0-2	2
I	MRL502	Mechanisms for Robotic Systems (Core)	2-0-0-2	2
I	MRL503	Modern Control Systems (Core)	2-0-0-2	2
I	MRL504	Sensor for Robotics (Core)	2-0-0-2	2
I	MRL505	Data Analysis and Visualization (Core)	2-0-0-2	2
II	MRL512	Artificial Intelligence (Core)	2-0-0-2	2
II	MRLXXX	Elective in ME	2-0-0-2	2
II	MRLXXX	Elective in EE	2-0-0-2	2
II	MRLXXX	Elective in DSAI	2-0-0-2	2
III	MRLXXX	Elective in MT&R	2-0-0-2	2
III	MRLXXX	Elective in MT&R	2-0-0-2	2
III	MRLXXX	Elective in DSAI/MT&R/EE/ME	2-0-0-2	2
III	MRP6XX	Minor Project	X-X-X-2	2
IV	MRP6XX	Major Project	X-X-X-6	6
		Campus immersion program*	0-1-6-4	4

Bucket	Course Code	List of Elective Courses	L-T-P-C	Credits
Electives in ME domain	MRL511	Actuators	2-0-0-2	2
	MRL622	Automation	2-0-0-2	2
Electives from EE domain	MRL601	Advanced Control Systems	2-0-0-2	2
	MRL602	Signal Interface Circuits	2-0-0-2	2
	MRL612	Digital System	2-0-0-2	2
Electives in DSAI domain	MRL615	Industrial Internet of Things	2-0-0-2	2
	MRL513	Soft Computing	2-0-0-2	2
	MRL613	Machine Learning	2-0-0-2	2
	MRL614	Reinforcement Learning	2-0-0-2	2
Electives in MT&R	MRL624	UAV Guidance & Navigation	2-0-0-2	2
	MRL623	Industry 4.0	2-0-0-2	2
	MRL621	Machine Vision for Robotics	2-0-0-2	2
	MRL520	Fundamentals of Robotics	2-0-0-2	2

* Note that list of electives category courses is tentative and it can be modified if required.

2. Executive MTech in Data Science & Data Analytics

Sem	Course Code	Course Name	L-T-P-C	Credits	Course Category
I	DSD501	Foundations of Data Science	3-0-0-3	3	Core
I	DSD502	Statistical Methods for Data Analysis	3-0-0-3	3	Core
I	DSD503	Big Data Technologies	2-1-0-3	3	Core
I	DSD504	Data Warehousing and Data Mining	2-0-1-3	3	Core
II	DSDXXX	Elective in Advanced Analytics	X-X-X-3	3	Elective
II	DSDXXX	Elective in Machine Learning	X-X-X-3	3	Elective
II	DSDXXX	Other DSD Electives	X-X-X-3	3	Elective
III	DSDXXX	Elective in Big Data	X-X-X-3	3	Elective
III	DSDXXX	Minor Project	X-X-X-2	2	Project
III	DSDXXX	Elective in Data Visualization	X-X-X-3	3	Elective
IV	DSDXXX	Major Project	X-X-X-6	6	Project

* Note that below list of electives category courses is tentative and it can be modified if required.

Elective types	Course Code	Elective Courses	L-T-P-C	Credits	Category
Advanced Analytics Electives	DSDXXX	Predictive Analytics	X-X-X-3	3	Elective
	DSDXXX	Text Mining and Natural Language Processing	X-X-X-3	3	Elective
	DSDXXX	Time Series Analysis and Forecasting	X-X-X-3	3	Elective
	DSDXXX	Advanced Statistical Modeling	X-X-X-4	4	Elective
	DSDXXX	Data Analytics in the Cloud	X-X-X-3	3	Elective
Machine Learning Electives	DSDXXX	Deep Learning and Neural Networks	X-X-X-4	4	Elective
	DSDXXX	Reinforcement Learning	X-X-X-3	3	Elective
	DSDXXX	Supervised and Unsupervised Learning Techniques	X-X-X-3	3	Elective
	DSDXXX	Machine Learning at Scale	X-X-X-4	4	Elective
Other DSD Electives	DSDXXX	Business Intelligence and Analytics	X-X-X-3	3	Elective
	DSDXXX	Data Governance and Compliance	X-X-X-3	3	Elective
	DSDXXX	Advanced Topics in Data Science	X-X-X-3	3	Elective
	DSDXXX	Data-Driven Decision Making	X-X-X-3	3	Elective

3. Executive MTech in Advanced Electrical Vehicle Systems

Semester	Course Code	Course Name	L-T-P-C	Credits	Course Category
I	EVSXXX	Fundamentals of Electric Vehicles	3-0-0-3	3	Core
I	EVSXXX	Electric Drives and Control	3-0-0-3	3	Core
I	EVSXXX	Battery Technology and Management Systems	2-1-0-3	3	Core
I	EVSXXX	Renewable Energy Systems for EVs	2-0-1-3	3	Core
II	EVSXXX	Elective in EV Power Systems	X-X-X-3	3	Elective
II	EVSXXX	Elective in Vehicle Dynamics	X-X-X-3	3	Elective
II	EVSXXX	Other EV Electives	X-X-X-3	3	Elective
III	EVSXXX	Minor Project	X-X-X-2	2	Project
III	EVSXXX	Advanced Elective in Battery Systems	X-X-X-3	3	Elective
III	EVSXXX	Advanced Elective in EV Design	X-X-X-3	3	Elective
IV	EVSXXX	Major Project	X-X-X-6	6	Project

Category	Course Code	Elective Courses	L-T-P-C	Credits	Category
EV Power Systems Electives	EVSXXX	Advanced Power Electronics for EVs	X-X-X-4	4	Elective
	EVSXXX	EV Charging Technology and Infrastructure	X-X-X-3	3	Elective
	EVSXXX	Smart Grids and EV Integration	X-X-X-3	3	Elective
	EVSXXX	High Voltage Systems in EVs	X-X-X-3	3	Elective
	EVSXXX	Energy Storage and Conversion	X-X-X-3	3	Elective
Vehicle Dynamics Electives	EVSXXX	Vehicle Aerodynamics	X-X-X-3	3	Elective
	EVSXXX	Advanced Vehicle Dynamics	X-X-X-4		Elective
	EVSXXX	Lightweight Materials for EVs	X-X-X-3	3	Elective
	EVSXXX	Noise, Vibration, and Harshness (NVH) in EVs	X-X-X-3	3	Elective
	EVSXXX	Suspension, Steering, and Braking Systems	X-X-X-3	3	Elective
Other EV Electives	EVSXXX	Autonomous and Connected Vehicles	X-X-X-3	3	Elective
	EVSXXX	Sustainable Mobility Solutions	X-X-X-2	2	Elective
	EVSXXX	Project Management in EV Industry	X-X-X-3	3	Elective
	EVSXXX	EV Business Models and Market Analysis	X-X-X-3	3	Elective
	EVSXXX	Environmental Impact of EVs	X-X-X-3	3	Elective
	EVSXXX	Thermal Management Systems in EV	X-X-X-2	2	Elective
	EVSXXX	Automobile Technology for EV	X-X-X-2	2	Elective

* Note that the list of electives category courses is tentative and it can be modified if required.

Eligibility Criteria: Following is the minimum requirements for all three programs

a) Should be a working professional with at least two (2) years of experience.

b) Should have a B.Tech / BE /M.Tech/ MSc (4 semester program)/ MCA (4 semester program) / MS Degree ((min. 4 semester program).

c) In the qualifying degree at least 55% marks or equivalent 5.5 CGPA/CPI must be there. In case of the candidate belonging to SC, ST, or Persons with Disability (PwD) category, this is relaxed to 50% or equivalent 5.0 CGPA/CPI.

For MCA/MSC passed graduates, the percentage score of MCA/MSC would be considered. For BE/BTech Engineering graduates without PG specialization, the percentage score of the undergraduate degree would be considered. For a post-graduation in the Engineering field of study, PG score qualification can be considered.

d) Selection process will be scheduled post-counseling & application process, depending on the number of eligible applications as per seat availability for the program. This entire process will be online.

Duration:

a) Duration of the program will be 2 calendar years/ min. 4 semesters. The nominal load per semester is 9 credits.

b) However, in each semester course credits registration can be min. 6 credits and max. 12 credits in permission with the coordination committee members' approval.

c) The program should be completed within a maximum of 3 calendar years/ 6 semesters.

d) Batch size for each course, Min - 60 students, Max - 200 students. 4 Batches to be run in each year, these can be modified as per response from the potential students.

Other Important Points:

a) This program is not equivalent to the regular MTech program of IIT Bhilai.

b) There can be a separate e- master program for non-executive category students.

c) The students under this Executive M.Tech program will be given e-alumni status of IIT Bhilai. The institute will not be responsible for their placement.

d) Teamlease EdTech, Mumbai has been roped in as IIT Bhilai partner for online sales & Marketing of these online programs, pre-selection of candidates as per our norms, use of their online platform for delivery of content and exams as well as fee collection.

e) The course instructors for each of the courses will be chosen as follows:

- - Firstly, priority will be given to IIT Bhilai faculty members. The number of lecture hours engagement for IIT Bhilai faculty members for such courses teaching will be as per consultancy norms.

- - If for a given course, no faculty is available from IIT Bhilai, other IIT/NIT/IIM/Renowned Industrial expert can be assigned as a course instructor for that particular course

Thank you