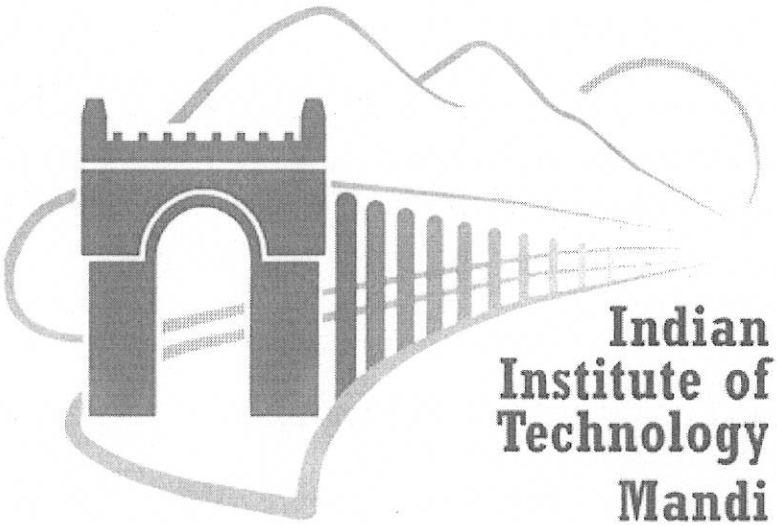
INDIAN INSTITUTE OF TECHNOLOGY MANDI

KAMAND, DISTT. MANDI – 175075 (HIMACHAL PRADESH)



MINUTES OF 42ND BOARD OF ACADEMICS MEETING

VENUE	:	A-4(SC) and GUEST HOUSE (NC) CONFERENCE ROOM + ONLINE
DATE	:	03rd SEPTEMBER, 2021 (FRIDAY)
TIME	:	03:00 P.M.

Following members attended the meeting

Sl. No	Responsibilities	Name
1	Dean Academics	Dr. Rahul Vaish
2	Associate Dean (Research)	Prof. Chayan K Nandi
3	Associate Dean (Courses)	Dr. Srikant Srinivasan
4	Chairman Course Proposal Committee	Dr. Venkata Uday Kala
5	Course Coordinator (IC Courses)	Dr. Aniruddha Chakraborty
6	Course Coordinator (B.Tech.-CSE)	Dr. Dileep A D
7	Course Coordinator (B.Tech.-ME)	Dr. Gaurav Bhutani
8	Course Coordinator (B.Tech.-CE)	Dr. Maheshreddy Gade
9	Course Coordinator (B.Tech.-DSE)	Dr. Manoj Thakur
10	Course Coordinator (B.Tech.-EP)	Dr. Pradeep Kumar (SBS)
11	Course Coordinator (B.Tech.-M.Tech. Integrated Dual Degree in Bio-Engg.)	Dr. Shubhajit Roy Chowdhury
12	Course Coordinator (M.Tech.-(Mechanical Engg. (Energy Systems)) (MES)	Dr. Rajeev Kumar
13	Course Coordinator (M.Tech.-(Structural Engg.))	Dr. Sandip Kumar Saha
14	Course Coordinator (M.Tech.-(VLSI))	Dr. Hitesh Shrimali
15	Course Coordinator (M.Tech.-(Power Electronics and Drives))	Dr. Narsa Reddy Tummuru
16	Course Coordinator (M.Tech.-(Communication and Signal Processing))	Dr. Siddartha Sarma
17	Course Coordinator (M.Tech.-Biotechnology)	Dr. Shyam K Masakapalli
18	Course Coordinator (M.Sc.-Applied Mathematics)	Dr. Rajendra K Ray
19	Course Coordinator (M.Sc.-Physics) + (I-Ph.D. (Physics))	Dr. Ajay Soni
20	Course Coordinator (MA Dev.Studies)	Dr. Shyamasree Dasgupta
21	Nominee-1: School of Engineering	Dr. Gaurav Bhutani
22	Nominee-1: School of Computing & Electrical Engineering	Dr. Renu M Rameshan
23	Nominee-2: School of Computing & Electrical Engineering	Dr. Manas Thakur
24	Nominee-1: School of Basic Sciences	Dr. Nitu Kumari
25	Nominee-2: School of Basic Sciences	Dr. C. S. Yadav
26	Nominee-1: School of Humanities & Social Sciences	Dr. Devika Sethi
27	Research Affairs Secretary	Mr. Adesh Singh
28	Academic Affairs Secretary	Mr. Bhumanyu Goyal
29	Assistant Registrar (Academics): Secretary	Mr. Vivek Tiwari

Following members could not attend the meeting

Sl. No.		Name	
1	Chairman Library Advisory Committee	Dr. Rajeshwari Dutt	Member
2	Course Coordinator (HSS Courses)	Dr. Suman Sigroha	Member
3	Course Coordinator (B.Tech.-EE)	Dr. Rahul Shrestha	Member
4	Course Coordinator (M.Tech.- (Energy Engg. (Materials)) (MEE)	Dr. Sumit Sinha Ray	Member
5	Course Coordinator (M.Tech.-(Fluid and Thermal Engg.))	Dr. Pradeep Kumar (SE)	Member
6	Course Coordinator (M.Tech.-(Computer Science and Engg.))	Dr. Sriram Kailasam	Member
7	Course Coordinator M.Sc. (Chemistry)	Dr. Bhaskar Mondal	Member
8	Nominee-2: School of Engineering	Dr. Subhamoy Sen	Member
9	Nominee-2: School of Humanities & Social Sciences	Dr. Puran Singh	Member
10	Industry Member – 1	Dr. Nadeem Akhtar	Member

Special Invitee

Sl. No.	Name	
1.	Dr. Tushar Jain	Asso. Prof., SCEE
2.	Dr. Arpan Gupta	Asso. Prof., SE

PART-A

(Issues discussed by the Board of Academics when the Student Members were present)

42.1 Confirmation of the minutes of 41st meeting of Board of Academics:

The minutes of the 41st Board of Academics meeting held on 13th August, 2021 were confirmed.

42.2 To consider modification in the IC Engineering basket for B.Tech. in Engineering Physics students:

Dr. Pradeep Kumar, Programme Coordinator for B.Tech. in Engineering Physics presented a proposal to the Board of Academics regarding modification in the IC Engineering basket for the B.Tech. in Engineering Physics programme.

As per the senate approved guidelines a student is required to do at least one course from each of the IC baskets (Science I, Science II and Engineering). Currently, Engineering Physics (EP) students have to compulsorily take 'Measurement and Instrumentation' course from the Engineering basket. It was proposed to remove the compulsory requirement of 'Measurement and Instrumentation' course i.e. a student may take any course from the Engineering basket.

BoA recommended the above for consideration of the Senate and its approval.

42.3 To consider the proposal of a Double Major B.Tech. degree:

Dr. Gaurav Bhutani presented a proposal to the Board of Academics regarding Double Major B.Tech. Degree. After due deliberations, the BoA recommended the proposal with minor changes for consideration of the Senate and its approval. The final modified proposal is placed as **Annexure – A.**

42.4 To consider the proposal for calculation of Cumulative Grade Point Average (CGPA):

Dr. Srikant Srinivasan, Associate Dean (Courses) presented a proposal to the Board of Academics regarding revising the CGPA calculation for course-based programs at the UG and PG level:

(i) The final CGPA, calculated upon the completion of all credit requirements towards the fulfillment of a degree, shall include all credits earned against a letter grade including those credits that are in excess of the minimum requirements.

(ii) The rule shall be applicable to all BTech/ MTech/ MA/ MSc/ Dual degree and other programs that may be considered under the category of course-based programs.

(iii) The final CGPA calculation shall not include any F grade once all the credit requirements are completed, including the minimum credit requirement per basket such as IC/ DC/ DE/ FE etc.

(iv) The Semester GPA calculation shall include F grade in continuation with earlier practices.

(v) The intermediate CGPA calculation, i.e. CGPA calculated during the course of the program before completion, shall also include F grade except for those cases where the course has been replaced by an equivalent course that has been successfully completed.

After due deliberations, the BoA recommended the proposal for consideration of the Senate and its approval, with the caution that a student shall not be permitted to register for any additional semesters after the completion of the minimum requirements towards graduation, e.g. the registration of excess credits should not be misused for purposes of continuing residence on campus.

42.5 To consider the proposal for change in Branch Change norms for UG programme:

Dr. Arpan Gupta, Associate Professor presented a proposal regarding modifications in the Branch Change rules for UG programmes. After due deliberations, the BoA recommended the following modified proposal for consideration of the Senate and its approval:

a) To be considered for a branch change, the student will have to submit an application before the end of the second semester of her/his programme. The applicant will have to specify the choices, in order of preference, of the branch or branches that she/he seeks a change to.

b) Branch change applications will be considered strictly in order of merit as established by the CGPA of first-year courses (excluding HSS electives) and only to the extent of the applicant's choices and in the order of the preferences expressed in the application. If a seat opens up at any later stage in the process, it will be offered to the applicant with the highest CGPA by going back up the list.

c) In granting the change of branch of a student, the strength of a class shall not exceed the sanctioned strength by more than 25% and shall not fall below the existing strength by more than 10%. (Any fraction will be rounded off to the nearest whole number).

d) Minimum CGPA to be eligible for branch change is 8.0

e) The student should have no backlog and should not have been found guilty of any severe academic or disciplinary misconduct.

f) During the branch change process, if any tie arises from equal CGPA scores of students, they will be treated equally and will be jointly subject to condition (3) above.

42.6 To consider the proposal to start a new programme, M.Tech. in Electric Transportation:

Dr. Narsa Reddy Tummuru, Programme Coordinator for M.Tech (PED) presented a proposal to the Board of Academics to start a new programme, M.Tech. in Electric Transportation. After due deliberations, the BoA recommended the proposal with minor modifications for consideration of the Senate and its approval. The final modified proposal is placed as **Annexure-B.**

42.7 Any other item with the permission of the Chair.

In addition to the circulated agenda points, Chairperson BoA permitted to take up the following points:

(i) **To consider modification of the minimum requirements of HSS course credits in B.Tech. and Integrated Dual Degree programmes (IDD) programmes.**

Dr. Tushar Jain, presented a proposal regarding modification in the minimum requirements of HSS course credits for B.Tech. and Integrated Dual Degree programmes:

Existing	Proposed
• HSS courses are distributed among four baskets, namely o Creative Understanding (CU) o Language Competence (LC) o Communicative Competence (CC) o Social Competence (SC) o Managerial Competence (MC)	
• 1 compulsory credit from the CU basket covered equivalently through the 5WIP modules. • 1 course (3 credits) per basket equivalent to 12 credits (total) should be done from the rest of the baskets.	• 1 compulsory credit from the CU basket covered equivalently through the 5WIP modules. *(To remain as it is)* • 12 compulsory credits can be done **from any of the baskets (LC, CC, SC, MC)**
• **5 compulsory HSS elective courses**	• **5 compulsory HSS electives shall be converted to free electives**
• Overall, a UG student is supposed to do 18 HSS credits.	

After detailed deliberations, the BoA recommended the proposal with minor modification for consideration of the Senate and its approval.

(ii) **To consider approval on utilisation of International visit grant by PhD scholars for participation in online mode due to restriction on International travel.**

The Associate Dean (Research) presented the following proposal regarding to allow utilization of International visit grant for participation via online mode due to restriction on International travel.

On the recommendations of the Board of Academics (BoA), the Senate in its 24th meeting held on 13th February, 2020, vide item no. 24.8 considered and approved the proposal for providing financial support to Ph.D. scholars for International visit.

"It was decided that Ph.D. scholars can be granted consolidated grant for attending conferences, workshops, summer / winter schools, short/long visits to perform experiments etc. Also, decided that assigned grant can be utilized for multiple visits during the program. Consequently, the Deans' Committee in its meeting held on 29th June, 2020 decided to provide maximum of Rs. 1.85 Lakh as international visit grant to PhD scholars with a condition that the scholar must participate in person."

After detailed deliberations the BoA recommended the proposal for consideration of the Senate and its approval.

(iii)**Modification in the degree requirement for Integrated-PhD (Physics) programme.**

Dr. Ajay Soni, PFG Chair presented a proposal regarding revision in the I-PhD (Physics) credit requirements.

As per the document approved by the Senate vide item No. 10.4 during its 10th Senate meeting held on 29 June, 2016:

'Any 12 credits in this program will be considered as equivalent to Ph.D. course work for any purpose where credits of Ph.D. course are considered.'

The following revision in the document was proposed:

'Any 9 credits in this program will be considered as equivalent to Ph.D. course work for any purpose where credits of Ph.D. course work are considered.'

After brief discussion, the BoA recommended the proposed revision to the Senate for its consideration and approval.

(iv) **Authorisation to the Chairperson, BoA/Dean (Academics) to recommend the list of graduands to the Senate for award of the Degree during the 9th Convocation of the Institute.**

The 9th Convocation of the Institute is scheduled to be held on 9th October, 2021 *(tentatively)* in online mode. The Board of Academics authorized the Chairperson, BoA/ Dean (Academics) to recommend the list of the students, who complete all the requirements of the programme, to the Senate for award of the degree during the 9th Convocation of the Institute.

The meeting ended with a vote of thanks to and by the Chair.

21/9/21

Secretary, Board of Academics

21-9-21

Chairman, Board of Academics

PART-B

(Issues discussed by the BoA without the Student Members being present)

-NIL-

ANNEXURE -A

Double Major proposal

at IIT Mandi

Abstract

A double major at IIT Mandi is proposed. Under this option, the student will be able to major in a secondary branch, along with a BTech (or dual degree -- BTech+MTech) in their primary branch (which the student got during selection at IIT Mandi / after branch change). For this the student will be required to complete additional coursework, which will include core and elective courses, in the secondary discipline. An additional one year, typically, will be permitted for the student to complete these additional requirements. A degree certificate stating B.Tech. (or Btech+MTech) in <ABC> with second Major in <XYZ> shall be awarded. This is practised at three other IITs as of date, including IIT Kanpur, IIT Gandhinagar and IIT Hyderabad.

Rationale

- Common modules of curriculum for all IIT Mandi engineering students are:
    - IC compulsory (54)
    - ISTP (4)
    - HSS core (13)
    - HSS electives (5)
    - Free electives (22)
- Fair amount of fundamental and common subjects amongst the engineering curriculum (98 credits) - this excludes the IC baskets of 9 credits.
- Disciplines are distinguished by B.Tech. project (8 credits), Discipline core (33) and Discipline electives (12). Thus, a total of 53 credits.
- Some additional work can make a student eligible for major requirements of two disciplines.

Note:

- A double major is not a dual degree (BTech + MTech).
- A double major is not a double degree (two BTechs). This is because the requirements of a second BTech degree (53 credits) would also include a second B.Tech. project, and is much more than that of the proposed second major (36-40 credits).

Benefits:

- Students with a second major in “X” can sit for intern/placement in “X” profiles too.
- Alleviates the pressing need of individual students to change their branch to the generally “most preferred” branch. This will reduce the stress on the students significantly.
- Double major will impart multidisciplinary research, increasing the scope for higher education in interdisciplinary fields.

Application

1. Eligibility criteria: CGPA ≥ 7.0, not more than one F grade. If someone is struggling with the parent branch, a double major will be an added pressure.
2. Application period:
    a. At the end of 4th and 6th semester for four-year BTech programs. Applications will be considered subject to the availability of seats in the program.
    b. At the end of 6th and 8th semester for five-year BTech+MTech dual degree programs. Applications will be considered subject to the availability of seats in the program.
3. In case the number of applicants exceeds the number of available vacancies, the process of selection into the second major shall be determined by a faculty committee constituted by the Dean academics for this purpose.
4. The Dean (Academics) shall decide a cap on the maximum number of students who can avail this option for any particular (second) discipline, based on the advice tendered by the respective Schools/PFG Chairs.
5. Student applications must be recommended by the Faculty Advisor.

Courses/Baskets

1. A basket of courses that contribute towards the second major is identified by the PFG of each (second) discipline, that may comprise some combination of discipline core and discipline elective courses from the second discipline. The PFG of the (second) discipline may also list an additional set of prerequisite courses in some cases. A minimum number of core credits may be decided for all second majors.
2. Between 36 and 40 credits from this basket need to be completed by the student.
3. For the purpose of completion of the 36-40 credits required for the second major, a maximum of 12 FE credits may be used from the parent program. The remaining FE credits from the parent program should be applied towards courses that do not count towards the second major basket requirement.
4. Students may start accumulating course credits in the form of additional courses (even before they officially enrol into a Double Major program) and convert them to be counted

in favour of Double Major requirements at the time of enrolling into this program. This will help them learn the disciplines gradually over the five years and also reduce load on the administration while offering courses to the students without clashes.

5. Courses that are a part of the common core (including HSS)/Discipline Core/Discipline Elective for a student's parent discipline cannot count towards their second Major requirement.
6. If a core/foundation course of second discipline Y is a part of parent program X's discipline core/elective:
    a. Eg:- DSE student wants to second major in CSE.
    b. "CS202 - Data Structures & Algorithm" is a discipline core for both CSE and DSE.
    c. Solution: Compensation of such credits can be done through:
        i. Possible replacements (from a pool of courses), suggested by PFG of the second discipline
        ii. Courses that count as DE for the second discipline Y

Pass/Fail rules

The enrollment into a second major shall not influence the Pass/Fail credit requirements of the parent discipline. However, it may be noted that none of the courses that count towards the second major may be taken under the Pass/Fail category

Completing the program

Only one CGPA will be reported on all official documents, calculated upon the performance of the student in all courses credited, including the requirement of BTech and second major. The overall grade report, in addition to the primary discipline courses, will also display the discipline of the second Major and courses done to complete the second Major along with the grades awarded.

Voluntary opting-out from the program is not allowed.

Termination of the program

1. After enrolling into a double major program, if a student gets an "F" grade in two or more than two courses, his/her enrollment to the double major program will be terminated.

2. The second Major part of the program will be automatically discontinued at the end of the tenth semester if the student is not able to complete the requirements of double major.
3. In the case of termination, the courses which were credited for completion of the second major basket can be counted towards the Free Electives (if required).

Felicitation and Awards

The double major program is a 5-year UG program. Hence, the following is proposed:

Foundation Day

A program-wise award for outstanding academic excellence will be given at the 4th year for the students seeking Double Major in addition to a 4-year BTech degree, based on their parent program.

Convocation

Four-year BTech students enrolled in the Double major program admitted into the institute in year x compete with 4-year BTech students admitted in year x + 1 for the following medals:

- President of India Gold Medal
- Institute Silver Medals
- Rani Gonsalves Memorial Medal
- Balasundaram Endowment Prize in German
- Director’s Gold medal

CnP rules

BTech students doing double major will be allowed to sit for placements in the 5th year, not 4th. BTech + MTech dual degree students will be allowed to sit in the placements in the 6th year, not 5th. CnP will have the final say in any case.

Implementation:

The following types of programs can be taken as second major:

- All engineering programs (CE, ME, CSE etc.)
- Science programs (Maths, Physics, Chemistry etc.)
- Engineering science (EP)

All participating PFGs will be requested to develop a template of courses for second major in their discipline.

Important notes:

1. The B.Tech. (Honours) program will only be applicable to the parent Major discipline, and not the second Major discipline. Furthermore, no waiver of Free Elective credits shall be provided to the student, in order to remain consistent with the pre-existing B.Tech. (Honours) requirement.
2. A student cannot undertake a second Major and minor in the same discipline.
3. Internship rules (including the time of internship) shall be the same as that for the regular B.Tech. program.
4. Timely completion of the course and credit requirements will solely be the students' responsibility.

References

For IIT Kanpur (since 2009):
- Common info: https://www.iitk.ac.in/doaa/data/Double-Major.pdf
- Course template: https://www.iitk.ac.in/doaa/data/Course-Template-B.Tech-BS.pdf
- Award rules: https://iitk.ac.in/sspc/sspc-convocation-awards

For IIT Hyderabad (since 2014):
- Common info: Page 27, point 4.3.4 https://ai.iith.ac.in/files/20200306-Academics-Handbook.pdf
- Course template: https://www.iith.ac.in/academics/assets/files/pdf/20200227-Courses-of-Study-Bachelors.pdf
- https://www.cse.iith.ac.in/assets/pdf/CSE-Minor-DoubleMajor-Curriculum-Aug2016.pdf

For IIT Gandhinagar:
- https://iitgn.ac.in/admissions/dmbtech

Comparison matrix

	IIT K	**IIT Hyd**	**IIT Gn**	**IIT Mandi proposed**
Disciplines for	All engineering	All engineering	All engineering	All engineering

2nd major	programs, science programs (PCM, Eco)	programs; Maths, Physics	programs only	programs; all science programs
Application	At the end of 4th or 7th sem	Anytime after 3rd sem	Anytime after 3rd sem	Anytime after the end of 4th semester
Seats/Cap	Not mentioned	At dept discretion (10% for CSE)	10 seats or 20%, whichever is higher	To be discussed
Merit/CGPA requirement at time of application	Min 7.0 CGPA	No CGPA and no backlog	Min 6.5 CGPA and no fail grade (F or E grade)	Min 7.0 CGPA and not more than one F grade
Credits allowed to be used from parent dept graduation requirements *, for the second major requirements (or credit waiver)	A maximum of 36 IIT K FE credits may be used (out of 54) == 66% of FE credits == 12 IIT Mandi credits	Not mentioned	Exactly 4 IIT Gn FE credits must be used (out of 16) == 25% of FE credits == 3 IIT Mandi credits	A maximum of 12 FE credits may be used (out of 22) ; == ~50% of FE credits
Credits for 2nd major	~100 IITK credits == 40 IIT Mandi credits	~24 IITH credits == 36 IIT Mandi credits	~54 IITGn credits == 50 IIT Mandi credits	36-40 credits

* Double Major students are allowed to use some FE slots for the second Major requirements.

1. For IIT Gn: **Exactly** 4 (out of 16 total) credits are **compulsorily** waived from the parent department graduation requirements to be used for the second Major requirements of Double Major students.
2. For IIT K: **At most** 36 (out of 54 total) credits may be waived from the parent department graduation requirements to be used for the second Major requirements of Double Major students.
3. For IIT H: Not mentioned
4. IIT Mandi proposed: **At most** 12 (out of 22 total) credits may be waived from the parent department graduation requirements to be used for the second Major requirements of Double Major students.

Appendix

Points to be discussed:

1. Convocation Award rules: discuss with the Awards committee
    - Requirement for a double major is ~ 184 credits, and for Dual degree it is 206 credits. Do we require to normalize the credits for the purpose of CGPA calculation during felicitation of awards? For discussion with the Chairperson, Awards Committee.
2. R.3.3 and R.3.4 (threshold credits beyond which extra courses do not count towards CGPA)
    - What should be the maximum number of credits beyond which extra courses will not count towards the CGPA calculation? For discussion with the Academic Section.
3. CnP chair: placement registration for double major students in the 5th year for BTech and 6th year for dual degree students.

ANNEXURE B

Proposal

for

Master of Technology in Electric Transportation

Indian Institute of Technology Mandi,
Himachal Pradesh, India

Name of the Degree Program:

Master of Technology in **Electric Transportation**

Abbreviation

Master of Technology is abbreviated as M.Tech.

Categories of Admission:

Candidates will be admitted to the M.Tech. Program of the Institute under one of the following categories:

i) Regular full-time students with Half-teaching Research Assistantship (HTRA) assistantship

ii) Regular full-time students without HTRA assistantship

iii) Full time sponsored students by the Industries, established Institutes/R&D Organizations/National laboratories without HTRA assistantship.

Duration:

The duration of this program is two years. Each year consists of two semesters, summer and winter terms. However, Half-teaching Research Assistantship (HTRA) duration will be governed as per Institute norms.

Credits to be earned:

The students have to earn minimum of 70 -72 credits for the degree of Master of Technology in this specialization. For more details on credit distribution please refer to ordinance and regulations for M.Tech./M.Sc. of IIT Mandi.

Eligibility:

a) Candidates who have qualified for the award of Bachelor's degree in Engineering / Technology with minimum first class or 60% aggregate marks (or Equivalent CGPA) in all the four years from a recognized University or Institute in **Electrical Engineering (EE), Electrical & Electronics Engineering (EEE), Instrumentation and Control, Electronics & Communication, Mechanical Engineering**, **Automobile, Production, Aeronautical Engineering** and who have qualified and have a valid score in Graduate Aptitude Test in Engineering (GATE) in the **EE/ME** disciplines are eligible to apply for admission to the this program.

b) For all B.Techs from IITs graduated with a CGPA of 8.0 or above, the requirement of GATE qualification is waived off.

c) A student sponsored by a recognized R&D organization, academic institution, government organization or industry with minimum first class or 60% aggregate marks (or Equivalent CGPA) in their Bachelor's degree in the aforementioned disciplines are eligible to apply for this program on a full-time basis. The Institute does not provide any assistantship to such students.

d) A candidate with Associate Membership of Professional Bodies equivalent to B.Tech in the aforementioned disciplines with minimum first class or 60% aggregate marks (or Equivalent CGPA), as approved by the Senate and having valid GATE score in **EE/ME** stream shall also be eligible to apply for admission to this program with assistantship, subject to regulations approved by the Senate.

For more details on eligibility criteria please refer to ordinance and regulations for M.Tech./M.Sc. of IIT Mandi.

Number of Seats:

The number of seats shall be as approved by the Senate.

Assistantship (Fellowship/Scholarship):

The award of assistantship shall be in accordance with prevailing norms of the Institute.

Award of Degree:

Award of this M. Tech. degree shall be in accordance with the regulation of the Senate in relation to the requirements of the given program.

Campus Stay:

Students admitted to this program are required to stay in campus and to participate and complete all requirements of the program.

Exception:

Any exception to above clauses will require approval of the Senate or by the Chairman, Senate.

Note: For detailed information, please refer to ordinance and regulations for M.Tech./M.Sc. of IIT Mandi.

Motivation and objectives:

India, along with several other rapidly growing economies, has recognized the imminent need for electrification of transport systems. The benefit derived from this transition will two-fold: first, it will help the country to reduce the dependence on fossil fuel that is primarily imported and has significant budgetary implications; second, with a penetration of clean fuel and renewables in the electricity generation sector, this transition will be able to contribute to mitigation of greenhouse emissions. To this end, the Government (GoI) of India has already put schemes, e.g., FAME, in action, and is actively looking for collaboration with the relevant industries and academia. While the industry is expected to focus on the production and distribution of electric vehicles, the responsibility of training the manpower for this cause is assigned to the academia.

The M.Tech in Electric transportation at IIT Mandi has been designed in alignment with the objectives of the initiative taken by the GoI and to cater to the growing demand of skilled personnel in the EV industry---both the new EV entrepreneurs and the existing ones.

Objectives of the program:

- Equipping the students with both the conceptual and practical knowledge pertaining to the electric transport industry.
- Exposing the students to cutting-edge research on electric transportation through various course projects, systems design (winter/summer short project), and dissertation.
- Enhancing their employability in the EV industry by engaging them in solving problems that originated in the industry in their year-long dissertation.

Course Structure

Overall Curriculum Structure:

Sr. No.	*Curriculum Structure Details*	*Credits*
1.	Discipline Core Courses (DC)	27
2.	Discipline Electives (DE)	06
3.	Open Electives from outside discipline (OE)	06
4.	Technical Communication(TC)	01
5.	Post Graduate Project (PGP-I and PGP-II)	15+15=30
	Total No. of Credits	**70**

Suggested Course Sequence:

FIRST SEMESTER (1st Sem)

Title of the course	L-T-P-C	Remarks
Power Electronic Applications in Electric Transportation	3-0-0-3	DC
Electrical Machine and Drives in Electric Transportation	3-0-0-3	DC
Laboratory course on Power Electronics and Electrical Drives	0-0-3-2	DC
Vehicle Design and Dynamics	3-0-0-3	DC
Modeling, Simulation and Control of HEV	3-0-0-3	DC
Laboratory course on Vehicle Design and Control	0-0-3-2	DC
Technical Communication	1-0-0-1	TC

Summer/Winter Break

Title of the course	C	Remarks
Systems Design: EVs	0-0-3-2	DC

SECOND SEMESTER (2nd Sem)

Title of the course	L-T-P-C	Remarks
Embedded Systems and IoT for E-Transportation	3-0-0-3	DC
Laboratory course on Embedded Systems and IoT for E-Transportation	0-0-2-1	DC
Energy Storage Technologies	3-0-0-3	DC
Laboratory course on Energy Storage Technologies	0-0-3-2	DC
Discipline Elective- I	6	DE
Discipline Elective II		DE
Open Elective-I	6	OE
Open Elective - II		OE

THIRD SEMESTER (3rd Sem)

Title of the course	L-T-P-C	Remarks
PGP - I	0-0-30-15	
Total	**15**	

FOURTH SEMESTER (4th Sem)

Title of the course	L-T-P-C	Remarks
PGP - II	0-0-30-15	
Total	**15**	

- **Open Electives**

  Open electives are to be taken from outside the discipline of program and should be at least of 6 credits in total [As per the IIT Mandi M Tech ordinance]

List of Discipline Electives:

- Impact of E-vehicle on Power Grids
- **Special Electrical machine**
- **Wide band gap devices for power electronics applications**
- **Nonlinear Analysis and Control of Power Electronic Converters**
- **Smart Grids**
- **Nonlinear Stability and Control**
- **Solar Photovoltaic Energy Systems**
- Power quality problems and mitigation techniques in Microgrids
- Computer Aided Design of Power Electronic systems and Electrical Drives
- **Finite Element Method**
- **Computational fluid dynamics**
- **Mechanical Vibration**
- **Design of Energy System**
- **Electric Vehicles: Economics, Policy and Social Embedding**

A few more electives will be added as DEs.