Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
MASTER OF TECHNOLOGY
in
MATERIALS SCIENCE & TECHNOLOGY

Vision of the Department

The department of Materials Science and Technology pursues to create a stimulating, diverse, collaborative and supportive environment that advances in the science and engineering of materials that serve upcoming days need through educational innovations, ground-breaking research, entrepreneurial pursuits, and community outreach.

Mission of the Department

As a department, we are committed to

- To inculcate ethics, social awareness, morality and responsibility to serve the society by creating a vibrant and nurturing educational environment and preparing students with a broad outlook;
- To create and disseminate knowledge about the role that materials play for human kind, both nationally & internationally towards the transformations of the civilization into a knowledge-based society.
- To develop liaison and collaboration with the globally recognized academic institutions in order to inject innovative and advanced thinking in teaching, learning and research.
- To generate intellectually capable and successful entrepreneurs having environmental consciousness and ethics who can work as an individual or in group in multi-cultural global environments for continuing significantly towards the betterment of quality of human life.
- To promote organizational and leadership skills in students through various extra-curricular and co-curricular events.

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Program Educational Objectives (PEOs)

Graduating Students of M. Tech in Materials Science & Technology program shall be able to

- **PEO1:** Pursue advanced education and research in Materials Science & Technology leading to lifelong learning.
- **PEO2:** Succeed in their career as globally employable professionals in academia and industry.
- **PEO3:** Emerge as ethically responsible citizens committed to social and environmental sustainability.

Program Outcomes (POs)

Graduating Students of M. Tech in Materials Science & Technology program will have

- **PO1:** An ability to independently carry out research /investigation and development work to solve practical problems.
- **PO2:** An ability to write and present a substantial technical report/document
- **PO3:** Students should be able to demonstrate a degree of mastery over the area as per the materials science & technology program.
- **PO4:** Develop an ability to work in team, apart from having awareness of social needs and professional code of conduct, ethics and behaviour.

Program Specific Outcomes (PSOs)

Graduating Students of M. Tech in Materials Science & Technology program will be able to:

- **PSO1:** Acquire fundamental knowledge of engineering to identify and solve different engineering problems.
- **PSO2:** Use modern software tools for modeling, analysis, and solution of problems in the domain of Materials Science & Technology related to material synthesis, characterization and application.
- **PSO3:** Emerge as productivity and quality improvement specialists.

Assessment techniques to be followed:

- Question preparation
- Presentation
- Report writing
- Problem solving
- Data analysis & Presentation
- Assignment
- Written exam
- Group discussion
- Viva
- Group project
- Exam with MCQ type question

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Curriculum Structure

Semester-I							
Sl No.	**Category**	**Subject Code**	**Subject Name**	**Total Number of contact hours**			**Credits**
				L	**T**	**P**	
Theory							
1	Program Core I	MST101	Foundations of Materials Science and Technology	3	0	0	3
2	Program Core II	MST102	Synthesis and Characterization of Materials	3	1	0	4
3	Program Elective I	MST103 A/B/C	A. Electronic, Optical and Magnetic Properties of Materials B. Materials Processing and Applications C. Waste Materials to Energy Conversion	3	0	0	3
4	Program Elective II	MST104 A/B/C/D	A. Green Energy and Allied Materials B. Material and Energy Balances C. Fundamentals of Electronic Device Fabrication D. Semiconductor Materials and Device Technology	3	0	0	3
5	Mandatory Learning Course	MLC101	Research Methodology and IPR	2	0	0	2
6	Audit Course I		Audit Course 1/2/8	2	0	0	2
Practical							
1	Laboratory I	MST191	Synthesis and Characterization of Materials	0	0	4	2
2	Laboratory II	MST192	Introduction to Computer Programming	0	0	4	2
			Total of Semester-I	***14***	***1***	***8***	***19***
Semester-II							
Theory							
1	Program Core III	MST201	Nanostructures and Nanomaterials	**3**	**1**	**0**	**4**
2	Program Core IV	MST202	Mechanical Behavior of Materials	3	0	0	3
3	Program Elective III	MST203 A/B/C	A. Electronic, Optical & Magnetic Properties of Materials B. Materials Processing and Applications C. Waste Materials to Energy Conversion	3	0	0	3
4	Program Elective IV	MST204 A/B/C	A. Materials Data Science and Informatics B. Computational Materials Science and Engineering C. Internet of Things: Sensing & Actuation Devices	3	0	0	3
5	Audit Course II		Audit Course 1/2/8	2	0	0	0
Practical							
1	Laboratory I	MST291	Fabrication, Processing and Testing of Materials	0	0	4	2
2	Laboratory II	MST292	Materials Data Mining & Analytics	0	0	4	2
Sessional							
1	Mini Project	MST281	Mini Project with Seminar: Design of Materials	0	0	4	2
			Total of Semester-II	***12***	***1***	***12***	***19***

Passed in *Board of Studies Meeting held on 03.04.2023*

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Curriculum Structure

Semester-III							
Sl No.	**Category**	**Subject Code**	**Subject Name**	**Total Number of contact hours**			**Credits**
				L	**T**	**P**	
Theory							
1	Program Elective V	MST301 A/B/C	1. Micro and Nano Fabrication 2. Nanotechnology & Nano sensors 3 Internet of Things: Sensing & Actuation Devices	3	0	0	3
2	Open Elective	MST302 A/B/C	1. Introduction to Artificial Intelligence 2. Block Chain Technology 3. Principles of Machine Learning	3	0	0	3
Sessional							
1	Major Project	MST381	Dissertation Phase-I (Progress)	0	0	20	10
			Total of Semester-III	***6***	***0***	***20***	***16***
Semester-IV							
Sessional							
1	Major Project	MST481	Dissertation Phase-II (Completion)	0	0	32	16
			Total of Semester-IV	***0***	***0***	***32***	**16**
			Total Credits of the M. Tech Program				***70***

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List of Electives

List of Program Electives

- **Program Elective – I**
  - A. **Electronic, Optical and Magnetic Properties of Materials (MST 103A)**
  - B. Materials Processing and Applications (MST 103B)
  - C. Waste Materials to Energy Conversion (MST 103C)
- **Program Elective – II**
  - A. **Green Energy and Allied Materials (MST 104A)**
  - B. Material and Energy Balances (MST 104B)
  - C. Fundamentals of Electronic Device Fabrication (MST 104C)
  - D. Semiconductor Materials and Device Technology (MST 104D)
- **Program Elective – III**
  - A. Electronic, Optical and Magnetic Properties of Materials (MST 203A)
  - B. **Materials Processing and Applications (MST 2034B)**
  - C. Waste Materials to Energy Conversion (MST 203C)
- **Program Elective – IV**
  - A. **Materials Data Science and Informatics (MST204A)**
  - B. Computational Materials Science and Engineering (MST204B)
  - C. Internet of Things: Sensing & Actuation Devices (MST204C)
- **Program Elective – V**
  - A. **Micro and Nano Fabrication (MST301A)**
  - B. Nanotechnology & Nano sensors (MST301B)
  - C. Internet of Things: Sensing and Actuation from Devices (MST301C)

List of Open Electives

- A. **Introduction to Artificial Intelligence (MST302A)**
- B. Block Chain Technology (MST302B)
- C. Principles of Machine Learning (MST303C)

List of Audit Courses

1.English for Research Paper Writing
2.Disaster Management
3.Sanskrit for Technical Knowledge
4.Value Education
5.Constitution of India
6.Pedagogy Studies
7.Stress Management by Yoga
8.Personality Development through Life Enlightenment Skills

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LIST OF MOOCS EQUIVALENT OF COURSES OF CURRICULUM

Classroom Equivalent Online Courses offered for M. Tech. in Materials Science & Technology

PROGRAM CORE						
Course Title (Theory)	*Credit as in Syllabus*	*MOOCS Equivalent (Theory)*	*Provided by*	*Duration (Week)*	*Credit*	*Name of University/Institute*
Introduction to Materials Science and Technology	3	Introduction to Materials Science and Engineering	NPTEL	12	4	IIT, BHU
Electronic, Optical and Magnetic Properties of Materials	3	Electronic, Optical and Magnetic Properties of Materials	edX	15	4	MIT
Nanostructures and Nanomaterials	3	Nanostructures and Nanomaterials: Characterization and Properties	NPTEL	15	4	IIT, Kanpur
Material and Energy Balances	3	Material and Energy Balances	NPTEL	12	3	IIT Madras
PROGRAM ELECTIVE						
Mechanical Behaviour of Material	3	Mechanical Behaviour of Material	edX	14	4	MIT
Fundamental of Materials Processing	3	Fundamental of Materials Processing-I Fundamental of Materials Processing-II	NPTEL	16	4	IIT, Kanpur
Waste Materials to Energy Conversion	3	Waste to Energy Conversion	NPTEL	8	2	IIT Roorkee
Synthesis & Characterization	3	Nanotechnology: A Maker's Course	Coursera	8	2	Duke University North Carolina State University The University of North Carolina at Chapel Hill
Fundamental of Electronic Device Fabrication	3	Fundamentals of electronic device fabrication	NPTEL	4	1	IIT Madras
Semiconductor Materials and Device Technology	3	Introduction to Semiconductor Devices 1	Coursera	13	4	Korea Advanced Institute of Science and Technology (KAIST)
Materials Data Science and Informatics	3	Materials Data Science and Informatics	Coursera	5	2	Georgia Institute of Technology

Computational Materials Science and Engineering	3	Computational Materials Science and Engineering	nanoHUB	6	2	University of Illinois
Internet of Things: Sensor and Devices	3	IoT Sensor and Devices	edX	5	2	Curtin University
Micro and Nanofabrication	3	Micro and Nanofabrication	edX	7	2	University of Lausanne
Nanotechnology & Nano sensors	3	Nanotechnology and Nano sensors, Part1 (5 wk.) & Nanotechnology & Nano sensors, Part 2 (5 wk.)	Coursera	10	3	Technion – Israel Institute of Technology
Internet of Things: Sensing and Actuation from Devices	3	Internet of Things: Sensing and Actuation from Devices	Coursera	6	2	UC SanDiego
OPEN ELECTIVE						
Introduction to Artificial Intelligence	3	Introduction to Artificial Intelligence	edX	4	2	Microsoft
Block Chain Technology	3	Block Chain Technology	edX	6	2	Berkey, University of California
Principles of Machine Learning	3	Principles of Machine Learning	edX	6	2	Microsoft
MANDATORY LEARNING COURSE						
Research Methodology & IPR	2	Understanding Research Methods	Coursera	4	2	University of London
		Intellectual Property Law and Policy: Part-I	edX	6		University of Pennsylvania

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Assessment Methodologies:

THEORY: Total marks of the theory paper are 100. These 100 marks is divided into 70 (End Semester Examination), 25 (Continuous Assessment) and 5 (Attendance) marks. 25 marks will be given on Internal Test, Quiz, Class Assignment etc.

- Question Paper pattern for End semester Examination

Question type	No. of questions	Marks allotted	Total
MCQ	10	1 mark each	1×10=10 marks
Short answer type question	15	5 marks each	3×5=15 marks
Long answer type question	45	15 marks each	3×15=45 marks
		TOTAL	**70 marks**

PRACTICAL:

- 100 marks is divided into 60 (End Semester Examination) and 40 (Internal Assessment) marks. 60 marks is again subdivided into 30 (Experiments to be performed or Computer programs to be written), 15 (Viva-voce) and 15 (Lab report) marks.
- 40 marks is again subdivided into 15 (Experiments performed in whole semester), 15 (Lab report maintenance), 5 (Viva-voce) and 5 (Attendance) marks.

SESSIONAL:

- 100 marks is divided into 35 (Continuous performance), 35 (Project report or Compendium preparation), 25 (Viva-voce) and 5 (Attendance) marks

Grading system

Sl. No.	Range of Marks	Letter Grade	Marks
1	41-50	D (Pass)	5
2	51-60	C (Average)	6
3	61-70	B (Good)	7
4	71-80	A (Very good)	8
5	81-90	E (Excellent)	9
6	91-100	O (Outstanding)	10
7	Less than 40	Fail	