

# NATIONAL INSTITUTE OF TECHNOLOGY DURGAPUR

## MINOR CURRICULUM OF 2021 ONWARD UNDERGRADUATE ADMISSION BATCH



Recommended in PGAC	: 16/08/2021
Approved by the Senate	: 22/08/2021

**FEW IMPORTANT POINTS**

- (a) Allocation of students in different minor programs will be made centrally based on the choices given by the students before the start of the 4<sup>th</sup> Semester and once a Minor Program is allotted to a student, he/she may opt out from the program, however, changeover to any other minor programs is not possible.
- (b) Students having CGPA of more than or equal to 8.5 at the end of 3<sup>rd</sup> Semester are only eligible to apply.
- (c) Minimum number of students required to float a minor program is 5, whereas, individual programs may have different maximum limit as mentioned in the table below.
- (d) A student cannot take more than 8 credits in a semester for Minor program.
- (e) Separate SGPA and CGPA calculations will be given for Major programs and Programs including Minor courses. Minor courses will be separately indicated in Grade Card.
- (f) Degree Nomenclature will be different from the existing one. In those cases where the student has earned the required credits for a Minor in another discipline within the stipulated time, this will be mentioned in the degree certificate as:
- B.Tech. in Chemical Engineering with Minor in Electrical Engineering
  - B.Tech. in Chemical Engineering (under Dual Degree program) with Minor in Electrical Engineering

Dept	Minor in	Credits	Curriculum for Minor		Who are not eligible	Maximum Permissible Students
			Theory	Lab / Sessional		
BT	Biotechnology	24	4 Core + 2 Elective	1 project	B. Tech. BT and DD-BT	10
CE	Civil Engineering	22	3 Core + 2 Electives	1 lab / project	B. Tech. CE	15
CS	Computer Science & Engineering	21	4 Core + 2 Electives	2 labs	B. Tech. CSE	20
CH	Chemical Engineering	22	3 Core + 2 Electives	1 lab	B. Tech. CH and DD-CH	10
CY	Chemistry in Industrial Applications	21	5 Core + 2 Elective	Industrial visit	--	20
EC	Electronics	22	2 Core + 4 Electives	1 lab	B. Tech. EC, B. Tech. EE, B. Tech. CSE	20
EE	Electrical Engineering	23	5 Core	2 labs	B. Tech. EE	20
HS	Economics	20	8 Core	No Labs	--	20
MA	Mathematics	20	5 Optional Core	No Labs	--	10
MM	Materials Science & Engineering	21	3 Core + 2 Electives	1 lab	B. Tech. MM	10
MS	Financial Management	20	6 Core	2 labs	--	20
MS	Marketing Management	20	6 Core	2 labs	--	20
MS	Systems and Operations Management	21	6 Core	2 labs	--	20
PH	Physics	22	4 Core + 1 Electives	1 lab	--	20

## DEPARTMENT OF BIOTECHNOLOGY

Program Name: Minor in Biotechnology

### CURRICULUM

Semester - 4							
Sl. No	Subject Code	Subject	L	T	S	C	H
1	BTM401	Microbiology and Cell Biology	3	1	0	4	4
2	BTC303	Biochemistry and Enzyme Technology	3	1	0	4	4
		<b>TOTAL</b>	<b>6</b>	<b>2</b>	<b>0</b>	<b>8</b>	<b>8</b>
Semester - 5							
Sl. No	Subject Code	Subject	L	T	S	C	H
1	BTM501	Molecular Biology and Immunology	3	1	0	4	4
		<b>TOTAL</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>	<b>4</b>
Semester - 6							
Sl. No	Subject Code	Subject	L	T	S	C	H
1	BTM601	Bioprocess Engineering Fundamentals	3	1	0	4	4
2	BTEXXX	Elective I	3	0	0	3	3
		<b>TOTAL</b>	<b>6</b>	<b>1</b>	<b>0</b>	<b>7</b>	<b>7</b>
Semester - 7							
Sl. No	Subject Code	Subject	L	T	S	C	H
1	BTEXXX	Elective II	3	0	0	3	3
2	BTM751	Seminar /Project	0	0	2	2	2
		<b>TOTAL</b>	<b>3</b>	<b>0</b>	<b>2</b>	<b>5</b>	<b>5</b>
		<b>TOTAL</b>	<b>18</b>	<b>4</b>	<b>2</b>	<b>24</b>	<b>24</b>

#### List of electives:

Elective – I		Elective - II	
Subject Code	Subject Name	Subject Code	Subject Name
BTE 610	Animal Biotechnology	BTE 711	Cancer Biology & Cell Signalling
BTE 613	Human Genomics	BTE 713	Biopharmaceutical Process Design
BTE 614	Molecular Virology	BTE 714	Bioenergy
BTE 615	Bio-metallurgy	BTE 715	Project Engineering for Biotechnology
BTE 616	Nano-biotechnology	BTE 716	Structural Biology
BTE 617	Marine Biotechnology	BTE 717	Environmental Biotechnology
BTE 618	Folding, Misfolding and Diseases	BTE 718	Proteomics and Protein Engineering
BTE 619	Engineering Resistance in Plants	BTE 719	Molecular Modelling & Drug Design
BTE 810	Plant Developmental Biology	BTE 720	Nano-therapeutics
BTE 811	Bioprocess Plant & Equipment Design	BTE 724	Application of Molecular Cloning
BTE 812	Medical & Pharmaceutical Biotechnology	BTE 721	Biomaterials
BTE 813	GM Crops	BTE 722	Vaccine Technology
BTE 814	Bioethics & IPR		
BTE 815	Environmental Microbiome		
	Machine learning for genomics		

**DEPARTMENT OF CIVIL ENGINEERING****Program Name: Minor in Civil Engineering****CURRICULUM**

Sl. No		Subject	L	T	S	C	H
<b>Group A (Compulsory)</b>							
1	CEC301	Solid Mechanics	3	1	0	4	4
2	CEC303	Building Construction & Concrete Technology	3	1	0	4	4
3	CEC401	Structural Analysis-I	3	1	0	4	4
<b>Group-B (Minimum Two)</b>							
1	CEC302	Fluid Mechanics	3	0	0	3	3
2	CEC402	Design of Concrete Structures	3	1	0	4	4
3	CEC502	Design of Steel Structure	3	1	0	4	4
4	CEC503	Soil Mechanics	3	0	0	3	3
5	CEC504	Transportation Engineering	3	1	0	4	4
6	CEC602	Foundation Engineering	3	0	0	3	3
7	CEC601	Water Resource Engineering	3	1	0	4	4
8	CEC603	Environmental Engineering	3	1	0	4	4
<b>Group-C (Minimum one)</b>							
1	CES554	Surveying Laboratory & Estimation Sessional	1	0	3	2.5	4
2	CES553	Transportation Engineering & Soil Mechanics Laboratory	0	0	3	1.5	3
3	CES652	Concrete Technology Laboratory	0	0	3	1.5	3
4	CES651	Environmental Engineering Laboratory & Computational Laboratory- I	0	0	3	1.5	3
5	CES751	Project - I	0	0	4	2	4
		<b>TOTAL</b>				<b>20</b>	

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

Program Name: Minor in Computer Science and Engineering

**CURRICULUM**

Sl. No	Course Code	Course Name	Pre-requisite	L-T-P	Credits
1	CSO441	Data Structures and Algorithms	Introduction to Computing	3-0-0	3
2	CSO543	Computer Organisation	Logic Design/Digital logic/Digital Electronics	3-0-0	3
3	CSO543	Operating Systems	Computer Organisation	3-0-0	3
4	CSO542	Database Management System	Data Structures and Algorithms	3-0-0	3
5	CSEXXX	Elective I	As required	3-0-0	3
6	CSEXXX	Elective II	As required	3-0-0	3
7	CSS352	Data Structures and Algorithms Laboratory	Data Structures and Algorithms (concurrently permitted)	0-0-4	2
8	CSS653	Database Management Systems Laboratory	Database Management Systems (concurrently permitted)	0-0-2	1
<b>Total Credits</b>					<b>21</b>

**DEPARTMENT OF CHEMICAL ENGINEERING**

Program Name: Minor in Chemical Engineering

**CURRICULUM**

Sl. No.	Subject Code	Name of the Subject	L	T	S	C	H
<b>Compulsory Core</b>							
1.	CHC403	Mass Transfer I	3	1	0	4	4
2.	CHC501	Chemical Reaction Engineering	3	1	0	4	4
3.	CHC601	Transport Phenomena	3	1	0	4	4
<b>Compulsory Laboratory</b>							
4.	CHS652	Chemical Reaction Engineering Laboratory	0	0	3	2	3
<b>Electives</b>							
5.	CHX7XX	Elective-I	3	1	0	4	4
6.	CHX7XX	Elective-II	3	1	0	4	4
<b>Total</b>			<b>15</b>	<b>5</b>	<b>3</b>	<b>22</b>	<b>23</b>

<b>List of Elective Subjects</b>		
Sl. No.	Subject Code	Name of the Subject
1.	CHC 301	Process Calculations
2.	CHC 302	Chemical Engineering Thermodynamics
3.	CHC 502	Mass Transfer II
4.	CHC503	Chemical Process Technology
5.	CHC504	Instrumentation and Process Control
6.	CHC402	Heat Transfer
7.	CHC403	Mechanical Operations
8.	CHC602	Petroleum Refining and Petrochemicals Engineering

## DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Program Name: Minor in Electronics

### CURRICULUM

Semester - 4							
Sl. No	Subject Code	Subject	L	T	S	C	H
1	ECC402	Electronic Devices and Circuits	3	1	0	4	4
2	ECO441 / ECO841	Elective I	3	0	0	3	3
Semester -5							
Sl. No		Subject	L	T	S	C	H
1	ECC302	Electronic Devices and Circuits - I	3	1	0	4	4
Semester - 6							
Sl. No		Subject	L	T	S	C	H
1	ECC403/E CE616	Elective II	3	0	0	3	3
2	ECO843/E CO853	Elective III	3	0	0	3	3
Semester - 7							
Sl. No		Subject	L	T	S	C	H
1	ECO742/E CO743	Elective IV	3	0	0	3	3
2	ECM7XX	Micro-credit Course	0	0	3	2	3
<b>TOTAL</b>			<b>18</b>	<b>2</b>	<b>2</b>	<b>22</b>	<b>23</b>

#### List of electives:

Elective – I		Elective - II	
Subject Code	Subject Name	Subject Code	Subject Name
ECO441	Communication Engineering	ECC403	Electromagnetic Theory and Transmission Lines
ECO841	Signal Processing	ECE616	VLSI Technology
Elective - III		Elective - IV	
Subject Code	Subject Name	Subject Code	Subject Name
ECO843	EMI/EMC	ECO742	Wireless Technology
ECO853	Electronic System Design	ECO743	Embedded System & IoT

**DEPARTMENT OF ELECTRICAL ENGINEERING****Program Name: Minor in Electrical Engineering****CURRICULUM**

Sl No	Subject Code	Subject Name	Semester	Prerequisites	L-T-P	Credit
1	EEC301	Network Analysis and Synthesis	3rd	Basic Electrical Engineering	3-1-0	4
2	EEC302	Electrical and Electronic Measurement	3rd	Basic Electrical Engineering	3-1-0	4
3	EEC401	Power Systems-I	4 <sup>th</sup>	Basic Electrical Engineering	3-1-0	4
4	EEC402 / EEC501	Electrical Machines-I / Electrical Machines-II	4 <sup>th</sup> / 5th	Basic Electrical Engineering	3-1-0	4
5	EEC504	Power Electronics	5th	Basic Electronics	3-1-0	4
6	EEM351	Electrical Networks and Measurement Laboratory	3rd	Basic Electrical Engineering	0-0-3	1.5
7	EES 552 / EES 651	Electrical Machines Laboratory-I / Electrical Machines Laboratory-II	4th	Basic Electrical Engineering	0-0-3	1.5
<b>Total Credit</b>						<b>23</b>

**Note:**

1. Electrical Machines-I (EEC402) and Electrical Machines Laboratory – I (EES 552) are for other than Mechanical Engineering students.
2. Electrical Machines-II (EEC501) and Electrical Machines Laboratory – II (EES 651) are only for Mechanical Engineering students.



**DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES**

Program Name: Minor in Economics

**CURRICULUM**

Total Credit Points - 20

Sl. No.	Sem.	Subject Code	Name of the Subject	L	T	S	C	H
1.	4 <sup>th</sup>	HSO4XX	Indian Economics	3	0	0	3	3
2.	5 <sup>th</sup>	HSMXXX	Public Finance	2	0	0	2	2
3.	5 <sup>th</sup>	HSO541	Statistical Techniques for Economics	3	0	0	3	3
4.	6 <sup>th</sup>	HSMXXX	Managerial Economics	2	0	0	2	2
5.	6 <sup>th</sup>	HSMXXX	Quantitative Economics	3	0	0	3	3
6.	7 <sup>th</sup>	HSO741	Development Economics & Sustainable Development	3	0	0	3	3
7.	8 <sup>th</sup>	HSMXXX	International Trade	2	0	0	2	2
8.	8 <sup>th</sup>	HSMXXX	Economics of Growth	2	0	0	2	2
<b>Total</b>				<b>20</b>	<b>0</b>	<b>0</b>	<b>20</b>	<b>20</b>

**DEPARTMENT OF MATHEMATICS****Program Name: Minor in Mathematics****CURRICULUM**

- ❖ **At least five subjects (with minimum 20 credit points) are to be chosen to earn a minor in “Mathematics” with at least one from each Group.**

**Group-A (At least one subject)**

<b>Course Code</b>	<b>Name of the Subject</b>	<b>Prerequisites</b>	<b>L-T-P</b>	<b>Total Credit</b>	<b>Semester</b>
MA1101	Complex Analysis	MEC	3-1-0	4	ODD
MA1104	Linear Algebra	MEC	3-1-0	4	ODD
MA1105	Real Analysis	MEC	3-1-0	4	ODD
MA4101	Topology	MEC, Real Analysis	3-1-0	4	EVEN
MA2102	Functional Analysis	MEC, Real Analysis	3-1-0	4	EVEN
MA2103	Modern Algebra	MEC	3-1-0	4	EVEN

**Group-B (At least one subject)**

<b>Course Code</b>	<b>Name of the Subject</b>	<b>Prerequisites</b>	<b>L-T-P</b>	<b>Total Credit</b>	<b>Semester</b>
MA1103	Ordinary and Partial Differential Equations	MEC	3-1-0	4	ODD
MA3102	Graph Theory	MEC	2-1-0	3	ODD
MA3103	Fluid Dynamics	MEC, Ordinary and Partial Differential Equations	3-1-0	4	ODD
MA2101	Integral Transforms and Integral Equations	MEC	3-1-0	4	EVEN
MA2104	General Mechanics and Variational Calculus	MEC, Ordinary and Partial Differential Equations	4-1-0	5	EVEN
MA2105	Numerical Analysis	MEC	3-1-0	4	EVEN

**Group-C (At least one subject)**

<b>Course Code</b>	<b>Name of the Subject</b>	<b>Prerequisites</b>	<b>L-T-P</b>	<b>Total Credit</b>	<b>Semester</b>
MA1102	Probability & Stochastic Processes	MEC	3-1-0	4	ODD
MA3101	Operations Research	MEC	3-1-0	4	ODD
MA9113	Mathematical Modeling	MEC, Ordinary and Partial Differential Equations	3-1-0	4	ODD
MA9116	Automata and Algorithms	MEC	3-1-0	4	ODD
MA4102	Generalized Functions and Wavelets	MEC	2-1-0	3	EVEN
MA9122	Algebraic Coding Theory	MEC, Modern Algebra	3-1-0	4	EVEN
MA9123	Dynamical Systems and Chaos Theory	MEC, Linear Algebra	3-1-0	4	EVEN

## DEPARTMENT OF METALLURGICAL AND MATERIALS ENGINEERING

**Program Name: Minor in Materials Science and Engineering**

### CURRICULUM

<b>Description</b>	Materials Science and Engineering is an interdisciplinary subject that uses basic science and engineering knowledge but has its special character. It is constantly developing new and exciting materials such as nanomaterials, high-temperature, and lightweight materials, green materials, and sustainable biomaterials for tissue engineering. Material Science combines a broad knowledge base and puts it to diverse practical and commercial use.						
Courses & Credit points	<b>Five (5) courses (min) and one lab (min) (Credit points:21)</b>						
	<b>Subject code</b>	<b>Subject name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>	<b>C</b>
<b>Section A</b> (Any Three) Total Credit to be earned: <b>12</b>	MMC301	Metallurgical Thermodynamics and Kinetics	3	1	0	4	4
	MMC302	Introduction to Metallurgy and Materials	3	1	0	4	4
	MMC402	Phase Transformation and Phase Equilibria	3	1	0	4	4
	MMC403	Materials Characterization	3	1	0	4	4
	MMC501	Manufacturing Processes	3	1	0	4	4
	MMC503	Fundamentals of Plastic Deformation & Strengthening of Materials	3	1	0	4	4
<b>Section B</b> (Any Two) Total Credit to be earned: <b>6</b>	MME611	Electronic and Thermal Properties of Materials	3	0	0	3	3
	MME614	Nano Science and Technology	3	0	0	3	3
	MME617	Metal Joining Processes	3	0	0	3	3
	MME615	Ceramic Technology	3	0	0	3	3
	MME710	Functional Materials	3	0	0	3	3
	MME712	Computational Materials Engineering	3	0	0	3	3
Laboratory (Any One, which is related to one choice of Section A) Total Credit to be earned: <b>3</b>	MMS351	Metallurgical Thermodynamics and Kinetics Lab	0	0	3	3	3
	MMS452	Phase Transformation and Phase Equilibria Lab	0	0	3	3	3
	MMS551	Manufacturing Processes Lab - I	0	0	3	3	3
	MMS553	Plastic Deformation & Strengthening of Materials Lab	0	0	3	3	3
	MMS653	Materials Characterization Lab-I	0	0	3	3	3

**DEPARTMENT OF MANAGEMENT STUDIES****Program Name: Minor in Financial Management****CURRICULUM**

<b>Semester</b>	<b>Subject Code</b>	<b>Name of the subject</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
Sem V	MS1003	Management Accounting	2	0	2	3
	MSM551	Financial Lab-I	0	0	2	1
Sem VI	MS2003	Financial Management	2	0	2	3
	MSM651	Financial Lab-II	0	0	2	1
Sem VII	MS9313	Banking Management	3	0	0	3
	MS9314	Investment and Portfolio Management	3	0	0	3
Sem VIII	MS9318	International Finance	3	0	0	3
	MS9320	Corporate Finance	3	0	0	3
<b>Total</b>						20

**DEPARTMENT OF MANAGEMENT STUDIES****Program Name: Minor in Marketing Management****CURRICULUM**

<b>Semester</b>	<b>Subject Code</b>	<b>Name of the subject</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
Sem V	MS1002	Marketing Management	2	0	2	3
	MSM552	Marketing Lab-I	0	0	2	1
Sem VI	MS2007	Research Methodology	2	0	2	3
	MSM652	Marketing Lab-II	0	0	2	1
Sem VII	MS9215	Digital Marketing	3	0	0	3
	MS9217	Marketing Research	3	0	0	3
Sem VIII	MS9221	Marketing Analytics	3	0	0	3
	MS9223	Sales and Distribution Management	3	0	0	3
<b>Total</b>						20

**DEPARTMENT OF MANAGEMENT STUDIES****Program Name: Minor in System and Operations Management****CURRICULUM**

<b>Semester</b>	<b>Subject Code</b>	<b>Name of the subject</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
Sem V	MS1004	Quantitative Techniques in Business	3	1	0	4
	MSM553	System Lab-I	0	0	2	1
Sem VI	MS2004	Operations research	2	0	2	3
	MSM653	System Lab-II	0	0	2	1
Sem VII	MS9413	Introduction to Data Science	3	0	0	3
	MS9416	Supply Chain Management	3	0	0	3
Sem VIII	MS9419	Logistics Management	3	0	0	3
	MS9420	Decision Modelling	3	0	0	3
<b>Total</b>						21

**DEPARTMENT OF PHYSICS**

Program Name: Minor in Physics

**CURRICULUM****Compulsory Courses**

Subject Code	Subject	L - T - P	Credit
PHM401	Classical Mechanics	3 - 1 - 0	4
PHM402	Quantum Mechanics	3 - 1 - 0	4
PHM501	Thermal and Statistical Physics	3 - 1 - 0	4
PHM502	Condensed Matter Physics	3 - 1 - 0	4
PHS651	Physics Laboratory	0 - 0 - 4	2
<b>TOTAL</b>			<b>18</b>

**Elective Courses**

Subject Code	Name of the Subject	L - T - P	Credit
PHM61X	Elective - I	3 - 1 - 0	4
<b>TOTAL</b>			<b>22</b>

**LIST OF ELECTIVE PAPERS**

Sl. No.	Subject Code	Name of the Subject	L-T-P	Credit
1	PHM610	Nuclear and Particle Physics	3 - 1 - 0	4
2	PHM611	Mathematical Physics	3 - 1 - 0	4
3	PHM612	Electrodynamics	3 - 1 - 0	4
4	PHM613	Electronics	3 - 1 - 0	4