NATIONAL INSTITUTE OF TECHNOLOGY DURGAPUR

MINOR CURRICULUM

OF

2021 ONWARD UNDERGRADUATE ADMISSION BATCH

Recommended in UGAC	: 16/08/2021
Approved by the Senate	: 22/08/2021
Revised in UGAC	: 15/12/2022
Revision approved by the Senate	: 23/01/2023

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 4th 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 ~~3rd Semester~~ 2nd Semester are only eligible to apply. The allotment of Minor will be made based on the results of the second semester examination from 2023-2024.

(c) A CGPA ≥ 8.0 is to be maintained in the subsequent semesters without any Backlog in order to keep the Minor registration active. Should CGPA fall below 8.0 at any point after registering for the minor; the Minor registration shall be cancelled.

(d) A student may cover the subjects as mentioned in respective Minor Curriculum either as a depth, elective or an open elective subject or as additional credits. He/she can earn up to 8 credits as depth / elective / open elective subjects, rest they will have to take as additional credits to earn a minor.

(e) Students enrolled in Dual Degree, Integrated M.Sc. are permitted to pursue minor in other disciplines up to the 10th Semester, while the students of B.Tech. should complete the requirements of minor program by 8th semester.

(f) Tie breaking shall be implemented in the following sequence: (CGPA of particular semester - SGPA of that semester - CGPA of preceding semester - SGPA of preceding semester).

(g) 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.

(h) A student cannot take more than 8 credits in a semester for a Minor program.

(i) 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.

(j) 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:

- Bachelor of Technology in Chemical Engineering with Minor in Electrical Engineering
- Bachelor of Technology in Chemical Engineering (under Dual Degree program) with Minor in Electrical Engineering

(Amended in 69th Senate, dated 23/01/2023)

CURRICULUM FOR MINOR PROGRAMS

Dept	Minor in	Credits	Curriculum for Minor		Who are not eligible	Maximum Permissible Students
			Theory	Lab / Sessional		
BT	Biotechnology	21	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	21.5	4 Core + 2 Electives	2 labs	B. Tech. CSE	10
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 & Communication	23/21	2 Core + 4 Electives	1 lab	B. Tech. EC, ~~B. Tech. EE, B. Tech. CSE~~	20
EE	Electrical Engineering	21.5/18.5	5 Core	1 lab	B. Tech. EE	20
HS	Economics	20	8 Core	No Labs	--	20
MA	Mathematics	20	5 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
		TOTAL	**3**	**1**	**0**	**4**	**4**
Semester -5							
Sl. No	**Subject Code**	**Subject**	**L**	**T**	**S**	**C**	**H**
1	BTM501	Biochemistry and Enzyme Technology	3	1	0	4	4
2	BTO541	Introduction to Computational Biology	3	0	0	3	3
		TOTAL	**6**	**1**	**0**	**7**	**7**
Semester - 6							
Sl. No	**Subject Code**	**Subject**	**L**	**T**	**S**	**C**	**H**
1	BTM601	Molecular Biology and Immunology	3	1	0	4	4
2	BTM651	Project	0	0	2	2	2
		TOTAL	**3**	**1**	**2**	**6**	**6**
Semester - 7							
Sl. No	**Subject Code**	**Subject**	**L**	**T**	**S**	**C**	**H**
1	BTM701	Bioprocess Engineering Fundamentals	3	1	0	4	4
		TOTAL	**3**	**1**	**0**	**4**	**4**
		TOTAL	**15**	**4**	**2**	**21**	**21**

DEPARTMENT OF CIVIL ENGINEERING

Program Name: Minor in Civil Engineering

CURRICULUM

Sl. No		Subject	L	T	S	C	H
Group A (Compulsory)							
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
Group-B (Minimum Two)							
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
Group-C (Minimum one)							
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
		TOTAL				**20**	

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	CSO443	Digital Computer Design	Introduction to Computing	3-0-0	3
~~2~~	~~CSO543~~	~~Computer Organisation~~	~~Logic Design/Digital logic/Digital Electronics~~	~~3-0-0~~	~~3~~
3	CSO544	Operating Systems	Computer Organisation / Digital Computer Design	3-0-0	3
4	CSO542	Database Management System	Data Structures and Algorithms	3-0-0	3
5*	CSE6XX	Elective I	As required	3-0-0	3
6*	CSE7XX	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)	0-0-3	1.5
		Total Credits			**21.5**

*Electives I & II should be from the Depth Electives offered to the B. Tech CSE students

Semester-wise Plan of subjects

Semester	Subject Codes	Credits Earned
Fourth	CSO441 CSO443	6
Fifth	CSO542 CSO543 CSS352	8
Sixth	CSE6XX CSS653	4.5
Seventh	CSE7XX	3

DEPARTMENT OF CHEMICAL ENGINEERING

Program Name: Minor in Chemical Engineering

CURRICULUM

Sl. No.	Subject Code	Name of the Subject	L	T	S	C	H
Compulsory Core							
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
Compulsory Laboratory							
4.	CHS652	Chemical Reaction Engineering Laboratory	0	0	3	2	3
Electives							
5.	CHX7XX	Elective-I	3	1	0	4	4
6.	CHX7XX	Elective-II	3	1	0	4	4
		Total	**15**	**5**	**3**	**22**	**23**

List of Elective Subjects							
Sl. No.	**Subject Code**	**Name of the Subject**	**L**	**T**	**S**	**C**	**H**
1.	CHC301	Process Calculations	3	1	0	4	4
2.	CHC302	Chemical Engineering Thermodynamics	3	1	0	4	4
3.	CHC402	Mechanical Operations	3	1	0	4	4
4.	CHC504	Instrumentation and Process Control	3	1	0	4	4
5.	CHC602	Petroleum Refining and Petrochemicals Engineering	3	1	0	4	4
6.	CHO441	Process Heat Transfer	3	0	0	3	3
7.	CHO541	Solid and Hazardous Waste Management	3	0	0	3	3
8.	CHO841	Bioengineering & Industrial applications	3	0	0	3	3
9.	CHO851	Energy, Environment & Sustainability	3	0	0	3	3

DEPARTMENT OF CHEMISTRY

Program Name: Minor in Chemistry and Industrial Applications

CURRICULUM

Sl No.	Subject Code	Subject	L-T-P	Credit point
1	CYM401	Power plant chemistry & corrosion Engineering	3-0-0	3
2	CYM501	Industrial chemistry	3-0-0	3
3	CYM502	Organometallic compounds: spectroscopic characterization and applications	3-0-0	3
4	CYM601	Analytical and environmental chemistry	3-0-0	3
5	CYM602	Spectroscopic Techniques and Experimental Electrochemistry	3-0-0	3
6	CYM701	Introduction to computational material design	3-0-0	3
7	CYM702	Natural Products and Drug design	3-0-0	3
			Total	**21**

DEPARTMENT OF ELECTRONICS AND COMMUNICATION

Program Name: Minor in Electronics & Communication Engineering

CURRICULUM

Semester - 4							
Sl. No	**Subject Code**	**Subject**	**L**	**T**	**S**	**C**	**H**
1	ECC402 / CSC302 / EEC403	Digital Circuits and Systems / Digital Logic Design / Digital Electronics	3	1/0	0	4/3	4/3
2	ECO441 / ECO841	Elective I	3	0	0	3	3
Semester -5							
Sl. No		**Subject**	**L**	**T**	**S**	**C**	**H**
1	ECC302 / ECC331	Electronic Devices and Circuits - I / Analog Electronics	3	1	0	4	4
Semester - 6							
Sl. No		**Subject**	**L**	**T**	**S**	**C**	**H**
1	ECC403 **/** ECE616	Elective II	3	1/0	0	4/3	4/3
2	ECO843 **/** ECO853	Elective III	3	0	0	3	3
Semester - 7							
Sl. No		**Subject**	**L**	**T**	**S**	**C**	**H**
1	ECO742 **/** ECO743	Elective IV	3	0	0	3	3
2	ECM7XX	Micro-credit Course	0	0	3	2	3
		TOTAL	**18**	**2**	**2**	**23/ 21**	**24/ 22**

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
ECO850	Communication Network	ECO742	Mobile Communication
ECO853	Electronic System Design	ECO743	Internet of Things

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 / EEE710	Network Analysis and Synthesis **(Except ECE)** / Renewable Energy Systems **(For ECE only)**	Odd	Basic Electrical Engineering	3-1-0 / 3-0-0	4 /3
2	EEC302 / EEE713	Electrical and Electronic Measurement **(Excluding the students who have already taken ECE621)** / Electrical Drives **(For ECE only)**	Odd	Basic Electrical Engineering / Electrical Machines, Power Electronics	3-1-0 / 3-0-0	4/3
3	EEC401	Power Systems-I	Even	Basic Electrical Engineering	3-1-0	4
4	EEC402 / EEC501	Electrical Machines-I **(Except ME)** / Electrical Machines-II **(For ME only)**	Even / Odd	Basic Electrical Engineering / Electrical Machines	3-1-0	4
5	EEC504 / EEE615	Power Electronics **(Excluding the students who have already taken ECE624)** / Advanced Power Electronics **(For ECE only)**	Odd / Even	Basic Electronics / Power Electronics	3-1-0 / 3-0-0	4 / 3
6	EES 552 / EES 651/	Electrical Machines Laboratory-I **(Except ME)** / Electrical Machines Laboratory-II **(For ME only)**	Odd / Even	Basic Electrical Engineering	0-0-3	1.5
Total Credit						**21.5 / 18.5**

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.	4th	HSO4XX	Indian Economics	3	0	0	3	3
2.	5th	HSMXXX	Public Finance	2	0	0	2	2
3.	5th	HSO541	Statistical Techniques for Economics	3	0	0	3	3
4.	6th	HSMXXX	Managerial Economics	2	0	0	2	2
5.	6th	HSMXXX	Quantitative Economics	3	0	0	3	3
6.	7th	HSO741	Development Economics & Sustainable Development	3	0	0	3	3
7.	8th	HSMXXX	International Trade	2	0	0	2	2
8.	8th	HSMXXX	Economics of Growth	2	0	0	2	2
Total				**20**	**0**	**0**	**20**	**20**

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)

Course Code	Name of the Subject	Prerequisites	L-T-P	Total Credit	Semester in which this course will be offered
MA1101	Complex Analysis		3-1-0	4	ODD
MA1104/ MAO542	Linear Algebra/ Linear Algebra		3-1-0/ 3-0-0	4 / 3	ODD/ ODD
MA1105	Real Analysis		3-1-0	4	ODD
MA4101	Topology	Real Analysis	3-1-0	4	EVEN
MA2102	Functional Analysis	Real Analysis	3-1-0	4	EVEN
MA2103	Modern Algebra		3-1-0	4	EVEN
MAO441	Discrete Mathematics		3-0-0	3	EVEN

Group-B (At least one subject)

Course Code	Name of the Subject	Prerequisites	L-T-P	Total Credit	Semester in which this course will be offered
MA1103	Ordinary and Partial Differential Equations		3-1-0	4	ODD
MA3102	Graph Theory		2-1-0	3	ODD
MA3103	Fluid Dynamics	Ordinary and Partial Differential Equations	3-1-0	4	ODD
MA2101	Integral Transforms and Integral Equations		3-1-0	4	EVEN
MAO541	Mathematical Methods for Engineers		3-0-0	3	ODD
MA2105/ MAO852	Numerical Analysis/ Advanced Numerical Analysis		3-1-0 / 3-0-0	4/ 3	EVEN/ EVEN

Group-C (At least one subject)

Course Code	Name of the Subject	Prerequisites	L-T-P	Total Credit	Semester in which this course will be offered
MA1102/ MAO442	Probability & Stochastic Processes / Probability & Stochastic Processes		3-1-0 / 3-0-0	4/ 3	ODD/ EVEN
MA3101/ MAO851	Operations Research/ Operations Research		3-1-0/ 3-0-0	4/ 3	ODD/ EVEN
MA9113	Mathematical Modeling	Ordinary and Partial Differential Equations	3-1-0	4	ODD
MA9116	Automata and Algorithms		3-1-0	4	ODD
MA4102	Generalized Functions and Wavelets		2-1-0	3	EVEN
MA9122	Algebraic Coding Theory	Modern Algebra	3-1-0	4	EVEN
MA9123	Dynamical Systems and Chaos Theory	Linear Algebra	3-1-0	4	EVEN

DEPARTMENT OF METALLURGICAL AND MATERIALS ENGINEERING

Program Name: Minor in Materials Science and Engineering

CURRICULUM

Description	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	**Five (5) courses (min) and one lab (min) (Credit points:21)**						
	Subject code	**Subject name**	**L**	**T**	**P**	**H**	**C**
Section A (Any Three) Total Credit to be earned: **12**	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
Section B (Any Two) Total Credit to be earned: **6**	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
	MME716	Composite Materials	3	0	0	3	3
Laboratory (Any One, which is related to one choice of Section A) Total Credit to be earned: **3**	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

Semester	Subject Code	Name of the subject	L	T	P	Credits
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
Total						20

DEPARTMENT OF MANAGEMENT STUDIES

Program Name: Minor in Marketing Management

CURRICULUM

Semester	Subject Code	Name of the subject	L	T	P	Credits
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 (Any two will be decided by DAC, DMS)	MS9215	Digital Marketing	3	0	0	3
	MS9217	Marketing Research	3	0	0	3
	MS9211	Marketing Communications	3	0	0	3
	MS9212	Consumer Behaviour	3	0	0	3
Sem VIII (Any two will be decided by DAC, DMS)	MS9221	Marketing Analytics	3	0	0	3
	MS9223	Sales and Distribution Management	3	0	0	3
	MS9219	Service Marketing and Retail Management	3	0	0	3
Total						20

DEPARTMENT OF MANAGEMENT STUDIES

Program Name: Minor in System and Operations Management

CURRICULUM

Semester	Subject Code	Name of the subject	L	T	P	Credits
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
Total						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
TOTAL			**18**

Elective Courses

Subject Code	Name of the Subject	L - T - P	Credit
PHM61X	Elective - I	3 - 1 - 0	4
TOTAL			**22**

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