

INDIAN INSTITUTE OF TECHNOLOGY GANDHINAGAR

NORMS FOR BTECH PROGRAMME

[As approved by a) the BoG in its 18th meeting held on 16 May 2016, 34th meeting held on 28 April 2022, 39th meeting held on 19 January 2024 b) Senate in its 61st meeting held on 15th November 2022, updated in the 63rd/64th/68th meetings of the Senate]

The curriculum of the undergraduate programme at IIT Gandhinagar focuses on students' overall development and step-by-step value addition. The aim is to

- impart a broad-based education
- emphasize strong fundamentals and substantial interdisciplinary exposure
- provide an opportunity to explore a wide spectrum of courses in each semester
- provide sufficient design exposure
- promote planning and organization, and encourage team work
- sensitize students to their socio-cultural context
- equip students for future leadership, transcending conventional disciplinary barriers
- emphasize need for lifelong learning and relearning.

The BTech programme is divided into two distinct but compatible parts called **Institute level curriculum** and **Discipline specific curriculum**. Each student is required to go through the Institute level curriculum, irrespective of his/her chosen branch of specialization. It consists of a package of compulsory courses, besides a few elective courses. The Discipline specific curriculum consists of a set of compulsory courses, electives, and project work.

All students admitted to the first year of undergraduate (BTech and BTech-MTech) programmes are called at least one week before the rest of the batches. First, they go through a **Foundation Programme** of about **four weeks** (five weeks for students admitted till AY 2022-23) followed by regular semester activities of about twelve weeks.

A student is required to pass the prescribed minimum courses of the curriculum for his/her programme and complete the **minimum credits requirement of 169-175** for the BTech degree according to the structure prescribed by each discipline.

A. BTech Curriculum (Applicable for students admitted from AY 2022-23)

1. Typically **forty hours of study load** (mind-space time) of a student may be counted as **equivalent to one credit** i.e. in a four credit course, a study load of 160 hours is expected from the student in a semester, including contact hours.
2. All BTech students are required to complete **28 credits** of courses under the **Humanities and Social Sciences** basket, including two mandatory Writing courses namely **HS 191: Introduction to Writing I (2 credits)** and **HS 192: Introduction to Writing II (2 credits)**.
3. In addition to the Writing courses, the Humanities and Social Sciences courses which are mandatory for undergraduate students are **Economics (4 credits)**, **Introduction to Philosophy (4 credits)** and **World Civilizations and Cultures (4 credits)**. In the future, baskets of courses may be offered as an alternative to the mandatory Humanities and Social Sciences courses. Rest of the 12 credits will be covered through Humanities, Social Sciences or Management electives, with **4 credits** (2 courses of 2 credits each) worth of courses from a **General Education Basket**. Some of the courses which could

be considered under the General Education (GE) Basket include courses on Cultural Expression, Performing Arts, Theatre, Fine Arts, Sports etc. The courses under the mandatory General Education Basket (up to 4 credits) will have Pass/Fail grade and not an usual letter grade. In cases where a student fails to clear the Foundation Programme, they may clear an additional 4 credits worth of GE courses for graduation. *Note: Credit for courses offered under the General Education Basket cannot be counted towards the graduation requirements for students who are admitted before 2022-23.*

4. All students are required to complete **8 credits** worth of courses from the **Science Basket**, which will have courses from **Chemistry, Cognitive Science, Earth Sciences and Physics**. The parent discipline of the student may specify one course out of the two courses which a student is required to complete. The courses which are covered under the Science basket will be updated from time to time and the currently approved list, along with courses specified by the parent disciplines, is shown in **Annexure I**. In addition, all students are required to complete an **additional 4 credits of Basic Science electives**, which may also include courses from the Science basket. *[Note: All Science Basket courses can also be considered as Basic Science electives. However, all Basic Science electives are NOT Science basket courses.]*
5. Three mathematics courses [**MA 103: Calculus of Single Variable & Linear Algebra (4 credits)**, **MA 104: Ordinary Differential Equations (2 credits)**, **MA 203: Numerical Methods (2 credits)**] will be mandatory for all undergraduate students. Further, a student will be required to complete **2 credits** worth of courses from the **Mathematics Basket**, which may include courses on Calculus of Several Variables, Complex Analysis, Integral Transform, Optimization Theory and Partial Differential Equations to name a few. The course to be completed from the Mathematics basket may be specified by the parent discipline of the student. All Mathematics courses are envisioned to be offered in the active learning mode, with significant use of visual learning tools, programming assignments etc.
6. To give students a research experience during their undergraduate programme, all undergraduate students are required to complete a project course. The student will be free to do this **Open Project Course (4 credits)** in the area/discipline of their choice, any time after the first year of their undergraduate programme. The Institute will also explore the possibility of creating open project courses on entrepreneurship under the aegis of IIEC. This project course may also be offered at the IITGN Research Park, in collaboration with industry partners.
7. In addition to the Open Project Course, students are free to register for project courses within or outside their parent discipline. These project courses can be at **Level 2 (XX-299)**, **Level 3 (XX-399)** or **Level 4 (XX-499)** and **up to 16 credits of such project courses can be counted towards the graduation requirements**.
8. Students will have the opportunity to do **Open Electives** worth **16 credits**.
9. **Four** semesters of **Physical Education (0 credit)** courses will be mandatory for all undergraduate students.
10. Other mandatory Institute level courses include
 - a) **ES 101: Engineering Graphics (3 credits)**
 - b) **ES 112: Computing (3 credits)**
 - c) **ES 113: Data Centric Computing (3 credits)**
 - d) **ES 114: Probability, Statistics and Data Visualization (3 credits)**

- e) **ES 115: Design, Innovation and Prototyping (5 credits)**
- f) **ES 116: Principles and Applications of Electrical Engineering (5 credits)**
- g) **ES 117: The World of Engineering (2 credits)**
- h) **ES 118: Materials for the Future (3 credits)**
- i) **ES 243: Biology for Engineers (4 credits)**
- j) **BS 192: Undergraduate Science Laboratory (3 credits)**

11. Discipline specific courses will be for **62-64 credits**. The details of discipline specific courses are shown in **Annexure II**.

12. In addition, a **comprehensive viva voce** is conducted every semester. It is a mandatory pass/fail activity with grade P/F.

13. Two sample academic paths are given below for Institute level courses. Students are free to choose their own path, in consultation with their faculty advisors.

Academic Plan, UG Curriculum (Institute Level - Plan I)

Semester	Course 1	Course 2	Course 3	Course 4	Course 5	Course 6	Course 7	Course 8	PE Course	Credits
First	FP:100 Foundation Programme	HS:191 Introduction to Writing I	HS:221 Introduction to Philosophy [#]	MA:103 Calculus of Single Variable & Linear Algebra	ES:101 Engineering Graphics	ES:112 Computing	ES:117 The World of Engineering	ES:118 Materials for the Future [#]	PE:101 Physical Education	
	4	2	4	4	3	3	2	3	0	25
Second	GE:101 General Education I [#]	HS:192 Introduction to Writing II	MA:104 Ordinary Differential Equations	BS:192 Undergraduate Science Laboratory	ES:113 Data Centric Computing [#]	ES:114 Probability, Statistics & Data Visualization	ES:115 Design, Innovation & Prototyping	ES:116 Principles & Applications of Electrical Engineering	PE:102 Physical Education	
	2	2	2	3	3	3	5	5	0	25
Third	GE:201 General Education II [#]	HS:151 Economics [#]	MA:203 Numerical Methods	BS:XXX Science Basket	ES:243 Biology for Engineers				PE:103 Physical Education	
	2	4	2	4	4				0	16
Fourth	HS:201 World Civilizations and Cultures [#]	MA:XXX Mathematics Basket	BS:XXX Science Basket						PE:104 Physical Education	
	4	2	4						0	10
Fifth	HS:XXX Elective	XX: XXX Open Project Course								8
	4	4								8
Sixth	HS:XXX Elective	XX: XXX Open Elective								8
	4	4								8
Seventh	HS:XXX Elective	XX: XXX Open Elective	XX: XXX Open Elective							12
	4	4	4							12
Eighth	BS:XXX Elective	XX: XXX Open Elective								
	4	4								08

#: May become a basket later

Academic Plan, UG Curriculum (Institute Level - Plan II)

Semester	Course 1	Course 2	Course 3	Course 4	Course 5	Course 6	Course 7	Course 8	PE Course	Credits
First	FP:100 Foundation Programme	HS:191 Introduction to Writing I	HS:221 Introduction to Philosophy [#]	MA:103 Calculus of Single Variable & Linear Algebra	ES:101 Engineering Graphics	ES:112 Computing	ES:117 The World of Engineering	ES:118 Materials for the Future [#]	PE:101 Physical Education	
	4	2	4	4	3	3	2	3	0	25
Second	GE:101 General Education I [#]	HS:192 Introduction to Writing II	MA:104 Ordinary Differential Equations	BS:192 Undergraduate Science Laboratory	ES:113 Data Centric Computing [#]	ES:114 Probability, Statistics & Data Visualization	ES:115 Design, Innovation & Prototyping	ES:116 Principles & Applications of Electrical Engineering	PE:102 Physical Education	
	2	2	2	3	3	3	5	5	0	25
Third	GE:201 General Education II [#]	BS:XXX Science Basket	MA:203 Numerical Methods							8
	2	4	2							8
Fourth	HS:XXX Elective	XX: XXX Open Elective	MA:XXX Mathematics Basket						PE:103 Physical Education	
	4	4	2						0	10
Fifth	HS:151 Economics [#]	XX: XXX Open Project Course	BS:XXX Elective						PE:104 Physical Education	
	4	4	4						0	12
Sixth	HS:201 World Civilizations and Cultures [#]	XX: XXX Open Elective	BS:XXX Science Basket							12
	4	4	4							12
Seventh	HS:XXX Elective	XX: XXX Open Elective	ES:243 Biology for Engineers							12
	4	4	4							12
Eighth	HS:XXX Elective	XX: XXX Open Elective								
	4	4								08

#: May become a basket later

Semester/ Term	Course 1	Course 2	Course 3	Course 4	Course 5	Course 6	Course 7	Course 8	PE Course	Credits
Term I	FP:100 Foundation Programme	HS:191 Introduction to Writing I	ES:102 Computing						PE:101A Physical Education	
	4	2	3						0	9
Semester 2	GE:101 General Education I [#]	HS:192 Introduction to Writing II	MA:103 Calculus of Single Variable & Linear Algebra	ES:113 Data Centric Computing [#]	ES:114 Probability, Statistics & Data Visualization	ES:115 Design, Innovation & Prototyping	ES:116 Principles & Applications of Electrical Engineering		PE:102 Physical Education	
	2	2	4	3	3	5	5		0	24
Term II	MA:104 Ordinary Differential Equations	ES:101 Engineering Graphics	ES:117 The World of Engineering	ES:118 Materials for the Future [#]					PE:101B Physical Education	
	2	3	2	3					0	10
Semester 3	GE:201 General Education II [#]	HS:221 Introduction to Philosophy [#]	MA:203 Numerical Methods	BS:XXX Science Basket	ES:243 Biology for Engineers				PE:103 Physical Education	
	2	4	2	4	4				0	16
Semester 4	HS:201 World Civilizations and Cultures [#]	MA:XXX Mathematics Basket	BS:XXX Science Basket						PE:104 Physical Education	
	4	2	4						0	10
Semester 5	HS:151 Economics [#]	XX: XXX Open Elective	BS:192 Undergraduate Science Laboratory							
	4	4	3							11
Semester 6	HS:XXX Elective	XX: XXX Open Elective	XX: XXX Open Project Course							
	4	4	4							12
Semester 7	HS:XXX Elective	XX: XXX Open Elective	BS:XXX Elective							
	4	4	4							12
Semester 8	HS:XXX Elective	XX: XXX Open Elective								
	4	4								08

#: May become a basket later

B. BTech Curriculum (Applicable for students admitted before AY 2022-23)

The distribution of credits as well as sample academic plans for students admitted before 2022-23 are shown in **Annexure III**.

C. Additional Learning

There is a provision of **Honours** and **Minors** available to students as an add on to the base level BTech degree. The students will initially take admission in BTech programme and will generally register for the minimum requirements of this base level programme. Besides registering for a number of elective courses as part of their programme requirement, the students will also be permitted to register for additional courses and collect some additional credits. Students will not be required to declare the type of elective or additional learning at the time of registration or during the course. They will keep collecting these credits by successfully completing different courses during their four years of stay by following their own planned academic path and aspirations in mind. At the time of graduation, the students will claim their basic degree of BTech, or BTech with Honours, or BTech with Minor(s) or BTech with Honours and with Minor(s) based on the collected credits. The requirements of Honours and Minors are given below.

(Applicable for students admitted from AY 2022-23)

1. A student can receive a **BTech (Honours)** degree if they complete a **minimum of 20 additional credits** of courses specified by the parent discipline, over and above the requirements of the base programme. This should include at least **one project course** in the area of the parent discipline, in addition to the open project course. Further, two open electives from the base programme, if it qualifies, may be counted in the 20 additional credits which are needed for Honours.
2. A student can receive a **Minor** in another discipline/focus area, if they complete a **minimum of 20 additional credits** of courses specified by that discipline/focus area group, over and above the requirements of the base programme. Two open electives from the base programme, if it qualifies, may be counted in the 20 additional credits which are needed for a Minor. Please refer to the advisory on Minors for more details about minors, including currently available minors and list of courses specified by

disciplines (if any). *[Note: For students pursuing multiple minors or honours and minor, a maximum of two open electives from the base programme may be counted in the additional credits needed for minors and/or honours.]*

(Applicable for all other students)

1. **Honours:** In addition to the requirements of the base level BTech degree, the students will complete **20 credits of courses** which enhance their core competence in their discipline. It is possible that a course, which is not generally offered by the same discipline but helps the students deepen their understanding in the core discipline, may also be considered for Honours with the approval of the DPC and the DOAA. For Honours, the student will be **required to complete 08 credits of BTech projects** related to the discipline. One of the open elective courses of base programme, if it qualifies, may be counted towards Honours, in which case the requirement of open electives will reduce to 12 credits.
2. **Minor:** In addition to the requirements of the base level BTech degree, the students will complete **20 credits of courses** from another discipline which enhance their core competence in that discipline. It is possible that a course, which is not generally offered by that particular discipline but helps the students deepen their core understanding in that discipline, may also be considered for Minor with the approval of the DPC and DOAA. One of the open elective courses of base programme, if it qualifies, may be counted towards Minor, in which case the requirement of open electives will reduce to 12 credits. *[Note: For students pursuing multiple minors or honours and minor, a maximum of one open elective from the base programme may be counted in the additional credits needed for minors and/or honours.]*

D. Academic Load

- A student will normally register for **20 - 24 credits in a semester** as per the respective programme. Each course carries a weightage in terms of credits depending upon the study load on the student and/or the number of contact hours (lectures and tutorials) and/or laboratory hours.
- There is no limit on the total number of project courses which a student can register during their programme. However, **a maximum of 16 credits of project courses can be counted towards graduation requirements**, irrespective of whether the student claims for BTech or BTech with Honours.
- A student may register up to a **maximum of 28 credits in a semester**. However, Faculty Advisor may specify a lower limit than 28 credits.
- A student who is placed on **Guided Progress Scheme (GPS)** can register for a **maximum of 21 credits**. For detailed norms about GPS scheme, please refer Academic Affairs Advisory on IWS.
- A student with CPI of 7.0 or above may be recommended by the Faculty Advisor to take an **overload of one course** (up to a maximum of 32 credits) subject to the approval of Chair, SAPC. Any relaxation to the minimum CPI requirement for overload may be considered by the Chair, SAPC based on the recommendation of DPC.
- Similarly, Chair, SAPC may allow a student to take a reduced load. Also, a deficient student may be required to take a reduced load as per the provisions/recommendations of SAPEC/Faculty Advisor/SAPC/ decisions of the Senate.
- A student can register for **one-credit short courses** in addition to any of the above-mentioned limits of academic load. These courses are not counted as overload. These

credits are not considered in graduation requirements; however, the successfully completed courses with their titles will be mentioned in the proficiency transcripts.

- A student is required to seek approval for academic overload/underload.
- No student is allowed to register for more than 10 credits during the summer term.

E. Early Termination

(Applicable for students admitted from AY 2023-24)

- Any student failing to earn a **minimum of 30 credits** within one year from his/her start of the first year programme (either due to admission or due to restart) **should start his/her programme afresh or exit the programme**. A student needs to secure a passing grade for earning the credits registered for the course.
- If the programme is restarted, then the credits earned and semesters registered prior to restart will not be carried over.
- Restart will be **permitted only once**.

(Applicable for students admitted in AY 2022-23)

- Any student failing to earn a **minimum of 21 credits** at the end of Term II can either **apply to start his/her programme afresh or will have to exit the programme**.
- If the programme is restarted, then the credits earned and semesters registered prior to restart will not be carried over.
- The restart will be **permitted only once**.
- Upon restart, students must **successfully complete at least 50% of the credits** at periodic intervals (at the end of Semester I and Semester II) to continue in the academic programme or else his/her admission will be terminated and no further chance shall be given.
- The student **need not repeat FP100: Foundation Programme** upon restart. Instead, any GE course of equivalent credit may be taken.
- The maximum period allowed to complete the programme will be **six years** (the first year or first semester if repeated will not be counted).

(Applicable for students admitted before AY 2022-23)

- Any student failing to earn a **minimum of 26 credits** at the end of first two registered (active) semesters can either **apply to start his/her programme afresh or will have to exit the programme**.
- If the programme is restarted, then the credits earned and semesters registered prior to restart will not be carried over.
- If a student fails to earn 26 credits in the first two semesters but successfully completes 15 or more credits in the second active semester, then only the first semester will be repeated i.e. the student will be deemed to have fresh start from the second active semester.
- The restart will be **permitted only once**.

- Upon restart, the student must successfully complete a minimum of 12 credits at the end of first semester and a minimum of 26 credits at the end of first two semesters, or else his/her admission will be terminated and no further chance shall be given.
- The student **need not repeat FP100: Foundation Programme** upon restart. Instead, any HSS course of equivalent credit may be taken.
- The maximum period allowed to complete the programme will be **six years** (the first year or first semester if repeated will not be counted).

F. Duration of the Programme

(Applicable for students admitted from AY 2023-24)

- For all programmes, there will be **no maximum permissible duration** to complete the requirements of the programme. However, at any time, **credits earned older than eight years will be deemed expired** and will not count towards the graduation requirements.
- After X years + 3 semesters, a request from the student is needed to extend the programme on a semester by semester basis, where X is the nominal period for a given programme (4 years for BTech/BSc and 5 years for BTech-MTech).
- This is applicable for students admitted from AY 2023-24. However, students from previous batches may opt for being considered under the above norms for duration of the programme.

(Applicable for students admitted before AY 2023-24)

- For the BTech programme, the maximum duration permitted, within which the programme must be completed, is **12 semesters**. If a student desires to finish his/her BTech programme in seven semesters, by successfully completing the other graduation requirements, he/she may be permitted to do so.

Science and Mathematics Basket Courses
(Applicable for undergraduate students admitted from AY 2022-23)

List of Courses in the Science Basket	
Course Code	Course Title
PH 201	Introduction to Electrodynamics
PH 202	Introduction to Quantum Physics
PH 404	Molecular and Crystal Physics
PH 503	Quantum Mechanics I
PH 505	Classical Electrodynamics
PH 507	Statistical Mechanics
PH 508	Classical Mechanics
PH 509	Computational Physics
PH 510	Condensed Matter Physics
CH 203	Fundamentals and Applications of Spectroscopy
CH 204	Organic Chemistry in Everyday Life
CH 302	Electrochemical Science and Engineering
CH 401	Food Chemistry
CH 511	Quantum Chemistry
CG 503	Fundamentals of Cognitive Psychology
CG 505	Fundamental Neuroscience
EH 605	Modeling of Earth System and Sustainability
EH 608	Biodiversity Conservation and Sustainable Development
EH 303	Introduction to Earth Sciences
EH 612	Ocean and Global Change
EH 602	River Morphology and Ecology
EH 304	Drone Data Acquisition Processing and Interpretation

Science Basket Courses specified by the Disciplines:

- BTech/BTech-MTech Electrical Engineering: PH 201 is mandatory.
- BTech Integrated Circuit Design and Technology: One course among PH 510, Physics of Materials (to be approved) is mandatory.
- BTech Materials Engineering: One course among PH 201, PH 202, CH 203 is mandatory.
- BTech/BTech-MTech Mechanical Engineering: One course among PH 201, PH 202, PH 404, PH 503, PH 505, PH 507, PH 508, PH 509, PH 510, CH 203, CH 204, CH 302, CH 401 is mandatory.

List of Courses in the Mathematics Basket	
Course Code	Course Title
MA 204	Introduction to Partial Differential Equations
MA 205	Calculus of Several Variables
MA 206	Introduction to Complex Analysis

Discipline Specific Curriculum
(Applicable for undergraduate students admitted from AY 2022-23)

BTech Curriculum – Artificial Intelligence [From AY 2023-24]

- The curriculum for BTech in Artificial Intelligence will have **discipline specific core courses** for **44 credits** and **discipline specific elective courses** for **20 credits**.
- The discipline-specific core courses are:
 - **Data Structures & Algorithms I** (4 credits)
 - **Signals, Systems & Random Processes** (4 credits)
 - **Digital Systems** (4 credits)
 - **Theory of Computing** (4 credits)
 - **Mathematical Foundations for AI** (4 credits)
 - **Control Systems** (4 credits)
 - **Software Tools & Techniques for AI** (4 credits)
 - **Computer Organization & Architecture** (4 credits)
 - **Foundations of AI: Multiagent Systems** (4 credits)
 - **Machine Learning** (4 credits)
 - **Introduction to Data Science** (4 credits)
- Some of the discipline-specific elective courses are categorized as **CSE Basket** courses. Courses under the CSE Basket, offer students background in core EECS topics. A **minimum of 4 credits** of courses under the discipline-specific elective courses are to be taken from this basket.
- **Online courses and CS project courses** (CS 299/399/499) can contribute **at most 8 credits as AI discipline-specific electives**.
- The tentative list of discipline-specific elective courses is shown in the table below. This list is expected to be dynamic and more courses may be added in the future.

Course Code	Course Title
TBD	Reinforcement Learning
TBD	Game Theory
ES 413	Deep Learning
ES 645	Optimization Methods in Machine Learning
ES 661	Probabilistic Machine Learning
TBD	Knowledge Representation and Reasoning
TBD	AI and Ethics
CS 613	Natural Language Processing
EE 645	3D Computer Vision
ES 659	Computer Graphics
TBD	Speech Technology
ES 615	Nature Inspired Computing
TBD	Robotics
TBD	AI for Sustainability
TBD	AI for Earth Sciences
TBD	AI for Biological Engineering
CSE Basket	
ES 214	Discrete Mathematics
CS 327	Compilers
CS 301	Operating Systems
CS 433	Computer Networks

EE 323	Digital Signal Processing
TBD	Software Engineering
CS 432	Databases

- A sample academic path for the proposed BTech in Artificial Intelligence is given at **Annexure II-A**.

BTech Curriculum – Chemical Engineering

- The curriculum for BTech in Chemical Engineering will have **discipline specific core courses** for **42 credits** and **discipline specific elective courses** for **20 credits**.
- The discipline-specific core courses are:
 - **Thermodynamics** (3 credits)
 - **Chemical Process Calculations** (3 credits)
 - **Chemical Engineering Thermodynamics** (3 credits)
 - **Process Fluid Mechanics** (3 credits)
 - **Heat Transfer** (3 credits)
 - **Chemical Reaction Engineering I** (3 credits)
 - **Chemical Reaction Engineering II** (3 credits)
 - **Separation Processes I** (3 credits)
 - **Process Dynamics & Control** (3 credits)
 - **Integrated Chemical Engineering Lab-I** (3 credits)
 - **Separation Processes II** (3 credits)
 - **Process Synthesis, Design & Simulation** (4 credits)
 - **Transport Phenomena** (3 credits)
 - **Integrated Chemical Engineering Lab-II** (2 credits)
- Students will be free to choose discipline-specific electives from a basket of courses, which broadly cover the following thematic areas:
 - Novel & Improved Materials (Advanced Materials)
 - Process Engineering & Safety
 - Bio-Processes & Pharmaceuticals
 - Energy & Sustainability
- A sample academic path for the curriculum for BTech in Chemical Engineering is given at **Annexure II-A**.

BTech Curriculum – Civil Engineering

- The curriculum for BTech in Civil Engineering will have **discipline specific core courses** for **42 credits** and **discipline specific elective courses** for **20 credits**.
- The discipline-specific core courses are:
 - **Mechanics of Solids** (4 credits)
 - **Earth Materials & Processes** (2 credits)
 - **Geospatial Engineering** (3 credits)
 - **Structural Analysis** (4 credits)
 - **Fluid Mechanics** (4 credits)
 - **Sustainability & Environment** (3 credits)
 - **Hydrology & Hydraulics** (4 credits)
 - **Design of Steel Structures** (4 credits)
 - **Soil Mechanics** (5 credits)
 - **Design of Reinforced Concrete Structures** (5 credits)

- **Construction Technology & Management** (4 credits)
- The discipline-specific elective courses are divided into two baskets namely **Design/Applications Basket** and **General CE Electives Basket**.
- **Twelve credits** of courses under the discipline-specific elective courses are to be taken from the **Design/Applications Basket**.
- **Eight credits** of courses under the discipline-specific elective courses are to be taken from the **General CE Electives Basket**.
- The tentative list of courses in the elective baskets are shown in the table below. This list is expected to be dynamic and more courses may be added in the future.

Basket	Course Code	Course Title
Design/ Applications	CE 313	Environmental Science and Engineering
	CE 314	Geotechnical Engineering
	CE 404	Transportation Engineering
	TBD	Irrigation Engineering and Hydraulic Structures
General CE Electives	CE 307	Masonry Design
	ES 404	Networks and Systems
	TBD	Data Sciences for Earth Systems
	CE 633	Infrastructure Systems: Planning and Management
	TBD	Advance Design of (Steel/Concrete)
	TBD	Advance Courses in Transportation Engineering

- A sample academic path for the revised curriculum for BTech in Civil Engineering is given at **Annexure II-A**.

BTech Curriculum – Computer Science & Engineering

- The curriculum for BTech in Computer Science & Engineering will have **discipline specific core courses** for **36 credits** and **discipline specific elective courses** for **26 credits**.
- The discipline-specific core courses are:
 - **Data Structures & Algorithms I** (4 credits)
 - **Discrete Mathematics** (4 credits)
 - **Digital Systems** (4 credits)
 - **Computer Organization & Architecture** (4 credits)
 - **Theory of Computing** (4 credits)
 - **Operating Systems** (4 credits)
 - **Software Tools and Techniques** (4 credits)
 - **Foundations of AI** (4 credits)
 - **Computer Networks** (4 credits)
- Some of the discipline-specific elective courses are categorized into baskets namely **Theory & Algorithms Basket** and **Systems Basket**. **At least 8 credits** of courses under the discipline-specific elective courses are to be taken from each of these two baskets.
- **Online courses and CS project courses** can contribute **at most 8 credits** as discipline electives.
- The tentative list of discipline-specific elective courses is shown in the table below. This

list is expected to be dynamic and more courses may be added in the future.

Course Code	Course Title
-	All CS Elective Courses
ES 654	Machine Learning
EE 645	3D Computer Vision
ES 659	Computer Graphics
ES 645	Optimization Methods in ML
Theory & Algorithms Basket	
ES 301	Data Structures & Algorithms II
CS 614	Advanced Algorithms
CS 617	Computational Complexity Theory
CS 617	Complexity Theory
CS 328	Introduction to Data Science
Systems Basket	
ES 242	Compilers
ES 214	Databases
TBD	Software Engineering
TBD	Principles of Programming Languages

- A sample academic path for the revised curriculum for BTech in Computer Science & Engineering is given at **Annexure II-A**.

BTech Curriculum – Electrical Engineering

- The curriculum for BTech in Electrical Engineering will have **discipline specific core courses** for **42 credits** and **discipline specific elective courses** for **20 credits**.
- The discipline-specific core courses are:
 - **Signals, Systems & Random Processes** (4 credits)
 - **Electronic Devices** (3 credits)
 - **Electrical Machines** (4 credits)
 - **Power Systems** (4 credits)
 - **Control Systems** (4 credits)
 - **Digital Systems** (4 credits)
 - **Engineering Electromagnetics** (4 credits)
 - **Analog & Mixed Signal Circuits** (4 credits)
 - **Power Electronics** (4 credits)
 - **Digital Signal Processing** (4 credits)
 - **Communication Systems** (3 credits)
- Students will be free to choose discipline-specific electives from a basket of courses.
- Students are required to do **PH 201: Introduction to Electrodynamics** as one of their Science Basket courses.
- A sample academic path for the revised curriculum for BTech in Electrical Engineering is given at **Annexure II-A**.

BTech Curriculum – Integrated Circuit Design & Technology [From AY 2024-25]

- The curriculum for BTech in Integrated Circuit Design & Technology will have **discipline specific core courses** for **44 credits** and **discipline specific elective courses** for **20 credits**.
- The discipline-specific core courses are:

- **Unveiling the Semiconductor World** (2 credits)
 - **Signals, Systems & Random Processes** (4 credits)
 - **Computer Organization & Architecture** (4 credits)
 - **Digital Systems** (4 credits)
 - **Analog & Mixed Signal Circuits** (4 credits)
 - **CMOS Circuit Design** (4 credits)
 - **Semiconductor Devices** (4 credits)
 - **Semiconductor Material & Device Characterization** (4 credits)
 - **IC Fabrication & Manufacturing** (4 credits)
 - **Thin Film Science & Vacuum Technology** (4 credits)
 - **Semiconductor Package Assembly & Manufacturing** (4 credits)
 - **IC Fabrication Lab** (2 credits)
- The tentative list of discipline-specific elective courses is shown in the table below. This list is expected to be dynamic and more courses may be added in the future.

Course Code	Course Title
TBD	VLSI Physical Design: Netlist to GDSII
EE 651	CMOS Analog IC Design
TBD	RF IC Design
TBD	Power Management IC Design
TBD	Design for Test
TBD	Nanoscale Devices
TBD	Memory Devices, Circuits & Systems
TBD	Compound Semiconductor Devices & Circuits
TBD	Power Semiconductor Devices
TBD	Manufacturing Process Control
TBD	Display Technology and Manufacturing
TBD	Physics and Manufacturing of Solar Cells
TBD	Advanced Semiconductor Manufacturing
TBD	Fundamentals of MEMS/NEMS

- Students are required to do **Physics of Materials** or **PH 510: Condensed Matter Physics** as one of their Science Basket courses.
- A sample academic path for the proposed BTech in Integrated Circuit Design & Technology is given at **Annexure II-A**.

BTech Curriculum – Materials Engineering

- The curriculum for BTech in Materials Engineering will have **discipline specific core courses** for **42 credits** and **discipline specific elective courses** for **20 credits**.
- The discipline-specific core courses are:
 - **Structure of Materials** (4 credits)
 - **Materials Thermodynamics** (4 credits)
 - **Transport Phenomena in Materials Engineering** (4 credits)
 - **Microstructural Engineering** (4 credits)
 - **Physics of Materials** (4 credits)
 - **Integrated Computational Materials Engineering** (4 credits)
 - **Mechanical Behaviour of Materials** (4 credits)
 - **Polymers, Ceramics and Composites** (4 credits)
 - **Materials Processing** (4 credits)
 - **Corrosion & Degradation of Materials** (4 credits)
 - **Materials & Environment** (2 credits).
- Students will be free to choose discipline-specific electives from a basket of courses.

- A sample academic path for the revised curriculum for BTech in Materials Engineering is given at **Annexure II-A**.

BTech Curriculum – Mechanical Engineering

- The curriculum for BTech in Mechanical Engineering will have **discipline specific core courses** for **44 credits** and **discipline specific elective courses** for **20 credits**.
- The proposed discipline-specific core courses are:
 - **Thermodynamics** (3 credits)
 - **Statics & Dynamics** (4 credits)
 - **Fluid Dynamics** (5 credits)
 - **Mechanics of Solids** (4 credits)
 - **Principles of Manufacturing Processes** (3 credits)
 - **Vibrations** (2 credits)
 - **Heat and Mass Transfer** (4 credits)
 - **Manufacturing Systems & Metrology** (3 credits)
 - **Mechanics of Materials** (3 credits)
 - **Control Systems** (4 credits)
 - **Synthesis and Analysis of Mechanisms** (3 credits)
 - **Mechanical Systems Design** (3 credits)
 - **Energy Systems** (3 credits)
- Students will be free to choose discipline-specific electives from a basket of courses.
- A sample academic path for the revised curriculum for BTech in Mechanical Engineering is given at **Annexure II-A**.

Note: Some of the discipline-specific courses shown in Annexure II-A are subject to revision.

Annexure – II-A

Bachelor of Technology (Artificial Intelligence)

Semester	Course 1	Course 2	Course 3	Course 4	Course 5	Course 6	Course 7	Course 8	PE Course	Credits
First	FP:100 Foundation Programme	HS:191 Introduction to Writing I	HS:221 Introduction to Philosophy [#]	MA:103 Calculus of Single Variable & Linear Algebra	ES:101 Engineering Graphics	ES:112 Computing	ES:117 The World of Engineering	ES:118 Materials for the Future [#]	PE:101 Physical Education	
	4	2	4	4	3	3	2	3	0	25
Second	GE:101 General Education I [#]	HS:192 Introduction to Writing II	MA:104 Ordinary Differential Equations	BS:192 Undergraduate Science Laboratory	ES:113 Data Centric Computing [#]	ES:114 Probability, Statistics & Data Visualization	ES:115 Design, Innovation & Prototyping	ES:116 Principles & Applications of Electrical Engineering	PE:102 Physical Education	
	2	2	2	3	3	3	5	5	0	25
Third	GE:201 General Education II [#]	HS:151 Economics [#]	MA:203 Numerical Methods	BS:XXX Science Basket	ES:243 Biology for Engineers	ES:242 Data Structures & Algorithms I	ES:244 Signals, Systems & Random Processes		PE:103 Physical Education	
	2	4	2	4	4	4	4		0	24
Fourth	HS:201 World Civilizations & Cultures [#]	MA:XXX Mathematics Basket	BS:XXX Science Basket	ES:204 Digital Systems	ES:245 Control Systems	CS:201 Theory of Computing	CS:303 Mathematical Foundations for AI		PE:104 Physical Education	
	4	2	4	4	4	4	4		0	26
Fifth	HS:XXX Elective	BS:XXX Elective	XX:XXX Open Project Course	ES:336 Computer Organization & Architecture	CS:203 Software Tools & Techniques for AI	CS:329 Foundations of AI: Multiagent Systems				
	4	4	4	4	4	4				24
Sixth	HS:XXX Elective	ES:335 Machine Learning	CS:328 Introduction to Data Science	XX:XXX Discipline Elective	XX:XXX Discipline Elective					
	4	4	4	4	4					20
Seventh	XX:XXX Open Elective	XX:XXX Open Elective	XX:XXX Open Elective	XX:XXX Discipline Elective						
	4	4	4	4						16
Eighth	XX:XXX Open Elective	XX:XXX Discipline Elective	XX:XXX Discipline Elective							
	4	4	4							12
	Discipline Core: 44 Credits, Discipline Electives: 20 Credits								Total Credits	172

[#]May become a basket later

Bachelor of Technology (Chemical Engineering)

Semester	Course 1	Course 2	Course 3	Course 4	Course 5	Course 6	Course 7	Course 8	PE Course	Credits
First	FP:100 Foundation Programme	HS:191 Introduction to Writing I	HS:221 Introduction to Philosophy [#]	MA:103 Calculus of Single Variable & Linear Algebra	ES:101 Engineering Graphics	ES:112 Computing	ES:117 The World of Engineering	ES:118 Materials for the Future [#]	PE:101 Physical Education	
	4	2	4	4	3	3	2	3	0	25
Second	GE:101 General Education I [#]	HS:192 Introduction to Writing II	MA:104 Ordinary Differential Equations	BS:192 Undergraduate Science Laboratory	ES:113 Data Centric Computing [#]	ES:114 Probability, Statistics & Data Visualization	ES:115 Design, Innovation & Prototyping	ES:116 Principles & Applications of Electrical Engineering	PE:102 Physical Education	
	2	2	2	3	3	3	5	5	0	25
Third	GE:201 General Education II [#]	HS:151 Economics [#]	MA:203 Numerical Methods	BS:XXX Science Basket	ES:243 Biology for Engineers	ES:211 Thermodynamics	CL:201 Chemical Process Calculations		PE:103 Physical Education	
	2	4	2	4	4	3	3		0	23
Fourth	HS:201 World Civilizations & Cultures [#]	MA:XXX Mathematics Basket	BS:XXX Science Basket	CL:202 Chemical Engineering Thermodynamics	CL:203 Process Fluid Mechanics	CL:204 Heat Transfer	CL:205 Chemical Reaction Engineering - I		PE:104 Physical Education	
	4	2	4	3	3	3	3		0	22
Fifth	HS:XXX Elective	XX:XXX Open Project Course	CL:313 Chemical Reaction Engineering - II	CL:314 Separation Processes - I	CL:315 Process Dynamics & Control	CL:326 Integrated Chemical Engineering Lab-I	XX:XXX Discipline Elective			
	4	4	3	3	3	3	4			23
Sixth	HS:XXX Elective	CL:316 Separation Processes - II	CL:317 Process Synthesis, Design & Simulation	CL:325 Transport Phenomena	CL:327 Integrated Chemical Engineering Lab-II	XX:XXX Discipline Elective	XX:XXX Discipline Elective			
	4	3	4	3	2	4	4			24
Seventh	XX:XXX Open Elective	XX:XXX Open Elective	XX:XXX Open Elective	XX:XXX Discipline Elective						
	4	4	4	4						16
Eighth	BS:XXX Elective	XX:XXX Open Elective	XX:XXX Discipline Elective							
	4	4	4							12
Discipline Core: 42 Credits, Discipline Elective: 20 Credits									Total Credits	170

[#]May become a basket later

Bachelor of Technology (Civil Engineering)

Semester	Course 1	Course 2	Course 3	Course 4	Course 5	Course 6	Course 7	Course 8	PE Course	Credits
First	FP:100 Foundation Programme	HS:191 Introduction to Writing I	HS:221 Introduction to Philosophy [#]	MA:103 Calculus of Single Variable & Linear Algebra	ES:101 Engineering Graphics	ES:112 Computing	ES:117 The World of Engineering	ES:118 Materials for the Future [#]	PE:101 Physical Education	
	4	2	4	4	3	3	2	3	0	25
Second	GE:101 General Education I [#]	HS:192 Introduction to Writing II	MA:104 Ordinary Differential Equations	BS:192 Undergraduate Science Laboratory	ES:113 Data Centric Computing [#]	ES:114 Probability, Statistics & Data Visualization	ES:115 Design, Innovation & Prototyping	ES:116 Principles & Applications of Electrical Engineering	PE:102 Physical Education	
	2	2	2	3	3	3	5	5	0	25
Third	GE:201 General Education II [#]	HS:151 Economics [#]	MA:203 Numerical Methods	BS:XXX Science Basket	ES:243 Biology for Engineers	ES:221 Mechanics of Solids	CE:201 Earth Materials & Processes	CE:203 Geospatial Engineering	PE:103 Physical Education	
	2	4	2	4	4	4	2	3	0	25
Fourth	HS:201 World Civilizations & Cultures [#]	MA:XXX Mathematics Basket	BS:XXX Science Basket	ES:212 Fluid Mechanics	CE:202 Sustainability & Environment	CE:302 Structural Analysis	CE:XXX Civil Engineering Design/Applications Basket		PE:104 Physical Education	
	4	2	4	4	3	4	4		0	25
Fifth	HS:XXX Elective	XX:XXX Open Project Course	CE:301 Soil Mechanics	CE:310 Hydrology & Hydraulics	CE:312 Design of Steel Structures					
	4	4	5	4	4					21
Sixth	HS:XXX Elective	CE:311 Design of Reinforced Concrete Structures	CE:XXX Civil Engineering Design/Applicatio ns Basket	CE:XXX Civil Engineering Design/Applicatio ns Basket	XX:XXX Discipline Elective					
	4	5	4	4	4					21
Seventh	XX:XXX Open Elective	XX:XXX Open Elective	XX:XXX Open Elective	CE:403 Construction Technology & Management						
	4	4	4	4						16
Eighth	BS:XXX Elective	XX:XXX Open Elective	XX:XXX Discipline Elective							
	4	4	4							12
	Discipline Core: 42 Credits, Civil Engineering Design/Applications Basket: 12 Credits, Discipline Elective: 8 Credits								Total Credits	170

[#]May become a basket later

Bachelor of Technology (Computer Science and Engineering)

Semester	Course 1	Course 2	Course 3	Course 4	Course 5	Course 6	Course 7	Course 8	PE Course	Credits
First	FP:100 Foundation Programme	HS:191 Introduction to Writing I	HS:221 Introduction to Philosophy [#]	MA:103 Calculus of Single Variable & Linear Algebra	ES:101 Engineering Graphics	ES:112 Computing	ES:117 The World of Engineering	ES:118 Materials for the Future [#]	PE:101 Physical Education	
	4	2	4	4	3	3	2	3	0	25
Second	GE:101 General Education I [#]	HS:192 Introduction to Writing II	MA:104 Ordinary Differential Equations	BS:192 Undergraduate Science Laboratory	ES:113 Data Centric Computing [#]	ES:114 Probability, Statistics & Data Visualization	ES:115 Design, Innovation & Prototyping	ES:116 Principles & Applications of Electrical Engineering	PE:102 Physical Education	
	2	2	2	3	3	3	5	5	0	25
Third	GE:201 General Education II [#]	HS:151 Economics [#]	MA:203 Numerical Methods	BS:XXX Science Basket	ES:243 Biology for Engineers	ES:214 Discrete Mathematics	ES:242 Data Structures & Algorithms I		PE:103 Physical Education	
	2	4	2	4	4	4	4		0	24
Fourth	HS:201 World Civilizations & Cultures [#]	MA:XXX Mathematics Basket	BS:XXX Science Basket	ES:204 Digital Systems	CS:201 Theory of Computing	XX:XXX Systems Basket	XX:XXX Theory & Algorithms Basket		PE:104 Physical Education	
	4	2	4	4	4	4	4		0	26
Fifth	HS:XXX Elective	XX:XXX Open Project Course	ES:336 Computer Organization & Architecture	CS:202 Software Tools and Techniques	CS:329 Foundations of AI: Multiagent Systems	CS:330 Operating Systems				
	4	4	4	4	4	4				24
Sixth	HS:XXX Elective	CS:331 Computer Networks	XX:XXX Theory & Algorithms Basket	XX:XXX Systems Basket	XX:XXX Discipline Elective					
	4	4	4	4	4					20
Seventh	XX:XXX Open Elective	XX:XXX Open Elective	XX:XXX Open Elective	XX:XXX Discipline Elective						
	4	4	4	4						16
Eighth	BS:XXX Elective	XX:XXX Open Elective	XX:XXX Discipline Elective							
	4	4	2							10
	Discipline Core: 36 Credits, Theory & Algorithms Basket: 8 Credits, Systems Basket: 8 Credits, General CSE Electives Basket: 10 Credits								Total Credits	170

[#]May become a basket later

Bachelor of Technology (Electrical Engineering)

Semester	Course 1	Course 2	Course 3	Course 4	Course 5	Course 6	Course 7	Course 8	PE Course	Credits
First	FP:100 Foundation Programme	HS:191 Introduction to Writing I	HS:221 Introduction to Philosophy [#]	MA:103 Calculus of Single Variable & Linear Algebra	ES:101 Engineering Graphics	ES:112 Computing	ES:117 The World of Engineering	ES:118 Materials for the Future [#]	PE:101 Physical Education	
	4	2	4	4	3	3	2	3	0	25
Second	GE:101 General Education I [#]	HS:192 Introduction to Writing II	MA:104 Ordinary Differential Equations	BS:192 Undergraduate Science Laboratory	ES:113 Data Centric Computing [#]	ES:114 Probability, Statistics & Data Visualization	ES:115 Design, Innovation & Prototyping	ES:116 Principles & Applications of Electrical Engineering	PE:102 Physical Education	
	2	2	2	3	3	3	5	5	0	25
Third	GE:201 General Education II [#]	HS:151 Economics [#]	MA:203 Numerical Methods	PH 201: Introduction to Electrodynamics (Science Basket)	ES:243 Biology for Engineers	ES:244 Signals, Systems & Random Processes	EE:221 Electronic Devices	EE:223 Electrical Machines	PE:103 Physical Education	
	2	4	2	4	4	4	3	4	0	27
Fourth	HS:201 World Civilizations and Cultures [#]	MA:XXX Mathematics Basket	BS:XXX Science Basket	ES:204 Digital Systems	EE:224 Power Systems	ES:245 Control Systems			PE:104 Physical Education	
	4	2	4	4	4	4			0	22
Fifth	HS:XXX Elective	XX:XXX Open Project Course	EE:312 Engineering Electromagnetics	EE:322 Analog & Mixed Signal Circuits	EE:323 Digital Signal Processing	EE:333 Power Electronics				
	4	4	4	4	4	4				24
Sixth	HS:XXX Elective	EE:313 Communication Systems	XX:XXX Discipline Elective	XX:XXX Discipline Elective	XX:XXX Discipline Elective	XX:XXX Discipline Elective				
	4	3	4	4	4	4				23
Seventh	XX:XXX Open Elective	XX:XXX Open Elective	XX:XXX Open Elective	XX:XXX Discipline Elective						
	4	4	4	4						16
Eighth	BS:XXX Elective	XX:XXX Open Elective								
	4	4								8
	Discipline Core: 42 Credits, Discipline Elective: 20 Credits								Total Credits	170

[#]May become a basket later

Bachelor of Technology (Integrated Circuit Design and Technology)

Semester	Course 1	Course 2	Course 3	Course 4	Course 5	Course 6	Course 7	Course 8	PE Course	Credits
First	FP:100 Foundation Programme	HS:191 Introduction to Writing I	HS:221 Introduction to Philosophy [#]	MA:103 Calculus of Single Variable & Linear Algebra	ES:101 Engineering Graphics	ES:112 Computing	ES:117 The World of Engineering	ES:118 Materials for the Future [#]	PE:101 Physical Education	
	4	2	4	4	3	3	2	3	0	25
Second	GE:101 General Education I [#]	HS:192 Introduction to Writing II	MA:104 Ordinary Differential Equations	BS:192 Undergraduate Science Laboratory	ES:113 Data Centric Computing [#]	ES:114 Probability, Statistics & Data Visualization	ES:115 Design, Innovation & Prototyping	ES:116 Principles & Applications of Electrical Engineering	PE:102 Physical Education	
	2	2	2	3	3	3	5	5	0	25
Third	GE:201 General Education II [#]	MA:203 Numerical Methods	ES:204 Digital Systems	ES:244 Signals, Systems & Random Processes	EE:322 Analog & Mixed-Signal Circuits	EE:XXX Unveiling the Semiconductor World	EE:XXX Semiconductor Devices		PE:103 Physical Education	
	2	2	4	4	4	2	4		0	22
Fourth	HS:201 World Civilizations and Cultures [#]	MA:XXX Mathematics Basket	BS:XXX Science Basket	EE:XXX Integrated Circuits Fabrication & Manufacturing	EE:XXX Device Fabrication Lab	EE:XXX CMOS Circuit Design	XX:XXX Discipline Elective		PE:104 Physical Education	
	4	2	4	4	4	2	4		0	24
Fifth	HS:151 Economics [#]	BS:XXX Science Basket	ES:336 Computer Organization & Architecture	ES:XXX Semiconductor Material & Device Characterization	ES:XXX Introduction to Thin Film Science & Vacuum Technology	XX:XXX Discipline Elective				
	4	4	4	4	4	4				24
Sixth	HS:XXX Elective	XX: XXX Open Elective	XX:XXX Open Project Course	ES:XXX Semiconductor Package Assembly & Manufacturing	XX:XXX Discipline Elective	XX:XXX Discipline Elective				
	4	4	4	4	4	4				24
Seventh	HS:XXX Elective	XX: XXX Open Elective	XX: XXX Open Elective	XX:XXX Discipline Elective	ES:243 Biology for Engineers					
	4	4	4	4	4					20
Eighth	BS:XXX Elective	XX: XXX Open Elective								
	4	4								8
	Discipline Core: 44 Credits, Discipline Elective: 20 Credits								Total Credits	172

[#]May become a basket later

Bachelor of Technology (Materials Engineering)

Semester	Course 1	Course 2	Course 3	Course 4	Course 5	Course 6	Course 7	Course 8	PE Course	Credits
First	FP:100 Foundation Programme	HS:191 Introduction to Writing I	HS:221 Introduction to Philosophy [#]	MA:103 Calculus of Single Variable & Linear Algebra	ES:101 Engineering Graphics	ES:112 Computing	ES:117 The World of Engineering	ES:118 Materials for the Future [#]	PE:101 Physical Education	
	4	2	4	4	3	3	2	3	0	25
Second	GE:101 General Education I [#]	HS:192 Introduction to Writing II	MA:104 Ordinary Differential Equations	BS:192 Undergraduate Science Laboratory	ES:113 Data Centric Computing [#]	ES:114 Probability, Statistics & Data Visualization	ES:115 Design, Innovation & Prototyping	ES:116 Principles & Applications of Electrical Engineering	PE:102 Physical Education	
	2	2	2	3	3	3	5	5	0	25
Third	GE:201 General Education II [#]	HS:151 Economics [#]	MA:203 Numerical Methods	ES:243 Biology for Engineers	MSE:202 Materials Thermodynamics	MSE:204 Transport Phenomena in Materials Engineering	MSE:207 Structure of Materials		PE:103 Physical Education	
	2	4	2	4	4	4	4		0	24
Fourth	HS:201 World Civilizations and Cultures [#]	MA:XXX Mathematics Basket	MSE:203 Integrated Computational Materials Engineering	MSE:205 Mechanical Behaviour of Materials	MSE:206 Physics of Materials	MSE:210 Microstructural Engineering	XX:XXX Discipline Elective		PE:104 Physical Education	
	4	2	4	4	4	4	4		0	26
Fifth	HS:XXX Elective	BS:XXX Science Basket	XX:XXX Open Project Course	MSE:307 Materials Processing	MSE:313 Polymers, Ceramics and Composites	XX:XXX Discipline Elective				
	4	4	4	4	4	4				24
Sixth	HS:XXX Elective	BS:XXX Science Basket	MSE:302 Corrosion & Degradation of Materials	MSE:312 Materials & Environment	XX:XXX Discipline Elective	XX:XXX Discipline Elective				
	4	4	4	2	4	4				22
Seventh	XX:XXX Open Elective	XX:XXX Open Elective	XX:XXX Open Elective	XX:XXX Discipline Elective						
	4	4	4	4						16
Eighth	BS:XXX Elective	XX:XXX Open Elective								
	4	4								8
	Discipline Core: 42 Credits, Discipline Elective: 20 Credits								Total Credits	170

[#]May become a basket later

Bachelor of Technology (Mechanical Engineering)

Semester	Course 1	Course 2	Course 3	Course 4	Course 5	Course 6	Course 7	Course 8	PE Course	Credits
First	FP:100 Foundation Programme	HS:191 Introduction to Writing I	HS:221 Introduction to Philosophy [#]	MA:103 Calculus of Single Variable & Linear Algebra	ES:101 Engineering Graphics	ES:112 Computing	ES:117 The World of Engineering	ES:118 Materials for the Future [#]	PE:101 Physical Education	
	4	2	4	4	3	3	2	3	0	25
Second	GE:101 General Education I [#]	HS:192 Introduction to Writing II	MA:104 Ordinary Differential Equations	BS:192 Undergraduate Science Laboratory	ES:113 Data Centric Computing [#]	ES:114 Probability, Statistics & Data Visualization	ES:115 Design, Innovation & Prototyping	ES:116 Principles & Applications of Electrical Engineering	PE:102 Physical Education	
	2	2	2	3	3	3	5	5	0	25
Third	GE:201 General Education II [#]	HS:151 Economics [#]	MA:203 Numerical Methods	BS:XXX Science Basket	ES:243 Biology for Engineers	ES:211 Thermodynamics	ME:206 Statics & Dynamics		PE:103 Physical Education	
	2	4	2	4	4	3	4		0	23
Fourth	HS:201 World Civilizations and Cultures [#]	MA:XXX Mathematics Basket	BS:XXX Science Basket	ES:221 Mechanics of Solids	ME:207 Fluid Dynamics	ME:208 Vibrations	ME:209 Principles of Manufacturing Processes		PE:104 Physical Education	
	4	2	4	4	5	2	3		0	24
Fifth	HS:XXX Elective	XX:XXX Open Project Course	ES:245 Control Systems	ME:333 Mechanics of Materials	ME:334 Heat and Mass Transfer	XX:XXX Manufacturing Systems and Metrology				
	4	4	4	3	4	3				22
Sixth	HS:XXX Elective	XX:XXX Open Elective	ME:335 Synthesis and Analysis of Mechanisms	XX:XXX Mechanical Systems Design	XX:XXX Energy Systems	XX:XXX Discipline Elective				
	4	4	3	3	3	4				21
Seventh	XX:XXX Open Elective	XX:XXX Open Elective	XX:XXX Discipline Elective	XX:XXX Discipline Elective						
	4	4	4	4						16
Eighth	BS:XXX Elective	XX:XXX Open Elective	XX:XXX Discipline Elective	XX:XXX Discipline Elective						
	4	4	4	4						16
	Discipline Core: 44 Credits, Discipline Elective: 20 Credits								Total Credits	172

[#]May become a basket later

Distribution of Credit Requirements
(Applicable for undergraduate students admitted before AY 2022-23)

Distribution of compulsory and elective courses:

- Institute level compulsory courses: 73 credits
- Discipline specific courses: 48-54 credits
- Electives: 44 credits
- Other requirements: 04 credits

Distribution of courses from various streams:

- Humanities + Management (8 courses): 32 credits
- Basic Science (11 courses): 40 credits
- Engineering Sciences (8 courses): 29 credits
- Discipline Specific (12-16 courses): 48-54 credits
- Open Electives and Other Requirements: 20 credits
- Total Credits: 169-175 credits

Note: 16 credits of Open electives may come from any of the different streams

Institute requirement of credits and electives in various streams:

	Compulsory	Group Elective	Open Electives
BS = Basic Science	32	8	
ES = Engineering Science	28	-	
HS = Humanities	12	20	16
D = Discipline Specific	48-54	-	
Other	5 (FP100+FP101)	-	
Total Credits	125-131	28	16

Note:

- BSE/HSE are BS elective and HS elective, respectively
- FP includes FP 100: Foundation Programme and FP 101: Introduction to Engineering
Incase fail to clear **FP 100** in the first semester after admission, then any HSS course of 4 credits is to be completed for graduation.
- Incase fail to clear **FP 101** in the second semester after admission, then at least two credits of open electives course is to be completed for graduation.
- Total of four physical education courses (PE 101, PE 102, PE 103 and PE 104) are required to be completed as part of the graduation requirements for the BTech programme for the students admitted from Academic Year 2021-22 onwards. For students admitted before 2021-22, the requirement will be two physical education courses (PE 101 and PE 102).
- For students admitted in the Academic Year 2020-21, the requirement of CH 202 & PH 102 are replaced by BS 191: Matter and Energy Laboratory (4 credits) and the requirement of HS 101-109 is replaced by HS 191: Introduction to Writing I and HS 192: Introduction to Writing II.
- For students admitted in the Academic Year 2021-22, the requirement of CH 202 & PH 102 are replaced by an additional 4 credits worth of BS elective courses (over and above the already existing requirement of 8 credits worth of BS elective courses).

Bachelor of Technology: Chemical Engineering

First Semester	FP 100 Foundation Programme 0-0-0-4	HS 101-109 Language 3-0-0-4	BE 101 Introduction to Life Sciences: Fundamentals of Life 3-1-0-4	MA 101 Mathematics I 4-2-0-4	ES 101 Engineering Graphics 2-0-3-3	ES 102/ES 112 Introduction to Computing/ Computing 2-0-2-3	ES 103 Introduction to Electrical Systems 3-1-0-4	PE 101 Physical Education 0-0-0-0		26
Second Semester	HS 151 Economics 3-1-0-4	MA 102 Mathematics II 3-2-0-4	PH 101 Physics 3-2-0-4	CH 202 Chemistry Lab 0-0-4-2	ES 104 Introduction to Analog and Digital Electronics 3-2-0-4	ES 105 Electrical and Electronics Lab 0-0-4-2	ES 106 Manufacturing and Workshop practice 2-0-3-4	PE 102 Physical Education 0-0-0-0	FP 101 Intro to Engineering 0-0-2-1	25
Third Semester	HS 221 Introduction to Philosophy 3-0-0-4	MA 201 Mathematics III 3-2-0-4	CH 201 General Chemistry 3-0-0-4	PH 102 Physics Lab 0-0-4-2	ES 201 Intro to Design and Innovation 2-0-4-4	ES 211 Thermodynamics 3-2-0-4	CL 201 Chemical Process Calculations 1-2-0-2	PE 103 Physical Education 0-0-0-0		24
Fourth Semester	HS 201-209 World Civilization/Culture/History 3-0-0-4	MA 202 Mathematics IV 3-2-0-4	ES 202 Introduction to Materials 3-0-0-4	ES 221 Mechanics of Solids 3-2-0-4	ES 212 Fluid Mechanics 3-2-0-4	CL 251 Fluid Mechanics Lab 0-0-4-2		PE 104 Physical Education 0-0-0-0		22
Fifth Semester	HS Elective 3-0-0-4	BS Elective 3-1-0-4	CL 221 Chemical Engg. Thermodynamics 3-1-0-4	CL 322 Chemical Reaction Engineering 3-1-0-4	ES 311 Heat and Mass Transfer 3-1-0-4	CL 351 Heat Transfer and Thermodynamics Lab 0-0-4-2				22
Sixth Semester	HS Elective 3-0-0-4	CL 321 Separation Processes 3-2-0-4	CL 422 Process Control 3-1-0-4	CL 424 Process Analysis and Simulation 1-1-4-3	CL 352 Mass Transfer and Reaction Engg. Lab 0-0-4-2					17
Seventh Semester	HS Elective 3-0-0-4	Open Elective 3-1-0-4	Open Elective 3-1-0-4	CL 425 Process Synthesis and Design 3-1-0-4	CL 451 Process Dynamics and Control Lab 0-0-4-2					18
Eighth Semester	HS Elective 3-0-0-4	BS Elective 3-1-0-4	Open Elective 3-1-0-4	Open Elective 3-1-0-4						16
Total Credits										170

Bachelor of Technology: Civil Engineering										
First Semester	FP 100 Foundation Programme 0-0-0-4	HS 101-109 Language 3-0-0-4	BE 101 Introduction to Life Sciences: Fundamentals of Life 3-1-0-4	MA 101 Mathematics I 4-2-0-4	ES 101 Engineering Graphics 2-0-3-3	ES 102/ES 112 Introduction to Computing/ Computing 2-0-2-3	ES 103 Introduction to Electrical Systems 3-1-0-4	PE 101 Physical Education 0-0-0-0		26
Second Semester	HS 151 Economics 3-1-0-4	MA 102 Mathematics II 3-2-0-4	PH 101 Physics 3-2-0-4	CH 202 Chemistry Lab 0-0-4-2	ES 104 Introduction to Analog and Digital Electronics 3-2-0-4	ES 105 Electrical and Electronics Lab 0-0-4-2	ES 106 Manufacturing and Workshop practice 2-0-3-4	PE 102 Physical Education 0-0-0-0	FP 101 Intro to Engineering 0-0-2-1	25
Third Semester	HS 221 Introduction to Philosophy 3-0-0-4	MA 201 Mathematics III 3-2-0-4	CH 201 General Chemistry 3-0-0-4	PH 102 Physics Lab 0-0-4-2	ES 201 Intro to Design and Innovation 2-0-4-4	CE 201 Earth Materials & Processes 2-0-3-4		PE 103 Physical Education 0-0-0-0		22
Fourth Semester	HS 201-209 World Civilization/ Culture/History 3-0-0-4	MA 202 Mathematics IV 3-2-0-4	ES 202 Introduction to Materials 3-0-0-4	ES 212 Fluid Mechanics 3-2-0-4	ES 221 Mechanics of Solids 3-2-0-4	CE 202 Sustainability & Environment 1-0-3-3		PE 104 Physical Education 0-0-0-0		23
Fifth Semester	HS Elective 3-0-0-4	CE 301 Soil Mechanics 3 -1-2-5	CE 302 Structural Analysis 3 -1-0-4	CE 303 Geospatial Engineering 1-0-3-3	CE 308 Water Resource Engineering 2-0-3-4					20
Sixth Semester	HS Elective 3-0-0-4	CE 304 Concrete Design 3-1-0-4	CE 305 Steel Design (half semester) 2-1-0-2	CE 307 Masonry Design (half semester) 2-1-0-2	CE 306 Civil Engineering Materials Lab 0-0-4-2	CE 403 Construction Technology & Management 3-0-0-4	CE 309 Field Survey Project 0-0-0-2			20
Seventh Semester	HS Elective 3-0-0-4	BS Elective 3-1-0-4	Open Elective 3-1-0-4	CE 401 Comprehensive Project – 1 0-0-3-4	Open Elective 3-1-0-4					20
Eighth Semester	HS Elective 3-0-0-4	BS Elective 3-1-0-4	Open Elective 3-1-0-4	Open Elective 3-1-0-4						16
Total Credits										172

Bachelor of Technology: Computer Science & Engineering										
First Semester	FP 100 Foundation Programme 0-0-0-4	HS 101-109 Language 3-0-0-4	MA 101 Mathematics I 4-2-0-4	ES 101 Engineering Graphics 2-0-3-3	ES 102/ES 112 Introduction to Computing/ Computing 2-0-2-3	ES 103 Introduction to Electrical Systems 3-1-0-4	BE 101 Introduction to Life Sciences: Fundamentals of Life 3-1-0-4	PE 101 Physical Education 0-0-0-0		26
Second Semester	HS 151 Economics 3-1-0-4	MA 102 Mathematics II 3-2-0-4	ES 104 Introduction to Analog and Digital Electronics 3-2-0-4	ES 105 Electrical and Electronics Lab 0-0-4-2	ES 106 Manufacturing and Workshop Practice 2-0-3-4	PH 101 Physics 3-2-0-4	CH 202 Chemistry Lab 0-0-4-2	PE 102 Physical Education 0-0-0-0	FP 101 Intro to Engineering 0-0-2-1	25
Third Semester	HS 221 Introduction to Philosophy 3-0-0-4	MA 201 Mathematics III 3-2-0-4	ES 201 Intro to Design and Innovation 2-0-4-4	ES 203 Digital Systems 2-1-3-4	ES 242 Data Structures & Algorithms I 2-0-2-3	CH 201 General Chemistry 3-0-0-4	PH 102 Physics Lab 0-0-4-2	PE 103 Physical Education 0-0-0-0		25
Fourth Semester	HS 201-209 World Civilization/ Culture/History 3-0-0-4	MA 202 Mathematics IV 3-2-0-4	ES 301 Data Structures & Algorithms II 3-1-0-4	ES 214 Discrete Mathematics 3-1-0-4	ES 215 Computer Organization and Architecture 3-1-0-4	ES 202 Introduction to Materials 3-0-0-4		PE 104 Physical Education 0-0-0-0		24
Fifth Semester	HS Elective 3-0-0-4	CS 302 Theory of Computation 3-1-0-4	CS 301 Operating Systems 3-0-2-5	CS XXX Extended Core 3-0-0-4	BS Elective 3-1-0-4					21
Sixth Semester	HS Elective 3-0-0-4	CS 328 Introduction to Data Science 3-1-0-4	CS 327 Compilers 3-0-2-5	CS XXX Extended Core 3-0-0-4	CS XXX Extended Core 3-0-0-4					21
Seventh Semester	HS Elective 3-0-0-4	Open Elective 3-1-0-4	Open Elective 3-1-0-4	BS Elective 3-1-0-4						16
Eighth Semester	HS Elective 3-0-0-4	Open Elective 3-1-0-4	Open Elective 3-1-0-4							12
Total Credits										170

Bachelor of Technology: Electrical Engineering										
First Semester	FP 100 Foundation Programme 0 - 0 - 0 - 4	HS 101-109 Language 3 - 0 - 0 - 4	BE 101 Introduction to Life Sciences: Fundamentals of Life 3 - 1 - 0 - 4	MA 101 Mathematics I 4 - 2 - 0 - 4	ES 101 Engineering Graphics 2 - 0 - 3 - 3	ES 102/ES 112 Introduction to Computing/ Computing 2 - 0 - 2 - 3	ES 103 Introduction to Electrical Systems 3 - 1 - 0 - 4	PE 101 Physical Education 0 - 0 - 0 - 0		26
Second Semester	HS 151 Economics 3 - 1 - 0 - 4	MA 102 Mathematics II 3 - 2 - 0 - 4	PH 101 Physics 3 - 2 - 0 - 4	CH 202 Chemistry Lab 0 - 0 - 4 - 2	ES 104 Introduction to Analog and Digital Electronics 3 - 2 - 0 - 4	ES 105 Electrical and Electronics Lab 0 - 0 - 4 - 2	ES 106 Manufacturing and Workshop Practice 2 - 0 - 3 - 4	PE 102 Physical Education 0 - 0 - 0 - 0	FP 101 Intro to Engineering 0 - 0 - 2 - 1	25
Third Semester	HS 221 Introduction to Philosophy 3 - 0 - 0 - 4	MA 201 Mathematics III 3 - 2 - 0 - 4	CH 201 General Chemistry 3 - 0 - 0 - 4	PH 102 Physics Lab 0 - 0 - 4 - 2	ES 201 Intro to Design and Innovation 2 - 0 - 4 - 4	ES 203 Digital Systems 2 - 1 - 3 - 4	EE 221 Electronic Devices 2 - 1 - 0 - 3	PE 103 Physical Education 0 - 0 - 0 - 0		25
Fourth Semester	HS 201-209 World Civilization/ Culture/History 3 - 0 - 0 - 4	MA 202 Mathematics IV 3 - 2 - 0 - 4	ES 202 Introduction to Materials 3 - 0 - 0 - 4	EE 331 Electrical Machines 3 - 1 - 0 - 4	ES 216 Signals, Systems and Networks 3 - 1 - 0 - 4			PE 104 Physical Education 0 - 0 - 0 - 0		20
Fifth Semester	HS Elective 3 - 0 - 0 - 4	EE 332 Power Systems 3 - 1 - 0 - 4	ES 331 Probability & Random Processes 3 - 1 - 0 - 4	EE 321 Analog Circuits 3 - 1 - 3 - 5	EE 311 Electromagnetic Waves 3 - 1 - 0 - 4					21
Sixth Semester	HS Elective 3 - 0 - 0 - 4	EE 341 Communication Systems 3 - 1 - 0 - 4	ES 333 Microprocessors & Embedded Systems 2 - 1 - 2 - 4	ES 332 Control Theory 3 - 1 - 0 - 4	EE 333 Power Electronics 2 - 1 - 3 - 4					20
Seventh Semester	HS Elective 3 - 0 - 0 - 4	BS Elective 3 - 1 - 0 - 4	Open Elective 3 - 1 - 0 - 4	Open Elective 3 - 1 - 0 - 4	EE 411 Digital Signal Processing 3 - 1 - 0 - 4	EE 431 Electrical Systems Lab 0 - 0 - 4 - 2				22
Eighth Semester	HS Elective 3 - 0 - 0 - 4	BS Elective 3 - 1 - 0 - 4	Open Elective 3 - 1 - 0 - 4	Open Elective 3 - 1 - 0 - 4						16
Total Credits										175

Bachelor of Technology: Materials Engineering										
First Semester	FP 100 Foundation Programme 0-0-0-4	HS 101-109 Language 3-0-0-4	BE 101 Introduction to Life Sciences: Fundamentals of Life 3-1-0-4	MA 101 Mathematics I 4-2-0-4	ES 101 Engineering Graphics 2-0-3-3	ES 102/ES 112 Introduction to Computing/ Computing 2-0-2-3	ES 103 Introduction to Electrical Systems 3-1-0-4	PE 101 Physical Education 0-0-0-0		26
Second Semester	HS 151 Economics 3-1-0-4	MA 102 Mathematics II 3-2-0-4	PH 101 Physics 3-2-0-4	CH 202 Chemistry Lab 0-0-4-2	ES 104 Introduction to Analog and Digital Electronics 3-2-0-4	ES 105 Electrical and Electronics Lab 0-0-4-2	ES 106 Manufacturing and Workshop practice 2-0-3-4	PE 102 Physical Education 0-0-0-0	FP 101 Intro to Engineering 0-0-2-1	25
Third Semester	HS 221 Introduction to Philosophy 3-0-0-4	MA 201 Mathematics III 3-2-0-4	CH 201 General Chemistry 3-0-0-4	PH 102 Physics Lab 0-0-4-2	ES 201 Intro to Design and Innovation 2-0-4-4	ES 211 Thermodynamics 3-2-0-4	ES 202 Introduction to Materials 3-0-0-4	PE 103 Physical Education 0-0-0-0		26
Fourth Semester	HS 201-209 World Civilization/ Culture/History 3-0-0-4	MA 202 Mathematics IV 3-2-0-4	ES 212 Fluid Mechanics 3-2-0-4	ES 221 Mechanics of Solids 3-2-0-4	MSE 209 Material Thermodynamics and Kinetics 3-1-0-4	MSE 201 Microstructural Engineering 3-0-2-5		PE 104 Physical Education 0-0-0-0		25
Fifth Semester	HS Elective 3-0-0-4	MSE 303 Mechanical Behaviour of materials 3-0-2-5	MSE 304 Principle of Metal Extraction & refining 3-0-0-4	MSE 305 Advanced Materials 3-0-0-4	MSE 310 Physics of Materials 3-0-0-4					21
Sixth Semester	HS Elective 3-0-0-4	BS Elective 3-1-0-4	MSE 307 Materials Processing 3-0-0-4	MSE 352 Material characterization techniques 2-0-3-4	MSE 302 Corrosion & Degradation of Materials 3-0-0-4					20
Seventh Semester	HS Elective 3-0-0-4	MSE 402 Computational Process Design 3-1-0-4	Open Elective 3-1-0-4	Open Elective 3-1-0-4						16
Eighth Semester	HS Elective 3-0-0-4	BS Elective 3-1-0-4	Open Elective 3-1-0-4	Open Elective 3-1-0-4						16
Total Credits										175

Bachelor of Technology: Mechanical Engineering

First Semester	FP 100 Foundation Programme 0-0-0-4	HS 101-109 Language 3-0-0-4	MA 101 Mathematics I 4-2-0-4	ES 101 Engineering Graphics 2-0-3-3	ES 102/ES 112 Introduction to Computing/ Computing 2-0-2-3	ES 103 Introduction to Electrical Systems 3-1-0-4	BE 101 Introduction to Life Sciences: Fundamentals of Life 3-1-0-4	PE 101 Physical Education 0-0-0-0		26
Second Semester	HS 151 Economics 3-1-0-4	MA 102 Mathematics II 3-2-0-4	ES 104 Introduction to Analog and Digital Electronics 3-2-0-4	ES 105 Electrical and Electronics Lab 0-0-4-2	ES 106 Manufacturing and Workshop Practice 2-0-3-4	PH 101 Physics 3-2-0-4	CH 202 Chemistry Lab 0-0-4-2	PE 102 Physical Education 0-0-0-0	FP 101 Intro to Engineering 0-0-2-1	25
Third Semester	HS 221 Introduction to Philosophy 3-0-0-4	MA 201 Mathematics III 3-2-0-4	ES 201 Introduction to Design & Innovation 2-0-4-4	ES 211 Thermodynamics 3-2-0-4	CH 201 General Chemistry 3-0-0-4	PH 102 Physics Lab 0-0-4-2	ES 321 Dynamics and Vibration 3-1-0-4	PE 103 Physical Education 0-0-0-0		26
Fourth Semester	HS 201-209 World Civilization/ Culture/History 3-0-0-4	MA 202 Mathematics IV 3-2-0-4	ES 202 Introduction to Materials 3-0-0-4	ES 212 Fluid Mechanics 3-2-0-4	ES 221 Mechanics of Solids 3-2-0-4			PE 104 Physical Education 0-0-0-0		20
Fifth Semester	HS Elective 3-0-0-4	ES 311 Heat and Mass Transfer 3-1-0-4	ME 321 Mechanics of Deformable Bodies 3-1-0-4	ME 331 Manufacturing Processes & Systems 3-0-0-4	ME 351 Mechanical Engineering Lab - I 0-0-4-2					18
Sixth Semester	HS Elective 3-0-0-4	ES 332 Control Theory 3-1-0-4	ME 322 Synthesis and Analysis of Mechanisms 2-1-2-4	ME 332 Industrial Engineering & Operations Research 3-1-0-4	ME 352 Mechanical Engineering Lab - II 0-0-4-2	ME 361 Integrated Design and Manufacturing-I 0-1-4-2				20
Seventh Semester	HS Elective 3-0-0-4	ME 461 Integrated Design & Manufacturing - II 0-1-4-2	Open Elective 3-1-0-4	Open Elective 3-1-0-4	BS Elective 3-1-0-4					18
Eighth Semester	HS Elective 3-0-0-4	Open Elective 3-1-0-4	Open Elective 3-1-0-4	BS Elective 3-1-0-4						16
Total Credits										169