UNIVERSITY OF MUMBAI

Honours/Minor Degree Programs Booklet

Part 1- Manual

(with effect from 2022-2023)

Honours and Minor Degree Programs

in

Engineering and Technology

1. Introduction:

As per the AICTE's Approval Process Handbook-2020-21: Chapter VII- clause 7.3.2 (Page 99-101), all branches of Engineering and Technology shall offer Elective Courses in the EMERGING AREAS viz., Artificial Intelligence (AI), Internet of Things (IoT), Blockchain, Robotics, Quantum Computing, Data Sciences, Cyber Security, 3D Printing and

Design, Augmented Reality/ Virtual Reality (AR/VR), as specified in Annexure 1 of the Approval Process Handbook.

a) Under Graduate Degree Courses in EMERGING AREAS shall be allowed as specialization from the same Department. The minimum additional Credits for such Courses shall be in the range of 18-20 and the same shall be mentioned in the degree, as specialization in that particular area. For example, doing extra credits for Robotics in Mechanical Engineering shall earn B.E./ B.Tech. (Hons.) Mechanical Engineering with specialization in Robotics

b) Minor specialization in EMERGING AREAS in Under Graduate Degree Courses may be allowed where a student of another Department shall take the minimum additional Credits in the range of 18-20 and get a

degree with minor from another Department.

It is also made very clear by AICTE that areas in which Minor Degree/Honours may be offered are numerous. It is up to the Universities with the help of their Academic Board/Council to decide whether Minor Degree/Hons. is to be offered or not in any particular area, which is not mentioned above. AICTE approval is not required for offering Minor Degree/Hons. in any such area, however the criteria that "Minor Degree or Hons. will cumulatively require additional 18 to 20 credits in the specified area in addition to the credits essential for obtaining the Under Graduate Degree in Major Discipline (i.e. 160 credits)"

2. Proposed Honours and Minor Degree:

Honours and Minor degree program is introduced in order to facilitate the students to choose additionally the specialized courses in the emerging areas of their choice and build their competence in such domains. Based on AICTE guidelines, the Faculty of Science and Technology has proposed to offer following Honours/ Minor degree program corresponding to each engineering program:

Table 1: Honours / Minor Degree Programs

Sr. No	Honours/Minor degree programs
1	Infrastructure Engineering
2	Smart Cities
3	Waterways Transport Engineering

4	Professional Practices in Structural Engineering
5	Green Technology and Sustainability Engineering
6	Infrastructure Policies & Regulations
7	Artificial Intelligence and Machine Learning
8	Blockchain
9	Cyber Security
10	Virtual and Augmented Reality
11	Data Science
12	Internet of Things (IoT)
13	Waste Technology
14	Electric Vehicles
15	Microgrid Technologies
16	Robotics
17	3D Printing
18	Industrial Automation

Note: The Honours and Minor degree programs selection for each of the engineering programs offered in University of Mumbai is as given in Table 2.

3. Honours and Minor Degree Eligibility Criteria for Students:

In view of the above-mentioned guidelines issued by AICTE in APH 2020-21 for offering Honours and Minor degree in the various engineering programs, the following recommendations are proposed on the eligibility criteria for students opting for same;

i) **Eligibility criteria for opting the Honours/ Minor Degree program:**
   a. **Students with no backlog in semester I, II, and III**
   b. **The CGPI (based on semester I, II, and III) of the students must be 6.75 and above**
   c. **For direct second year (DSE) admitted students - No backlog in semester III and CGPI must be 6.75 and above**

ii) **Each eligible student can opt for maximum one Honour's or one Minor Programs at any time.**

iii) **However, it is optional for leaners to take Honours/Minor degree program.**

iv) **The Honours/ Minor degree program can be opted only during regular engineering studies**

v) **The student shall complete the Honours/ Minor degree program in stipulated four semesters only.**

4. Honours and Minor Degree Program Scheme and Structure:

Honours and Minor degree program be offered from academic year 2022-23 onwards along with Rev 2019 'C' scheme syllabus.

Honours and Minor credit courses will be offered from Semester V onwards to Semester VIII

5. Eligibility criteria for Department/Institute to offer Honours/Minor degree:

As the intention of offering the Honours degree program is to facilitate the advanced learners to build their competence in emerging areas with additional in-depth course work, it becomes very essential to ensure availability of such expert faculties and infrastructure with the departments and institutes. **The proposed modality of approval is self-assessment and declaration basis.** Institute can assess on following points before offering Honours/Minor degrees,

1. The Honours Degree program out of 18 programs listed in Table-1 can only be offered by an institute having the regular degree program running as specified in Table 2 column B.

2. Availability of Faculty expertise in domains of Honours/Minor degree domains
   a. Regular faculty on institute role who has completed PhD/Masters in same domain.
      OR
   b. Regular faculty on institute role who is doing research either sponsored by government agencies or industries or trusts.
      OR
   c. Regular faculty on institute role who has successfully completed certificate course in same domain and able to deliver the expectations of specialisation in emerging areas.

3. Availability of laboratory infrastructure/facilities in domains of Honours /Minor degree
   a. Established centre of excellence in same domain.
      OR
   b. Built research facilities to facilitate research in emerging areas
      OR
   c. Minimum facility is already developed to conduct hands on experience in chosen domains of Hons and Minor degrees.

Institute shall submit declaration of availability of expertise of faculty members and laboratory facilities to offer Hons/Minor degree to University well in advance (i.e before announcement of admission) for same to the Academic Authorities.

The verification of declaration of institute shall be done by LIC committees visiting for affiliation purpose or academic audit purpose.

6. Examination and Evaluation of Honours/Minor Degree Courses:

In current scenario First Year and Final Year of engineering examinations, assessments and result declaration are entirely done by University, while as in Second and Third Year question papers are delivered by University, assessment and results preparation and declaration after approval from university is done by Institute on behalf of University following all ordinances and regulations of university. Hons/Minor degrees courses will be offered in Third and Final Year of engineering as specialisation in emerging areas.

By keeping in mind availability of expertise of faculty with particular Institute only, proposed following modalities of Examination and Evaluation,

a. The continuous assessment and End Sem. Examination (ESE) evaluation shall follow the same pattern as adopted for corresponding semester stated by the University.
b. Question paper will be set and delivered to institutes by University for all Hons/Minor degree
c. End semester Assessment will be done as per the laid down practices by following all applicable ordinances and regulations of university
d. Hons/Minor degree courses can be treated as Audit type of courses, wherein passing marks set will be 40. If any student scored equal or more than passing marks in particular course can be declared as pass.
e. Grading of courses offered under Hons/Minor degree shall be avoided and also not included in overall CUMMULATIVE GRADE POINT AVERAGE, to bring parity with all students admitted for the basic program.
f. Hons/Minor degree shall be conferred in addition to basic degree only after successfully completion of all courses
g. University can make provision for entering pass or fail in course offered under Hons/Minor degree on portal.

7. Award of Honours / Minor Degree:

The students successfully completing the Honours / Minor Degree shall be awarded with the degree designated as: "B. E. in ……(regular) Engineering with Honours/Minor in …….. (specialization)"

Example 1: Students s successfully completing BE in Computer Engineering with specialization (Honours) in Cyber Security shall get a degree as "B.E. Computer Engineering (Honours- Cyber Security)
Printing"
Example 2: Students successfully completing BE in Computer Engineering with specialization (Minor) in Electric Vehicles shall get a degree as "B.E. Computer Engineering (Minor - Electric Vehicles)"

Template for Honours degree Program Syllabus Scheme

University of Mumbai Honours in ---------- (With effect from 2022-23)										
Year & Sem	**Course Code and Course Title**	**Teaching Scheme Hours / Week**			**Examination Scheme and Marks**					**Credit Scheme**
		Theory	Seminar /Tutorial	Pract.	Internal Assessment	End Sem. Exam	Term Work	Oral/ Pract	Total	Credits
TE Sem. V	**HXXC501: Subject 1**	04	--	--	20	80	--	--	100	04
	Total	**04**	**-**	**--**	**100**		**-**	**-**	**100**	**04**
										Total Credits = 04
TE Sem. VI	**HXXC601: Subject 2**	04	--	--	20	80	--	--	100	04
	Total	**04**	**-**	**-**	**100**		**-**	**-**	**100**	**04**
										Total Credits = 04
BE Sem. VII	**HXXC701: Subject 3**	04	--	--	20	80	--	--	100	04
	HXXSBL701: Lab-1	--	--	04	--	--	50	50	100	02
	Total	**04**	**-**	**04**	**100**		**50**	**50**	**200**	**06**
										Total Credits = 06
BE Sem.VIII	**HXXC801: Subject 4**	04	-	--	20	80	--	--	100	04
	Total	**04**	**-**	**-**	**100**		**-**	**-**	**100**	**04**
										Total Credits = 04
Total Credits for Semesters V,VI, VII &VIII = 04+04+06+04 = 18										
Reference: https://www.aicte-india.org/sites/default/files/APH%202020_21.pdf (page 99-101)										

Honours and Minor Degree Programs

Mapping with Engineering/Technology Programs in University of Mumbai

Honour's/Minors degree program is being introduced by the Faculty of Science and Technology of University of Mumbai in order to facilitate the students to choose additionally the specialized courses in the emerging areas of their choice and build their competence in such domains. As per AICTE guidelines, Honours/Minors degree program to be chosen by eligible students (based on certain criteria given in manual) studying in third year of various Engineering program's are elaborated in following table to bring clarity to all stakeholders including students, faculty members and institutions. **Each eligible student can opt for maximum one Honour's or one Minor Programs at any time.**

Table 2: Honours and Minor Degree Program Mapping with Engineering Programs

	Honours / Minor Degree Programs	Programs who can offer this Honours Degree Program	Programs who can offer this as Minor Degree program
Row	**Column A**	**Column B**	**Column C**
1	**Infrastructure Engineering**	**Civil Engineering**	1. Mechanical Engineering 2. Production Engineering 3. Automobile Engineering 4. Mechatronics Engineering 5. Printing and Packaging Technology 6. Electrical Engineering 7. Chemical Engineering 8. Electronics and Telecomm. Engineering 9. Electronics Engineering 10. Computer Engineering 11. Information Technology 12. Instrumentation Engineering 13. Electronics and Computer Science 14. Artificial Intelligence & Data Science 15. Cyber Security 16. Computer Science and Engineering (Artificial Intelligence & Machine Learning) 17. Computer Science and Engineering (Internet of Things & Cyber Security including Blockchain) 18. Computer Science and Engineering (Data Science) 19. Artificial Intelligence & Machine Learning 20. Data Engineering 21. Internet of Things 22. Computer Science and Design

2	**Smart Cities**	**Civil Engineering**	1. Civil and Infrastructure Engineering 2. Mechanical Engineering 3. Production Engineering 4. Automobile Engineering 5. Mechatronics Engineering 6. Printing and Packaging Technology 7. Electrical Engineering 8. Chemical Engineering 9. Electronics and Telecomm. Engineering 10. Electronics Engineering 11. Computer Engineering 12. Information Technology 13. Instrumentation Engineering 14. Electronics and Computer Science 15. Artificial Intelligence & Data Science 16. Cyber Security 17. Computer Science and Engineering (Artificial Intelligence & Machine Learning) 18. Computer Science and Engineering (Internet of Things & Cyber Security including Blockchain) 19. Computer Science and Engineering (Data Science) 20. Artificial Intelligence & Machine Learning 21. Data Engineering 22. Internet of Things 23. Computer Science and Design
3	**Waterways Transport Engineering**	**Civil Engineering**	1. Civil and Infrastructure Engineering 2. Mechanical Engineering 3. Production Engineering 4. Automobile Engineering 5. Mechatronics Engineering 6. Printing and Packaging Technology 7. Electrical Engineering 8. Chemical Engineering 9. Electronics and Telecomm. Engineering 10. Electronics Engineering 11. Computer Engineering 12. Information Technology 13. Instrumentation Engineering 14. Electronics and Computer Science 15. Artificial Intelligence & Data Science 16. Cyber Security 17. Computer Science and Engineering (Artificial Intelligence & Machine Learning) 18. Computer Science and Engineering (Internet of Things & Cyber Security including Blockchain) 19. Computer Science and Engineering (Data Science) 20. Artificial Intelligence & Machine Learning 21. Data Engineering

			22. Internet of Things 23. Computer Science and Design
4	**Professional Practices in Structural Engineering**	**Civil Engineering**	1. Civil and Infrastructure Engineering 2. Mechanical Engineering 3. Production Engineering 4. Automobile Engineering 5. Mechatronics Engineering 6. Printing and Packaging Technology 7. Electrical Engineering 8. Chemical Engineering 9. Electronics and Telecomm. Engineering 10. Electronics Engineering 11. Computer Engineering 12. Information Technology 13. Instrumentation Engineering 14. Electronics and Computer Science 15. Artificial Intelligence & Data Science 16. Cyber Security 17. Computer Science and Engineering (Artificial Intelligence & Machine Learning) 18. Computer Science and Engineering (Internet of Things & Cyber Security including Blockchain) 19. Computer Science and Engineering (Data Science) 20. Artificial Intelligence & Machine Learning 21. Data Engineering 22. Internet of Things 23. Computer Science and Design
5	**Green Technology and Sustainability Engineering**	**1 Civil Engineering** **2 Chemical Engineering** **3 Printing and Packaging Technology**	1. Civil and Infrastructure Engineering 2. Mechanical Engineering 3. Production Engineering 4. Automobile Engineering 5. Mechatronics Engineering 6. Electrical Engineering 7. Electronics and Telecomm. Engineering 8. Electronics Engineering 9. Computer Engineering 10. Information Technology 11. Instrumentation Engineering 12. Electronics and Computer Science 13. Artificial Intelligence & Data Science 14. Cyber Security 15. Computer Science and Engineering (Artificial Intelligence & Machine Learning) 16. Computer Science and Engineering (Internet of Things & Cyber Security including Blockchain) 17. Computer Science and Engineering (Data Science) 18. Artificial Intelligence & Machine Learning 19. Data Engineering

			20. Internet of Things 21. Computer Science and Design
6	**Infrastructure Policies & Regulations**	**Civil and Infrastructure Engineering**	1. Mechanical Engineering 2. Production Engineering 3. Automobile Engineering 5. Mechatronics Engineering 6. Printing and Packaging Technology 7. Electrical Engineering 8. Chemical Engineering 9. Electronics and Telecomm. Engineering 10. Electronics Engineering 11. Computer Engineering 12. Information Technology 13. Instrumentation Engineering 14. Electronics and Computer Science 15. Artificial Intelligence & Data Science 16. Cyber Security 17. Computer Science and Engineering (Artificial Intelligence & Machine Learning) 18. Computer Science and Engineering (Internet of Things & Cyber Security including Blockchain) 19. Computer Science and Engineering (Data Science) 20. Artificial Intelligence & Machine Learning 21. Data Engineering 22. Internet of Things 23. Computer Science and Design
7	**Artificial Intelligence and Machine Learning**	**1 Computer Engineering** **2 Electronics and Telecomm. Engineering** **3 Electronics Engineering** **4 Information Technology** **5 Electronics and Computer Science** **6 Mechatronics Engineering** **7 Computer Science and Engineering (Internet of Things & Cyber Security including Blockchain)** **8 Cyber Security** **9 Computer Science and Engineering (Data Science)** **10 Internet of Things** **11 Data Engineering** **12 Computer Science and Design**	1. Civil Engineering 2. Civil and Infrastructure Engineering 3. Mechanical Engineering 4. Production Engineering 5. Automobile Engineering 6. Printing and Packaging Technology 7. Electrical Engineering 8. Chemical Engineering 9. Instrumentation Engineering

8	**Blockchain**	**1 Computer Engineering** **2 Electronics and Telecomm. Engineering** **3 Electronics Engineering** **4 Information Technology** **5 Electronics and Computer Science** **6 Artificial Intelligence & Data Science** **7 Cyber Security** **8 Computer Science and Engineering (Artificial Intelligence & Machine Learning)** **9 Computer Science and Engineering (Data Science)** **10 Internet of Things** **11 Data Engineering** **12 Computer Science and Design** **13 Artificial Intelligence & Machine Learning**	1. Civil Engineering 2. Civil and Infrastructure Engineering 3. Mechanical Engineering 4. Production Engineering 5. Automobile Engineering 6. Mechatronics Engineering 7. Printing and Packaging Technology 8. Electrical Engineering 9. Chemical Engineering 10. Instrumentation Engineering
9	**Cyber Security**	**1 Computer Engineering** **2 Electronics and Telecomm. Engineering** **3 Electronics Engineering** **4 Information Technology** **5 Electronics and Computer Science** **6 Artificial Intelligence & Data Science** **7 Computer Science and Engineering (Artificial Intelligence & Machine Learning)** **8 Computer Science and Engineering (Data Science)** **9 Internet of Things** **10 Artificial Intelligence & Machine Learning** **11 Data Engineering** **12 Computer Science and Design**	1. Civil Engineering 2. Civil and Infrastructure Engineering 3. Mechanical Engineering 4. Production Engineering 5. Automobile Engineering 6. Mechatronics Engineering 7. Printing and Packaging Technology 8. Electrical Engineering 9. Chemical Engineering 10. Instrumentation Engineering

10	**Virtual and Augmented Reality**	**1 Computer Engineering** **2 Electronics and Telecomm. Engineering** **3 Electronics Engineering** **4 Information Technology** **5 Electronics and Computer Science** **6 Computer Science and Engineering (Internet of Things & Cyber Security including Blockchain)** **7 Artificial Intelligence & Data Science** **8 Cyber Security** **9 Computer Science and Engineering (Artificial Intelligence & Machine Learning)** **10 Computer Science and Engineering (Data Science)** **11 Internet of Things** **12 Artificial Intelligence & Machine Learning** **13 Data Engineering** **14 Computer Science and Design**	1. Civil Engineering 2. Civil and Infrastructure Engineering 3. Mechanical Engineering 4. Production Engineering 5. Automobile Engineering 6. Mechatronics Engineering 7. Printing and Packaging Technology 8. Electrical Engineering 9. Chemical Engineering 10. Instrumentation Engineering
11	**Data Science**	**1 Computer Engineering** **2 Electronics and Telecomm. Engineering** **3 Electronics Engineering** **4 Information Technology** **5 Electronics and Computer Science** **6 Mechanical Engineering** **7 Production Engineering** **8 Automobile Engineering** **9 Computer Science and Engineering (Internet of Things & Cyber Security including Blockchain)** **10 Cyber Security** **11 Computer Science and Engineering (Artificial Intelligence & Machine Learning)** **12 Internet of Things** **13 Artificial Intelligence & Machine Learning** **14 Electrical Engineering** **15 Computer Science and Design**	1. Civil Engineering 2. Civil and Infrastructure Engineering 3. Mechatronics Engineering 4. Printing and Packaging Technology 5. Chemical Engineering 6. Instrumentation Engineering

12	**Internet of Things (IoT)**	**1 Computer Engineering** **2 Electronics and Telecomm. Engineering** **3 Electronics Engineering** **4 Information Technology** **5 Electronics and Computer Science** **6 Electrical Engineering** **7 Mechanical Engineering** **8 Production Engineering** **9 Automobile Engineering** **10 Mechatronics Engineering** **11 Artificial Intelligence & Data Science** **12 Cyber Security** **13 Computer Science and Engineering (Artificial Intelligence & Machine Learning)** **14 Computer Science and Engineering (Data Science)** **15 Artificial Intelligence & Machine Learning** **16 Data Engineering** **17 Computer Science and Design**	1. Civil Engineering 2. Civil and Infrastructure Engineering 3. Printing and Packaging Technology 4. Chemical Engineering 5. Instrumentation Engineering
13	**Waste Technology**	**Chemical Engineering**	1. Civil Engineering 2. Civil and Infrastructure Engineering 3. Mechanical Engineering 4. Production Engineering 5. Automobile Engineering 6. Mechatronics Engineering 7. Printing and Packaging Technology 8. Electrical Engineering 9. Electronics and Telecomm. Engineering 10. Electronics Engineering 11. Computer Engineering 12. Information Technology 13. Instrumentation Engineering 14. Electronics and Computer Science 15. Artificial Intelligence & Data Science 16. Cyber Security 17. Computer Science and Engineering (Artificial Intelligence & Machine Learning) 18. Computer Science and Engineering (Internet of Things & Cyber Security including Blockchain) 19. Computer Science and Engineering (Data Science) 20. Artificial Intelligence & Machine Learning 21. Data Engineering 22. Internet of Things 23. Computer Science and Design

14	**Electric Vehicles**	**1 Electrical Engineering** **2 Mechanical Engineering** **3 Production Engineering** **4 Automobile Engineering**	1. Civil Engineering 2. Civil and Infrastructure Engineering 3. Mechatronics Engineering 4. Printing and Packaging Technology 5. Chemical Engineering 6. Electronics and Telecomm. Engineering 7. Electronics Engineering 8. Computer Engineering 9. Information Technology 10. Instrumentation Engineering 11. Electronics and Computer Science 12. Artificial Intelligence & Data Science 13. Cyber Security 14. Computer Science and Engineering (Artificial Intelligence & Machine Learning) 15. Computer Science and Engineering (Internet of Things & Cyber Security including Blockchain) 16. Computer Science and Engineering (Data Science) 17. Artificial Intelligence & Machine Learning 18. Data Engineering 19. Internet of Things 20. Computer Science and Design
15	**Microgrid Technologies**	**Electrical Engineering**	1. Civil Engineering 2. Civil and Infrastructure Engineering 3. Mechanical Engineering 4. Production Engineering 5. Automobile Engineering 6. Mechatronics Engineering 7. Printing and Packaging Technology 8. Chemical Engineering 9. Electronics and Telecomm. Engineering 10. Electronics Engineering 11. Computer Engineering 12. Information Technology 13. Instrumentation Engineering 14. Electronics and Computer Science 15. Artificial Intelligence & Data Science 16. Cyber Security 17. Computer Science and Engineering (Artificial Intelligence & Machine Learning) 18. Computer Science and Engineering (Internet of Things & Cyber Security including Blockchain) 19. Computer Science and Engineering (Data Science) 20. Artificial Intelligence & Machine Learning 21. Data Engineering 22. Internet of Things 23. Computer Science and Design

16	**Robotics**	**1. Mechanical Engineering** **2. Production Engineering** **3. Automobile Engineering** **4. Printing and Packaging Technology** **5. Mechatronics Engineering** **6. Electrical Engineering**	1. Civil Engineering 2. Civil and Infrastructure Engineering 3. Chemical Engineering 4. Electronics and Telecomm. Engineering 5. Electronics Engineering 6. Computer Engineering 7. Information Technology 8. Instrumentation Engineering 9. Electronics and Computer Science 10. Artificial Intelligence & Data Science 11. Cyber Security 12. Computer Science and Engineering (Artificial Intelligence & Machine Learning) 13. Computer Science and Engineering (Internet of Things & Cyber Security including Blockchain) 14. Computer Science and Engineering (Data Science) 15. Artificial Intelligence & Machine Learning 16. Data Engineering 17. Internet of Things 18. Computer Science and Design
17	**3D Printing**	**1. Mechanical Engineering** **2. Production Engineering** **3. Automobile Engineering** **4. Printing and Packaging Technology**	1. Civil Engineering 2. Civil and Infrastructure Engineering 3. Mechatronics Engineering 4. Electrical Engineering 5. Chemical Engineering 6. Electronics and Telecomm. Engineering 7. Electronics Engineering 8. Computer Engineering 9. Information Technology 10. Instrumentation Engineering 11. Electronics and Computer Science 12. Artificial Intelligence & Data Science 13. Cyber Security 14. Computer Science and Engineering (Artificial Intelligence & Machine Learning) 15. Computer Science and Engineering (Internet of Things & Cyber Security including Blockchain) 16. Computer Science and Engineering (Data Science) 17. Artificial Intelligence & Machine Learning 18. Data Engineering 19. Internet of Things 20. Computer Science and Design

18	**Industrial Automation**	**Instrumentation Engineering**	1. Civil Engineering 2. Civil and Infrastructure Engineering 3. Mechanical Engineering 4. Production Engineering 5. Automobile Engineering 6. Mechatronics Engineering 7. Printing and Packaging Technology 8. Electrical Engineering 9. Chemical Engineering 10. Electronics and Telecomm. Engineering 11. Electronics Engineering 12. Computer Engineering 13. Information Technology 14. Electronics and Computer Science 15. Artificial Intelligence & Data Science 16. Cyber Security 17. Computer Science and Engineering (Artificial Intelligence & Machine Learning) 18. Computer Science and Engineering (Internet of Things & Cyber Security including Blockchain) 19. Computer Science and Engineering (Data Science) 20. Artificial Intelligence & Machine Learning 21. Data Engineering 22. Internet of Things 23. Computer Science and Design

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