JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

(Established by Govt. Act No. 30 of 2008)

Kukatpally, Hyderabad – 500085, Telangana (India).

R-25 Academic Regulations (For Minors & Honours)

The emphasis of JNTUH has always been on orienting professional students toward emerging technologies that are expected to shape the world in the years to come.

To enhance the career opportunities, the University has designed a curriculum that offers a Bachelor of Technology (B.Tech.) degree in a core branch with a Minor in a specified program, particularly in emerging fields such as Artificial Intelligence & Machine Learning (AI&ML), Data Science, Internet of Things (IoT), etc. For example, a student may pursue B.Tech. in Mechanical Engineering with a Minor in AI&ML.

Similarly, to enable students to expand their domain knowledge in their respective B.Tech. branches both laterally and vertically, the University has also introduced the option of pursuing a Bachelor of Technology in a particular branch with Honours.

Objectives of Minor program

The key objectives of offering B.Tech. with Minor Degree program are:

- To enhance interdisciplinary knowledge and skills
- To provide specialization in emerging technologies and thrust areas of engineering
- To improve the employability and career prospects of undergraduate students
- To promote academic flexibility and holistic academic development

Objectives of Honors Program

The key objectives of offering B.Tech. with Honors program are:

- To increase the employability of undergraduate student with expanded knowledge in his/her core Engineering discipline.
- To provide an opportunity to student to pursue his/her higher studies in wider range of specializations.

Common Academic Regulations for both Honours and Minor Degree Programs

1. The student can choose only one Minor or Honours program along with his/her B.Tech. degree. A student who opts for a Minor program is not eligible to enrol in an Honours program.
2. Minor and Honours Degree programs are co-terminus. Hence, if a student receives his/her provisional degree certificate without completing the requirements of Minor/Honours Degree, the student has to forego the claim for Minors/Honours Degrees.
3. There is no transfer of credits from Minor/Honours program courses to regular B.Tech. degree course & vice versa.
4. The weekly instruction hours, internal & external evaluation and award of grades are on par with regular 4-Years B.Tech. program.
5. The institute/ department shall prepare the time-tables for each Minor/Honours course offered at their respective institutes without any overlap/clash with other courses of B.Tech. degree in the respective semesters.
6. Each of the Minor and Honours degree is an 18 credits program.

7. A student can graduate with a Minor/Honours Degree if he/she fulfils the requirements for his/her regular B.Tech. program as well as fulfils the requirements for Minor/ Honours program.
8. The choice to opt/take a Minor/ Honours program is purely on the choice of the students.

Additional Academic Regulations for *B.Tech. with Minor* program

1. Minor courses and the offering departments

S. No.	Minor Program	Eligible branch of students	Offering Department	Award of Degree
1.	Remote Sensing and GIS	All branches except B. Tech. in Civil Engg.	CE	"B.Tech. in branch name with Minor in Remote Sensing and GIS"
2.	Electric Vehicles	All branches except B.Tech. in Electrical and Electronics Engg.	EEE	"B.Tech. in branch name with Minor in Electric Vehicles"
3.	Autonomous Vehicles	All branches except B.Tech. in Mechanical Engg.	ME	"B.Tech. in branch name with Minor in Autonomous Vehicles"
4.	Robotics	All branches except B.Tech. in Electronics and Communication Engg.	ECE	"B.Tech. in branch name with Minor in Robotics"
5.	IOT	All branches, except B.Tech. in CSE (IOT) / B.Tech. (IOT)	ECE	"B.Tech. in branch name with Minor in IOT"
6.	Quantum Technologies	All circuit branches	ECE	"B.Tech. in branch name with Minor in Quantum Technologies"
7.	Artificial Intelligence & Machine Learning	All branches, except B. Tech. in CSE (AI&ML)/ B.Tech. (AI&ML)	CSE	"B.Tech. in branch name with Minor in AI&ML"
8.	Data Science	All branches, except B. Tech. in CSE (Data Science)/ B.Tech. (Data Science)	CSE	"B.Tech. in branch name with Minor in Data Science"
9.	Cyber Security	All branches, except B. Tech. in CSE (Cyber Security)/ B.Tech. (Cyber Security)	CSE	"B.Tech. in branch name with Minor in Cyber Security"
10.	Game Development	All branches	CSE	"B.Tech. in branch name with Minor in Game Development"
11.	Quantum Computing	All branches including CSE	CSE	"B.Tech. in branch name with Minor in Quantum Computing"
12.	Computing Skills	All branches excluding CSE & Allied branches	CSE	"B.Tech. in branch name with Minor in Computing Skills"
13.	Mining Engg.	All branches excluding Mining Engg	Mining Engg.	"B.Tech. in branch name with Minor in Mining Engg."
14.	Innovation and Entrepreneurship	All branches	HSS	"B.Tech. in branch name with Minor in Innovation and Entrepreneurship"

2. Academic Regulations for B. Tech. Degree with Minor programs

1. The list of courses of each Minor program, their respective credits weightage and semester-wise break-up of the courses are attached to these regulations of Minor.

Semester	**Theory (# Credits)** (*Which is not studied in regular course*):	**Total Credits**
II Year II Sem.	Theory Course – 1	3

II Year II Sem.	Lab – 1	1
III Year I Sem.	Theory Course – 2	3
III Year II Sem.	Theory Course – 3	3
III Year II Sem.	Lab-2	1
IV Year I Sem.	Theory Course – 4	3
IV Year I Sem.	Project/ Experiential Learning	4
Total Credits		18

2. All these 18 credits shall be offered from II Year II Semester to IV Year I Semester.
3. These 18 credits are to be earned from the Courses identified for Minors degree offered by the host department.
4. After registering for the Minor programme, if a student is unable to earn all the required 18 credits but secured the required 160 credits of B.Tech. and the student opts for getting the provisional degree certificate, he/she will be awarded only B.Tech. degree in the concerned branch. In such cases, the student has to forego his/her minor degree.
5. However, if the student wants his minor degree also, he/she should not claim his provisional degree certificate and appear for backlog minor courses. As and when he/she secures all the 18 credits, he/she will be awarded both B.Tech. degree and Minor degree.
6. The student can withdraw from the Minor program at any time.
7. If the student withdraws or unable to complete the Minor degree program, the grade memos for the courses completed in the Minor program shall be issued but not the Minor Degree.

5. Eligibility conditions for the student to register for Minor course

a) A student shall be eligible to opt for the **B.Tech. Degree with a Minor programme** only if he/she is promoted from **I Year II Semester to II Year I Semester in the first attempt**.

6. Registration for the courses in Minor Program

b) Students shall register for the courses pertaining to the current semester for the Minor program at the end of the previous semester. (Ex. Registration for Minor degree courses in II Year II Semester should be done at the end of II Year I Semester).

c) No course of Minor degree should be same to that of the regular B.Tech. course. The students should take the advice of faculty mentors while registering for a course.

d) The registration fee to be collected from the students by the College is **Rs. 1000/-** per one credit and should be registered as per the schedule.

Additional Academic Regulations for *B. Tech. with Honours program*

1. All the 18 credits of Honours Degree need to be completed from III year I semester to IV year II semester only.
2. These 18 credits are to be earned from the recommended courses offered at the parent department. The courses whose mode of learning is MOOCS, as specified in the course structure are to be completed through the SWAYAM MOOCS platform.
3. After registering for the Honours programme, If the student fails in any course of either B.Tech. degree or Honours program in any semester he/she shall not be awarded Honours degree. Such students will be awarded only B.Tech. degree in the concerned branch if they earn the required 160 credits. The student has to forego his/her Honours program.
4. The student can withdraw from the Honours program at any time.
5. If the student withdraws or unable to complete the Honours program, the grade memos for the courses completed in the Honours program shall be issued but not the Honours Degree.
6. The students can choose Honours program only in their respective branches.

2. Eligibility conditions of the students for the Honors degree

1. A student can opt for the B.Tech. Degree with Honours in III Year I Semester, provided that he/she has passed all courses in the first attempt in all semesters till II Year I Semester and has maintained a CGPA of 7.5 or above.
2. If more than 30% of the students in a branch fulfil the eligibility criteria (as stated above), the number of students given eligibility should be limited to 30%. The criteria to be followed for choosing 30% candidates in a branch may be the CGPA secured by the students till II year I semester.
3. The department concerned should be either NBA accredited or shall offer at least one M.Tech. Program.
4. Successful completion of 18 credits earmarked for honours program with at least 7.5 CGPA along with successful completion of 160 credits earmarked for regular B. Tech. Program with at least 7.5 CGPA and passing all subjects in first attempt gives the eligibility for the award of B. Tech. (Honors) degree.

3. Registration for the course in Honors program

1. Students shall register for the courses pertaining to the Honours program, at the end of the previous semester (Ex. Registration for courses in III Year I Semester should be done at the end of II Year II Semester).
2. The students should choose a course from the list against each semester (from Honours course structure) other than the courses they have studied/registered for regular B.Tech. programme. No course of Honours program should be same as offered/to be offered course in the regular B.Tech. course. The students should take advice of faculty mentors while registering for a course.
3. The registration fee to be collected from the students by the College is **Rs. 1000/-** per one credit and should be registered as per the schedule.

4. Course Structure of Honors program courses shall be as shown in the below table:

S. No.	Year / Semester	Course to be chosen from/ studied	Mode of Learning	No. of Credits
1	III-1	PE-1 or PE-2	Blended/Conventional	3
2	III-2	Research Methodologies	Conventional	2
3	III-2	PE-3	Conventional	3

4	IV-1	PE-4	Conventional	3
5	IV-1	PE-5/PE-6 or Equivalent MOOCS Course (as suggested by the University)	MOOCS	3
6	IV-2	Project/ Experiential Learning	--	4
			Total Credits	**18**

5.1 The institute shall offer a course on Research Methodologies by combining the students of all branches (if the number of students is more, multiple parallel sessions may be conducted). The time slots in the time-tables of respective branches should be aligned. There shall be an internal and external evaluation for Research Methodologies course.

5.2 If the blended course option is chosen, for the subject in III-I semester, the learning should be partially in online mode and partially in offline mode. The external evaluation shall be done by the University; however, the course teacher shall consider the online assessment part also while finalizing the internal marks.

R25 B.TECH. HONOURS - RESEARCH METHODOLOGIES

Prerequisite: None

Course Objectives:

- To understand the research problem
- To know the literature studies, plagiarism and ethics
- To get the knowledge about technical writing and induce paper publication skills

Course Outcomes: Gain the sound knowledge of the following important elements:

- Distinguish research methods
- Carryout literature review thoroughly to identify contemporary research problems
- Data collection and analysis
- Write and publish a technical research paper
- Review papers effectively

UNIT - I
INTRODUCTION:
Objective of Research; Definition and Motivation; Types of Research; Research Approaches; Steps in Research Process; Criteria of Good Research.

UNIT - II
RESEARCH FORMULATION AND LITERATURE REVIEW:
Problem Definition and Formulation; Literature Review; Characteristics of Good Research Problem; Literature Review Process; Plagiarism, Ethics in Research.

UNIT - III
DATA COLLECTION:
Primary and Secondary Data; Primary and Secondary Data Sources; Data Collection Methods; Data Processing; Classification of Data.
DATA ANALYSIS:
Statistical Analysis; Multivariate Analysis; Correlation Analysis; Regression Analysis; Principle Component Analysis; Samplings

UNIT - IV RESEARCH
DESIGN:
Need for Research Design; Features of a Good Design; Types of Research Designs; Induction and Deduction.
HYPOTHESIS FORMULATION AND TESTING:
Hypothesis; Important Terms; Types of Research Hypothesis; Hypothesis Testing; Z-Test; t-Test; f- Test; Making a Decision; Types of Errors; ROC Graphics.

UNIT - V
PRESENTATION OF THE RESEARCH WORK:
Business Report; Technical Report; Research Report; General Tips for Writing Report; Presentation of Data; Oral Presentation; Bibliography and References; Intellectual Property Rights; Open-Access Initiatives; Plagiarism.

TEXT BOOKS:

1. Research Methodology. Methods & Technique: Kothari. C.R.
2. Stuart Melville and Wayne Goddard, “Research methodology: an introduction for science & engineering students’”

REFERENCES:

1. Practical Research: planning and Design (8th Edition) – Paul D. Leedy and Jeanne E. Ormrod.
2. A Hand Book of Education Research – NCTE
3. Methodology of Education Research – K.S. Sidhu.
4. Tests, Measurements and Research methods in Behavioural Sciences- A.K. Singh.
5. Statistical Methods- Y.P. Agarwal.
6. Methods of Statistical Ananlysis- P.S Grewal.
7. Fundamentals of Statistics – S.C. Gupta, V.K. Kapoor.
8. Intellectual Property Rights by Deborah E. Bouchoux, Cengage Learning.
9. Managing Intellectual Property – The Strategic Imperative, Vinod V.Sople, 2nd Edition, PHI Learning Private Limited.
10. Research methodology – S.S. Vinod Chandra, S. Anand Hareendran