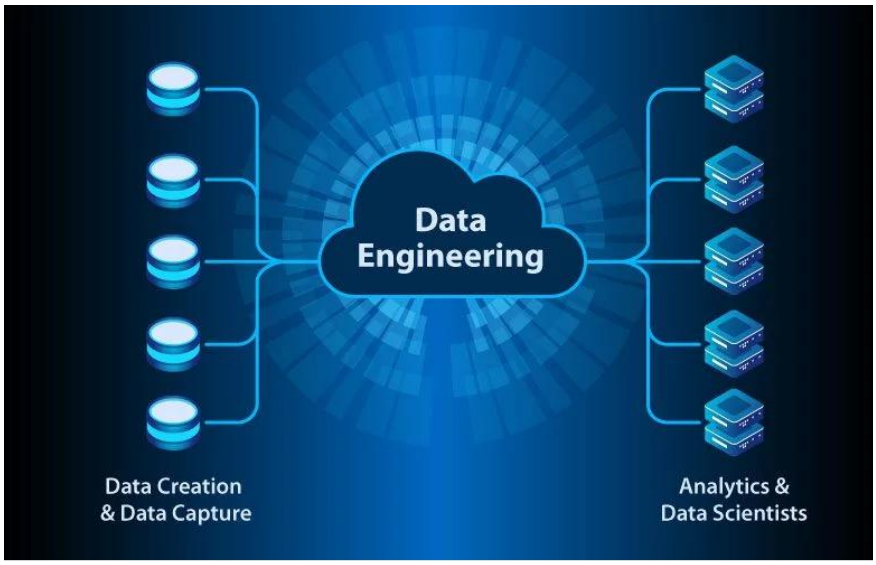
NIELIT Ropar
Deemed to be University

M. Tech. in Data Engineering
(Department of AI)



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Introduction:

For the last twenty years, the world has observed the participation of IT enabled services in all sectors. Along with the increase of social media services, the dynamics of the World Wide Web has moved from data consumption to a data generation situation. The social networking services have make possible not only the organizations but as well as individual users as the source of content providers. Internet data is escalating exponentially and so is the capacity of data. Areas of applications such as social media, healthcare industry, weather forecast, e-commerce, traffic monitoring and every possible domains are yielding colossal quantity of data, called "BIG DATA", at a record magnitude. This has created a huge need for skilled professionals, known as ***Data Scientists***, who can mine and interpret data. Understanding this gigantic amount of data is a major challenge in science, technology and industry. However, there is a gap between the demand and supply of data scientists and technologists due to the subsequent grounds:

• Undergraduate courses are not targeted enough to address the difficulties in this area because of their generic nature.

• There are not enough postgraduate courses that stresses explicitly on Data Science and Engineering.

Stressing these issues in mind, the Department of AI at NIELIT Ropar, started a two-year Masters in Technology (M.Tech.) program in Data Engineering.

This program would offer students an opportunity to gain knowledge of both foundational and experimental components of Data Engineering with application of Machine Learning and Deep Learning techniques. On completion of this program, a student will be able become industry ready involving innovation and problem-solving and can join the industry as a ***Data Scientist/Data Analyst/Data Engineer.*** Along with the courses that provide specialization in Data Engineering, students will also have opportunity to explore some applied domains such as Neural Networks, Fuzzy Logic, Genetic Algorithms, Data Warehousing, Cloud Computing, Data Security and Access Control, Web Analytics and Development and many others.

Program Educational Objectives (PEOs):

PEO1: Graduates leverage foundational and advanced concepts in data engineering to excel in diverse professional roles, fostering innovation and critical problem-solving.

PEO2: Graduates demonstrate proficiency in advanced data engineering techniques, algorithms, and tools, addressing industry challenges and contributing to research and development.

PEO3: Graduates exhibit effective communication, teamwork, and ethical values, positioning them as responsible leaders and collaborators in the data engineering domain.

Program Outcomes (POs):

PO1: Graduates apply mathematical foundations and data engineering principles to solve complex computing challenges independently and collaboratively.

PO2: Graduates design, analyze, and implement advanced data structures, algorithms, and computational solutions, showcasing competence in data engineering.

PO3: Graduates critically evaluate and select appropriate data engineering methodologies and tools, demonstrating adaptability to evolving technologies and industry trends.

PO4: Graduates proficiently analyze and interpret data, employ machine learning techniques, and contribute to advancements in data preparation, analysis, and storage technologies.

PO5: Graduates exhibit expertise in data warehousing, data mining, and data security, ensuring efficient management, retrieval, and protection of large-scale data sets.

Course Category Wise Credit Distribution

Category	Credits
Program Core	12
Core Labs	4
Electives	15
Electives Labs	4
Audit Course	2
Open Electives	3
Project / Dissertation	28

Course Structure

Semester-I						
S. No	**Course Code**	**Course Name**	**L**	**T**	**P**	**C**
1.	DEL601	Program Core I- Mathematical foundations of Computer Science	3	0	0	3
2.	DEL602	Program Core II- Advanced Data Structures	3	0	0	3
3.	DEL*	Program Elective I	3	0	0	3

4.	DEL*	Program Elective II	3	0	0	3
5.	ACL601	Research Methodology and IPR	2	0	0	2
6.	ACL*	Audit Course -1	2	0	0	0
7.	DEP601	Laboratory 1 (Advanced Data Structures)	0	0	4	2
8.	DEP*	Laboratory 2 (Based on Electives)	0	0	4	2
Total credits: 18						
Semester-II						
1.	DEL603	Program Core III Advance Algorithms	3	0	0	3
2.	DEL604	Program Core IV Soft Computing	3	0	0	3
3.	DEL*	Program Elective III	3	0	0	3
4.	DEL*	Program Elective IV-	3	0	0	3
5.	ACL*	Audit Course -2	2	0	0	0
6.	DEP604	Laboratory 1 (Based on Cores)	0	0	4	2
7.	DEP*	Laboratory 2 (Based on Electives)	0	0	4	2
8.	DED601	Mini Project	2	0	0	2
Total Credits: 18						
Semester-III						
1.	DEL*	Program Elective-V	3	0	0	3
2.	OEL*	Open Elective	3	0	0	3
3.	DED701	Dissertation-I/ Industrial project	0	0	20	10
Total credit: 16						
Semester-IV						
S. No	Course Code		L	T	P	C
1.	DED702	Dissertation-II	0	0	32	16
Total credit: 16						

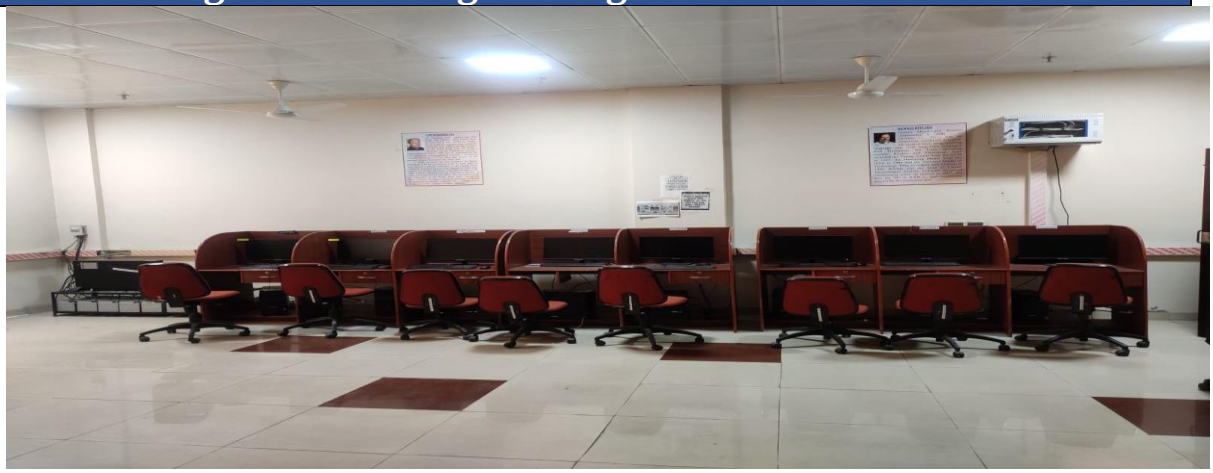
Elective Courses						
Sl. No.	Course code	Course Name	L	T	P	C
1.	DEL702	Data Science	3	0	0	3
2.	DEL703	Distributed Systems	3	0	0	3
3.	DEL704	Data Preparation and Analysis	3	0	0	3
4.	DEL705	Machine Learning	3	0	0	3
5.	DEL706	Recommender System	3	0	0	3
6.	DEL707	Data Storage Technologies and Networks	3	0	0	3
7.	DEL708	Data Visualization	3	0	0	3
8.	DEL709	Big Data Analytics	3	0	0	3
9.	DEL710	Data Warehousing & Data Mining	3	0	0	3
10.	DEL711	Data Security and Access Control	3	0	0	3
11.	DEL712	Web Analytics and Development	3	0	0	3
12.	DEL713	Knowledge Discovery	3	0	0	3
13.	DEL714	GPU Computing	3	0	0	3
14.	DEL715	Cloud Computing	3	0	0	3
15.	DEL716	Distributed Databases	3	0	0	3

Audit Course						
Sl. No.	Course code	Course Name	L	T	P	C
1.	ACL701	English for Research Paper Writing	3	0	0	3
2.	ACL702	Disaster Management	3	0	0	3

3.	ACL703	Sanskrit for Technical Knowledge	3	0	0	3
4.	ACL704	Value Education	3	0	0	3
5.	ACL705	Constitution of India	3	0	0	3
6.	ACL706	Pedagogy Studies	3	0	0	3
7.	ACL707	Stress Management by Yoga	3	0	0	3
8.	ACL708	Personality Development through Life Enlightenment Skills.	3	0	0	3

Open Electives						
Sl. No.	Course code	Course Name	L	T	P	C
9.	OEL701	Business Analytics	3	0	0	3
10.	OEL702	Industrial Safety	3	0	0	3
11.	OEL703	Operations Research	3	0	0	3
12.	OEL704	Cost Management of Engineering Projects	3	0	0	3
13.	OEL705	Composite Materials	3	0	0	3
14.	OEL706	Waste to Energy	3	0	0	3

Walkthrough of Data Engineering Lab



The department of Data Engineering has dedicated and fully equipped laboratories with modern and sophisticated equipments. This stream is a new and exponentially growing field which consists of a set of tools and techniques used to extract useful information from data. For this, the lab consists of computer systems with High End Configuration and relevant licensed software installed on it. All computers are provided with the high-end Internet Facility.

The Lab has the following hardware and software as:

- Desktop Computers with Brief Specs as -Core i7, 10th Gen 8 Core, 16 GB RAM, ITB SSD, 23.8 inches, Display, Wi-Fi Enabled, Keyboard, Mouse, Window 10 Professional.
- Open Source Software like R, Python, RapidMiner
- Also has operating system platforms like Windows XP, Windows Server , flavours of Linux; different IDE's like .NET, JAVA, Visual Studio, Oracle and so on.
- Cloud technologies enable the evolution of data labs by allowing for increased versatility, remote access, and secure data monitoring and drive the advancement and cost-effectiveness of data labs. Our Lab is compatible with leading cloud providers such as AWS, and Azure, as well as on-premise installations.

The Lab runs continuously where students can have hands-on learning experience that accommodates learners with the right amount of foundational knowledge and a commitment to success. There is a constant attempt made by the department to provide state of the art resources in the lab to meet the demands of the project ideas requiring cutting edge technology.

Job Roles

Data has always been essential for making any kind of decision. The modern world is entirely data-driven, and without data-driven strategic planning and decision-making, not a single firm could exist. Due to data's priceless insights and trust, a number of professions in the sector today deal with it. They are :

Data Analyst: Data Analyst analyzes numeric data and uses it to help companies make better decisions.

Data Engineer: Data Engineer involved in preparing data. They develop, constructs, tests & maintain complete architecture.

Data Scientist: A data scientist analyzes and interprets complex data. They are data wranglers who organize (big) data.

Business Analyst: Identify business needs and challenges, translating them into solutions through data analysis, process improvement, and resource allocation.

Database Administrator: Manage, secure, and ensure the availability and performance of database servers, facilitating access to users and maintaining data integrity.

Data Architect: Design the blueprint of data management systems, ensuring scalable and efficient data infrastructure that supports organizational goals.

Machine Learning Engineer: Develop algorithms and models for tasks like image recognition and predictive analytics, collaborating with data scientists to apply insights from data.

Quantitative Analyst: Apply mathematical and statistical methods to financial markets, creating models for trend prediction, investment strategy evaluation, and risk assessment.

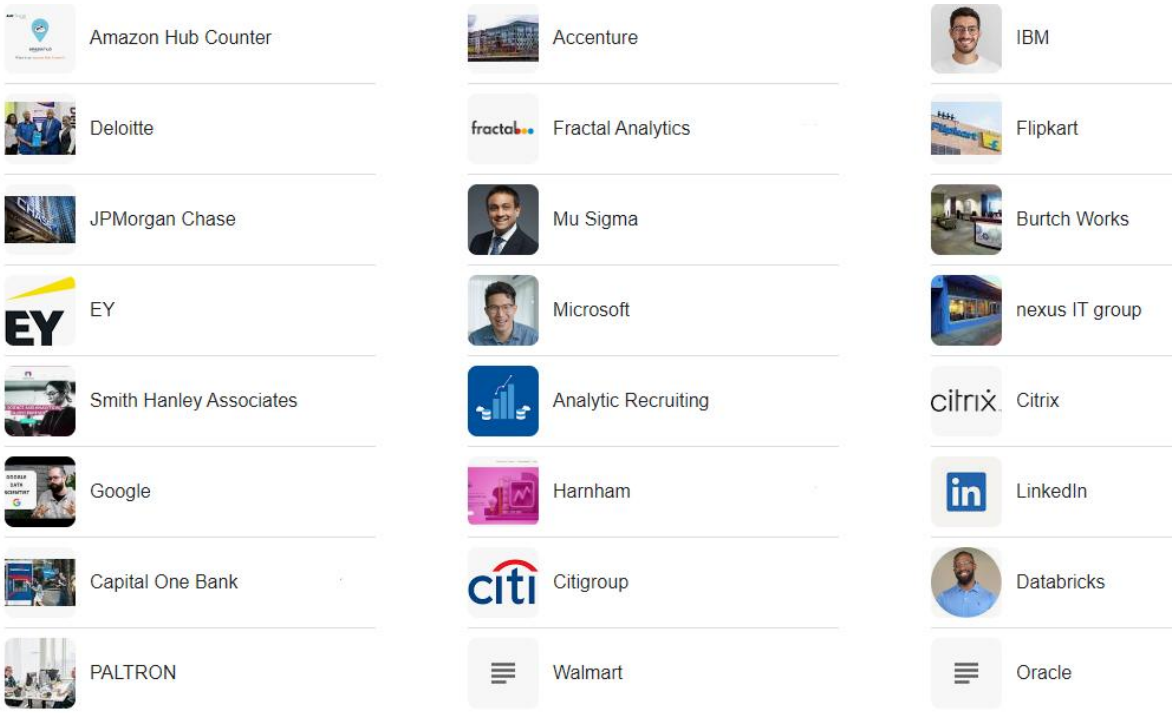
Data Mining Specialist: Use statistical and machine learning techniques to uncover patterns and insights in large datasets, supporting predictive analytics and decision-making.

Data Visualization Engineer: Specialize in converting data into visually appealing graphics, working with data analysts and business teams to tell stories with data.

Top Recruiters

Big data is transforming industries across the globe. As data increasingly help companies gain valuable insights and make more informed decisions, it's no surprise that data science jobs are also growing exponentially. Here is the list of top Data Science Recruiting companies in which one can apply for after completing the M.Tech course:

1. **Fractal Analytics**
2. **Amazon**
3. **Deloitte**
4. **LinkedIn**
5. **MuSigma**
6. **Flipkart**
7. **IBM**
8. **Accenture**
9. **Citrix**
10. **Myntra**
11. **Airtel X Labs:**
12. **JP Morgan**
13. **Oracle**
14. **Crayon Data**
15. **Paytm**
16. **PayPal**
17. **Mercedes Benz Research and Development**
18. **BG Consultants**
19. **PwC**
20. **Walmart**



Course Fees and Number of Seats

Fee Structure for the Academic year (2024-25)

No.	Particulars	Sem1	Sem2	Sem3	Sem4
1	Tution and Lab Fees	65,000/-	65,000/-	65,000/-	65,000/-
2	Caution Money	6,500/-	Nil	Nil	Nil
	Sub Total	71,500/-	65,000/-	65,000/-	65,000/-

Number of Seats: 18

Eligibility Criteria

Admission to M.Tech (Data Engineering) shall be made on the basis of merit of GATE Score in respective discipline. The candidates seeking admissions in M.Tech course must have passed B.E./B.Tech in any branch of engineering with 50% (45% for SC/ST & Disabled Persons Categories) marks.

For GATE Passed Candidates: For admission to M.Tech in Data Engineering, candidate must have passed GATE paper in CS/IT/ECE/EE.

For Non-GATE Passed Candidates: M.Tech in Data Engineering candidate must have passed B.E./B.Tech in Computer Sciences/ Information Technology/ Electronics and Communication Engineering/ Electronics and Instrumentation Engineering/ Information Communication Technology/ Electronics and Computer Engineering/Electrical and Electronics Engineering/ Electrical Engineering/ Mechanical Engineering or equivalent degree in Engineering with 50% (45% for SC/ST & Disabled Persons Categories) marks.

Hostel Facilities

NIELIT Ropar provides in-campus hostel accommodation for both boys and girls separately with a total capacity of 160 seats in each hostel with modern amenities. The hostels are secured by round-the-clock security guards at the entry gates.

Other Facilities

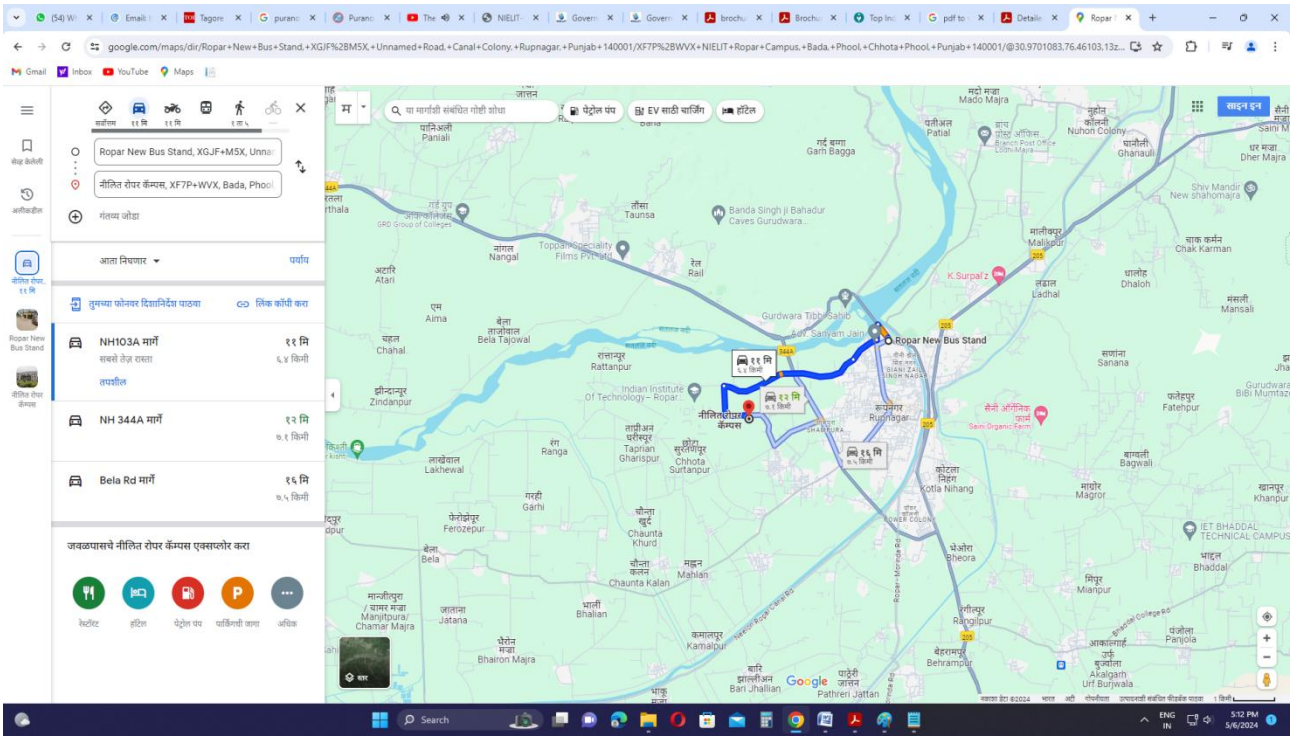
- NKN Connectivity
- 24x 7 Wi-Fi Campus
- IEEE Online Access
- Shodh Ganga Access
- ACM Online Access

Location and How to reach

Please scan the code above to get the location detail w.r.t to NIELIT Ropar Campus

By Auto /Taxi from Ropar Bus Stand

https://maps.app.goo.gl/eEcEqsxMyetwy5AA6



By Auto /Taxi from Ropar Railway station

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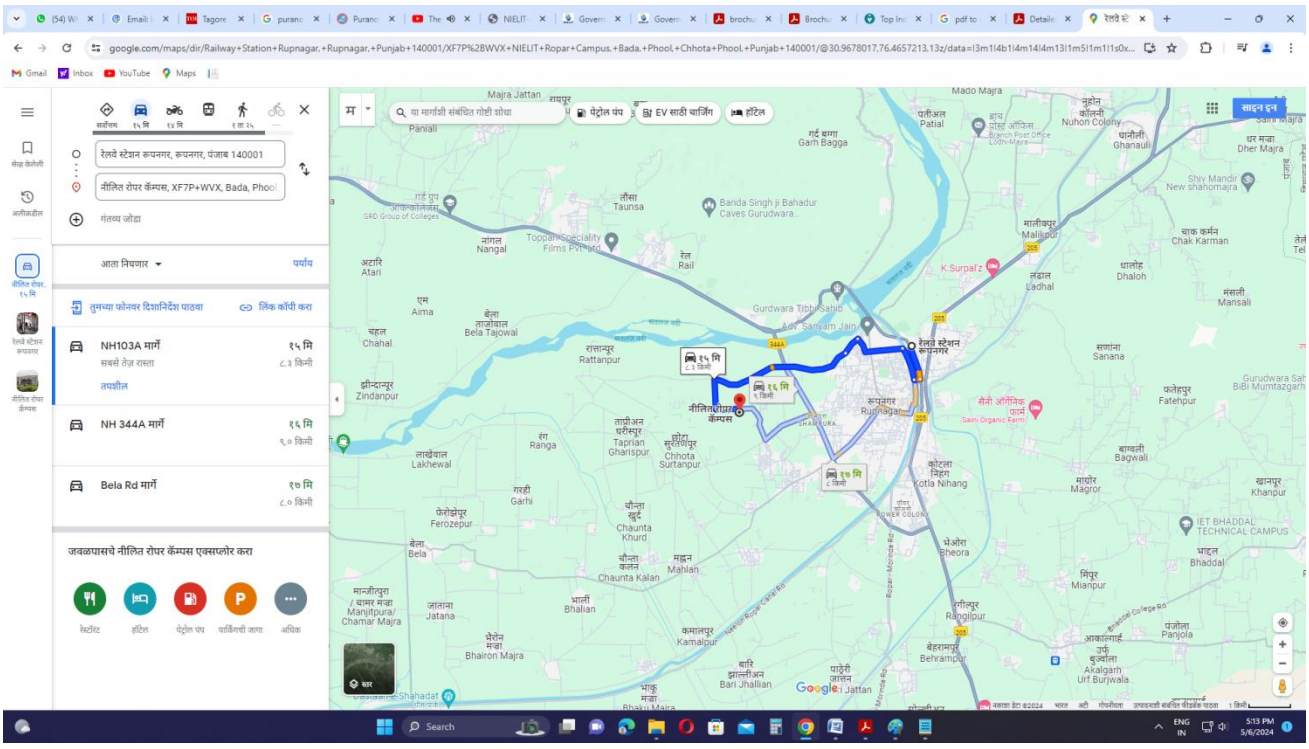

By Airport

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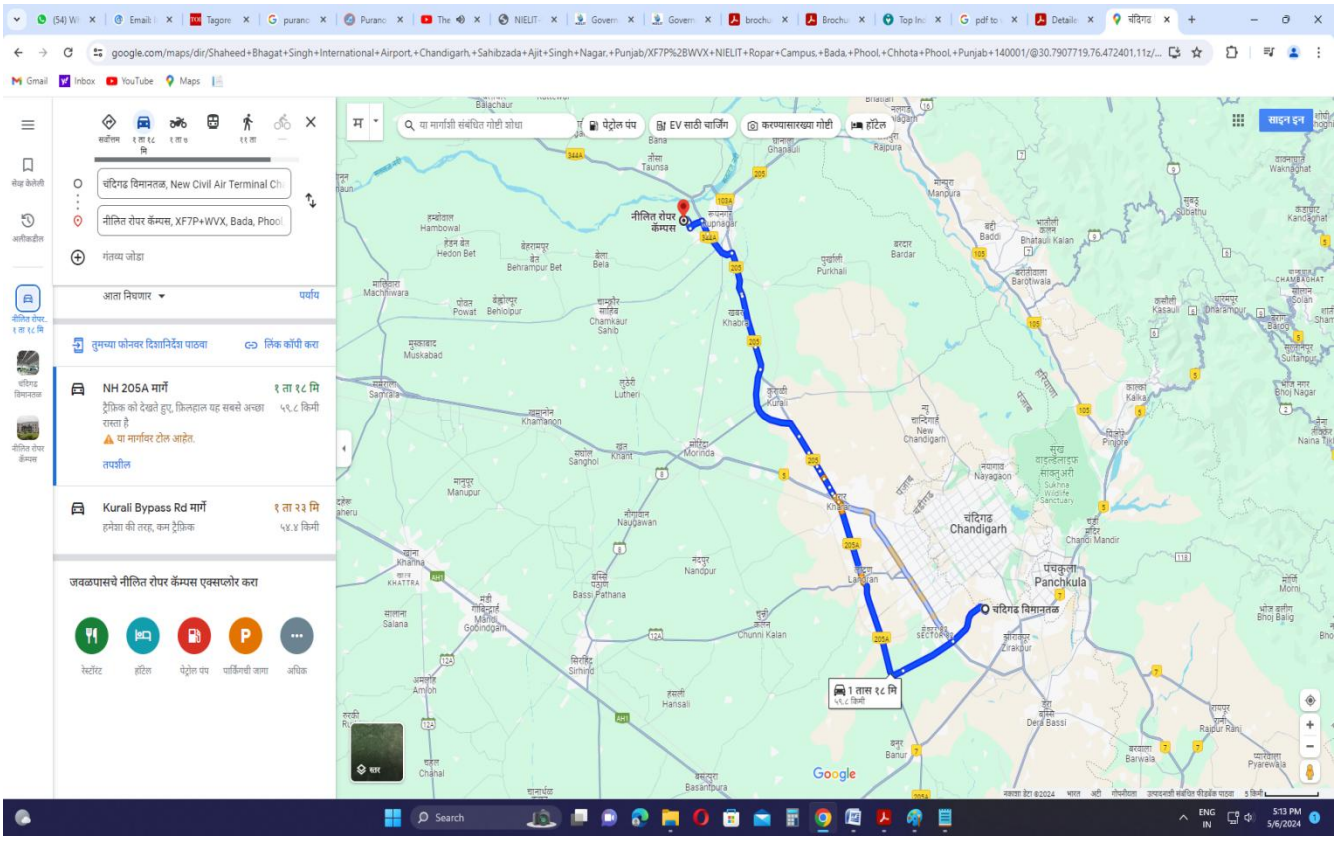

The nearest Airport is Shaheed Bhagat Singh International Airport which is situated at 55 kms away from the NIELIT Ropar Campus. One can reach the venue by hiring a taxi from the airport.

Important Contact Details

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