Proposal for B.Tech.

in

Agricultural Engineering with Data Analytics

School of Civil and Environmental Engineering

Indian Institute of Technology Mandi

Form for proposal of New Programme

Name of the New Proposed Program: B.Tech. in Agricultural Engineering with Data Analytics

I. General Information:

Name (s) of prosper schools/centres **School of Civil and Environmental Engineering**, **SMME, CAIR, and SBB** (in case of interdisciplinary program, please mention all schools/centres names)

II. Program Description:

A. Provide a justification/rationale for the program. How does the program relate to the mission of the IIT Mandi?

The Bachelor of Technology (B.Tech.) in Agricultural Engineering with Data Analytics is designed to build a strong foundation in agricultural sciences while emphasizing engineering applications relevant to evolving agricultural sector in India. The program integrates core areas such as farm machinery, Soil and Water Management Engineering, irrigation systems, post-harvest and food processing, along with emerging domains like smart agriculture and data analytics. The aim is to develop a balanced curriculum that combines scientific understanding with practical, hands-on training to address real-world challenges in agriculture.

Agriculture continues to be central to India's economy, supporting livelihoods, ensuring food security, and contributing to rural development. However, increasing pressure on natural resources, climate variability, and the need for higher productivity demand a shift towards more efficient and technology-driven practices. In this context, agricultural engineering plays a critical role in improving resource use efficiency, mechanization, and value addition through processing and supply chain innovations.

The proposed program specifically addresses these needs by training students in key employment-oriented specializations—farm machinery and mechanization, soil and water management, food processing, and smart agriculture integrated with data analytics. These areas are directly aligned with current and future demands of the agricultural sector, including precision farming, sensor-based irrigation, AI-driven decision support systems, and automation in processing industries. Such skill sets will enable graduates to contribute effectively across industries, startups, government agencies, and research organizations.

With India rapidly adopting digital and smart farming solutions, there is a growing requirement for professionals who can bridge the gap between traditional agricultural practices and modern technological interventions. This program aims to produce graduates who are not only technically sound but also capable of applying

data-driven approaches to enhance productivity, sustainability, and profitability in agriculture.

In addition, the program will strengthen academic and research activities at IIT Mandi by fostering interdisciplinary learning and innovation. By focusing on both technological advancement and practical applicability, it is expected to contribute meaningfully to agricultural development in India while creating diverse employment opportunities for graduates in both public and private sectors.

B. SWOT analysis of the program

The SWOT analysis highlights how the proposed B.Tech. in Agricultural Engineering with Data Analytics can be effectively integrated within IIT Mandi's academic ecosystem, while identifying areas for strategic strengthening.

Strengths & Opportunities

- The program offers a strong interdisciplinary foundation, combining agricultural sciences with engineering and data analytics, aligned with emerging national priorities in smart and sustainable agriculture.
- The curriculum integrates key domains such as farm machinery, Soil and Water Management Engineering, food processing, and precision agriculture, ensuring both theoretical depth and practical relevance.
- Growing adoption of AI, IoT, and data-driven decision systems in Indian agriculture creates significant opportunities for graduates in industry, startups, and research.
- The program is well-positioned to leverage IIT Mandi's existing strengths in engineering, data science, and interdisciplinary research, fostering innovation in agri-tech solutions.
- Strong potential to build collaborations with agri-tech companies, farm equipment industries, irrigation sectors, and food processing units, enhancing internships, projects, and placements.
- Integration of UG research (e.g., B.Tech. Honors) provides early exposure to innovation, entrepreneurship, and real-world problem solving.

Areas for Development (Weaknesses & Mitigation)

- There is an opportunity to further strengthen dedicated teaching and experimental facilities (e.g., farm machinery labs, soil-water labs, smart agriculture testbeds) to enhance hands-on learning at the undergraduate level.

- Expansion of core faculty expertise in specialized areas such as smart agriculture, agricultural automation, and food processing will deepen the program's academic strength and reduce reliance on shared teaching resources.
- Awareness among students regarding career pathways in Agricultural Engineering with Data Analytics can be enhanced through targeted outreach, industry interaction, and showcasing successful career trajectories.
- Building a structured and sustained network with key employment sectors—including farm equipment manufacturing, irrigation systems, food processing industries, agri-startups, and digital agriculture companies—will further strengthen placement outcomes.

These areas can be systematically strengthened by establishing well-equipped undergraduate teaching laboratories aligned with key specializations, including farm machinery and automation, Soil and Water Management Engineering, food processing, and smart agriculture with data analytics. Such facilities will support hands-on training, experimental learning, and exposure to technologies such as sensor-based systems, IoT-enabled devices, and data-driven decision tools. In parallel, recruitment of faculty with expertise in precision agriculture, agricultural automation, irrigation engineering, post-harvest processing, and agricultural data analytics will further consolidate the core strength of the program and reduce reliance on associated faculty from other Schools.

While awareness about career pathways in Agricultural Engineering with Data Analytics is still evolving, the proposed curriculum—through its integration of technical training, domain-specific specializations, and data analytics skills—is well-positioned to enhance student employability across multiple sectors. Graduates will be equipped for roles in farm machinery industries, irrigation and water management companies, food processing and supply chain sectors, agri-tech startups, and digital agriculture platforms. To further strengthen placement outcomes, focused efforts will be made to build sustained collaborations with these sectors, including industry partnerships, internships, field-based projects, and startup engagement within the agri-tech ecosystem.

C. Justification with respect to National Education Policy (NEP) mandates

The proposed B.Tech. program in Agricultural Engineering with Data Analytics is closely aligned with the core principles of the National Education Policy (NEP) 2020, particularly its emphasis on multidisciplinary education, experiential learning, skill development, and research-driven innovation. The program is designed to integrate agricultural sciences,

core engineering disciplines, and data analytics, thereby addressing NEP's vision of breaking rigid disciplinary boundaries and promoting holistic technical education.

In line with NEP's focus on competency-based learning and critical thinking, the curriculum incorporates hands-on laboratory training, field-based experimentation, data-driven problem solving, and project-based learning. Students will be trained in applying analytical tools, sensor-based systems, and computational approaches to real-world agricultural challenges such as resource optimization, yield prediction, irrigation scheduling, and post-harvest management.

The program also supports national priorities by aligning with key government initiatives and missions, including:

Digital Agriculture Mission (India) – through training in AI, IoT, remote sensing, and data-driven decision support systems for precision farming.

National Mission on Sustainable Agriculture (NMSA) – by focusing on soil and water management, climate-resilient practices, and efficient resource utilization.

Doubling Farmers' Income initiatives – through mechanization, value addition, and improved supply chain efficiency via food processing and post-harvest technologies.

Atmanirbhar Bharat and Startup India – by promoting innovation, entrepreneurship, and agri-tech startup development in areas such as smart farming and automation.

Furthermore, the program incorporates flexibility in curriculum structure, including elective specializations in farm machinery, Soil and Water Management Engineering, food processing, and smart agriculture with data analytics, which is consistent with NEP's recommendations on student choice, multiple exit options, and interdisciplinary mobility. The inclusion of undergraduate research, innovation projects, and industry engagement also aligns with NEP's goal of strengthening the research ecosystem at the undergraduate level.

By combining domain knowledge with emerging technologies, the program prepares graduates to contribute effectively to national agricultural transformation, while also enabling pathways for higher education, research, and employment across agri-tech industries, government sectors, and innovation ecosystems.

D. Provide a mission statement for the program. Include educational and learning objectives

Mission Statement

The B.Tech. program in Agricultural Engineering with Data Analytics aims to develop engineers with strong foundations in agricultural systems, engineering design, and data-driven decision-making, capable of addressing contemporary challenges in Indian agriculture. The program focuses on building expertise across key specializations—farm machinery and automation, Soil and Water Management Engineering, food processing and

post-harvest systems, and smart agriculture integrated with data analytics—to enhance productivity, resource-use efficiency, and sustainability. Through a combination of rigorous coursework, hands-on laboratory and field training, and research-driven learning, the program seeks to produce graduates who can contribute effectively to industry, government, research, and entrepreneurial ecosystems.

Educational and Learning Objectives

Graduates of the B.Tech. in Agricultural Engineering with Data Analytics program will be able to:

- **Farm Machinery and Automation:**
  Design, evaluate, and optimize agricultural machinery and mechanized systems using engineering principles, while integrating automation, sensors, and control systems to improve operational efficiency and reduce labor dependency.
- **Soil and Water Management Engineering**
  Analyze and manage soil–water systems through hydrological modelling, irrigation design, and resource optimization, applying data analytics for precision irrigation scheduling, water-use efficiency, and climate-resilient agriculture.
- **Food Processing and Post-Harvest Engineering:**
  Develop and improve processing, storage, and value-addition systems, ensuring quality, safety, and supply chain efficiency using process engineering principles and data-driven monitoring systems.
- **Smart Agriculture and Data Analytics:**
  Apply AI, machine learning, remote sensing, and IoT-based systems for crop monitoring, yield prediction, decision support, and precision farming, enabling data-informed agricultural management.
- **Interdisciplinary Problem Solving and Innovation:**
  Work effectively across disciplines to develop integrated agricultural solutions, combining engineering design, biological systems understanding, and computational tools.
- **Research, Entrepreneurship, and Leadership:**
  Engage in research, product development, and startup-oriented innovation, contributing to agri-tech ecosystems and advancing solutions with economic, environmental, and societal impact.
- **Sustainability and National Relevance:**
  Address challenges related to food security, sustainable resource management, and climate resilience, aligned with national priorities and global sustainability goals.

E. Credit Structure of the programme

Division	Sub-division	Credits
Institute Core	IC Compulsory	32
	IC Baskets	6
	HSS	12
	IKSHMA	3
Discipline	Discipline Core	49
	Discipline Electives	17
Electives	Free Electives	22
	*FDP+DP+MTP + ISTP or Equivalent	19
	Total	**160**

The credit structure will be followed as per the existing norms of the institute. Out of 160 credits, 49 credits will be dedicated to discipline courses. Total of 17 credits will be assigned for discipline electives wherein few optional baskets will be introduced for promoting B.Tech. Specialization for 15 credits. Total of 66 credits will be maintained for DC (49 credits) and DE (17 credits) courses while the rest of the credits will be kept for IC and other institute level

courses (90 credits).

F. List of courses proposed

IC Courses / Basket	Core Courses	Discipline Electives
1. Internship 2. Complex and Vector Calculus 3. Linear Algebra 4. ODE & Integral Transforms 5. Graphics for Design 6. "Introduction to Python and Data Science	16. Hydraulic Engineering 17. Hydraulic Engineering Lab 18. Soil Science and Mechanics 19. Surveying Traditional and Digital 20. Farm Machinery & Equipment 21. Irrigation and Hydraulic Structure	1. Heat transfer and lab 2. Engineering Thermodynamics 3. Remote Sensing and GIS 4. Sustainable Agriculture Waste Management

7. (Computing and Data Science/ Data Science I)"	22. Water Resources Engineering	5. Agricultural Risk Assessment
8. Applied Electronics	23. Crop Production Technology (Field & Horticulture crop)	6. Robotics and Drones in Agriculture
9. Applied Electronics Lab	24. IoT Systems and Clouds	7. Agricultural Information and Database Management system
10. Physics Practicum	25. Strength of Materials and Structure	8. Automated Climate Controlled Agriculture
11. Calculus	26. Strength of Materials and Structure Lab	9. Bio-process engineering
12. Probability and Statistics (Data Science II)	27. Theory and Design of Machine Elements	10. Food packaging
13. Machine Learning (Data Science III)	28. Food Science & Technology	11. Tractor and Power System
14. Environmental Science	29. Food Science & Technology Lab	12. Product Realization Technology
15. Mechanics of Rigid Bodies	30. Post-Harvest Engineering	13. Soil water conservation Engineering
	31. Self-Sufficient Farming (Natural Farming)	14. Smart Automation in Agriculture
	32. Control Systems Engineering	15. Smart Automation in Agriculture – Open Field Lab
	33. Civil Engineering Drawing	16. Smart Automation in

		Agriculture – CCA Lab

G. Provide a list of any current courses that would be cross-listed with the program:

1. Water Resources Engineering
2. Hydraulic Engineering and Lab
3. Surveying Traditional and Digital
4. Irrigation Engineering and Hydraulic Structure
5. Civil Engineering Drawing
6. Heat transfer and lab
7. Engineering Thermodynamics
8. Remote Sensing and GIS
9. IoT Systems and Clouds
10. Control Systems Engineering
11. Strength of Materials and Structure
12. Strength of Materials and Structure Lab
13. All IC and IC basket courses are the same as SCENE

H. What, if any, new courses will be required for the program? A separate course proposal is required for each new required course.

Being a new B.Tech. program, around 20 new courses will be proposed with required
details. At the same time, some of the existing courses in the subject of Civil and environmental Engineering, Mechanical Engineering and Computer and Electrical Engineering will be adopted as per the requirement. Separate course proposals are being prepared and will be submitted in the due course.

I. Provide a sample academic plan for students completing the academic program being proposed.

SEMESTER 1			
Sl. No.	**Course Code**	**Course Name (Place Holder)**	**Credits**
1	IC140	Graphics for Design	4
2	IC112	Calculus	2
3	IC113	Complex and Vector Calculus	2
4	IC152	Introduction to Python and Data Science (Data Science I)	4
5	IC230	Environmental Science	3

6	HSXXX/IKXXX	HSS Course/IKSHMA Course	3
		Total Credit	**18**
	Industrial Visit		Pass/Fail
Semester 2			
Sl. No.	**Course Code**	**Course Name (Place Holder)**	**Credits**
1	IC114	Linear Algebra	2
2	IC115	ODE & Integral Transforms	2
3	IC161	Applied Electronics	3
4	IC161P	Applied Electronics Lab	2
5	IC240	Mechanics of Rigid Bodies	3
6	IC252	Probability and Statistics (Data Science II)	4
7	IKXXX/HSXXX	IKSHMA Course/HSS Course	3
		Total Credit	**19**
	Industrial Visit		Pass/Fail
Semester 3			
Sl. No.	**Course Code**	**Course Name**	**Credits**
1	AGXXX	Crop Production Technology	3
2	AGXXX	Soil Science and Mechanics	4
3	CE301, CE301P	Strength of Materials and structure	4
4	IC272	Machine Learning (Data Science III)	3
5	DE-1	DE (Engineering Thermodynamics)	4
6	AGXXX	Farm Machinery and Equipment	3
7	IC201P	Design Practicum	3
		Total Credits	**24**
	Industrial Visit		Pass/Fail
Semester 4			
Sl. No.	**Course Code**	**Course Name (Place Holder)**	**Credits**
1	CE201	Surveying Traditional and Digital	4
2	CE251	Hydraulics Engineering	3
3	AGXXX/EE301	Control system Engineering	4
4	AGXXX	Theory and Design of Machine ELEMENTS	4
5	CE304P	Hydraulics Engineering Lab	1

6	HSXXX	HSS Course	3
7	IC-222P	Physics Practicum	2
		Total	21
	Industrial Visit		Pass/Fail

SEMESTER 5

Sl. No.	Course Code	Course Name (Place Holder)	Credits
1	CE303	Water Resources Engineering	3
2	CE451	Irrigation and Hydraulic Structure	3
3	CS541P	IoT Systems and Clouds	3
4	AGXXX	Food Science and Technology and Lab	4
5	CE353P	Civil Engineering Drawing	1
6	HSXXX	HSS Course	3
7	AGXXX	Self-Sufficient Farming (Natural Farming)	2
8	FE-1	Free Elective	3
		Total Credit	**22**

After Semester 5

Sl. No.	Course Code	Course Name (Place Holder)	Credits
1	IC 010	Internship	2

Semester 6

Sl. No.	Course Code	Course Name	Credits
1	FE-2	Free Elective	3
2	DE-2	DE (Smart Automation in Agriculture, Theory, Open Field Lab, CCA Lab)	4
3	AGXXX	Post-Harvest Engineering	3
4	DE-3	DE(Soil and water conservation Engineering)	3
5	FE-3	Free Elective	3
6	DP301P or Equivalent	ISTP or FE	4

7	DE-4	Discipline Electives	3
		Total Credits	**23**
Semester 7			
Sl. No.	**Course Code**	**Course Name**	**Credits**
1	DE-5	Discipline Elective	3
2	FE-4	Free Elective	4
3	HSXXX	HSS Courses	3
4	FDP*/DE-6	FDP/DE	4
5	CE498P or Equivalent	Major Technical Project (MTP-I) or DE	3
		Total Credits	**17**
Semester 8			
Sl. No.	**Course Code**	**Course Name (Place Holder)**	**Credits**
1	FE-5	Free Elective	3
2	FE-6	Free Elective	3
3	FE-7	Free Elective	3
4	CE499P or Equivalent	Major Technical Project (MTP-II) or DE	5
		Total Credits	14

- **Instead of FDP students can opt for DE.**

Discipline Electives

1. Heat transfer and lab
2. Engineering Thermodynamics
3. Remote Sensing and GIS
4. Sustainable Agriculture Waste Management
5. Agricultural Risk Assessment
6. Robotics and Drones in Agriculture
7. Agricultural Information and Database Management system
8. IoT Systems and Clouds
9. Computer Network
10. Automated Climate Controlled Agriculture
11. Bio-process engineering
12. Food packaging

13. Tractor and Power System

J. If established at other institutions, please submit sample programs from those institutions.

1. In what ways is this proposal consistent with those programs?

The proposed B.Tech. in Agricultural Engineering with Data Analytics is consistent with established programs such as the B.Tech. in Agricultural and Food Engineering at IIT Kharagpur, while introducing targeted enhancements in data-driven and digital agriculture.

Both programs retain a strong foundation in core engineering sciences, including engineering mechanics, thermodynamics, fluid mechanics, heat and mass transfer, and machine design, which form the analytical base for agricultural systems engineering. The proposed curriculum similarly incorporates soil science/soil mechanics, hydrology, and irrigation engineering, aligning with IIT Kharagpur's well-established emphasis on soil–water–plant relationships and water resource management.

In terms of domain-specific training, there is clear alignment in the inclusion of farm machinery and power, irrigation and drainage engineering, and food engineering/food process engineering. IIT Kharagpur's program emphasizes design and performance evaluation of agricultural machinery, irrigation system design, watershed management, and unit operations in food processing, all of which are retained in the proposed program with comparable depth.

The academic structure in both programs follows a progressive learning approach, beginning with basic sciences (mathematics, physics, chemistry) and core engineering courses in the initial semesters, followed by discipline-specific courses and design-oriented subjects in later semesters. Laboratory and field-based components are integral in both cases, including farm machinery labs, Soil and Water Managment Engineering labs, and food processing laboratories, ensuring hands-on skill development.

The IIT Kharagpur curriculum also integrates interdisciplinary exposure through courses related to electronics, instrumentation, and environmental engineering, particularly in areas such as measurement systems, control, and environmental impact assessment. The proposed program builds on this structure by embedding data analytics, AI/ML applications, sensor-based systems, and IoT-enabled agriculture within these traditional domains, thereby extending rather than replacing the existing framework.

Another point of alignment is the inclusion of engineering drawing, workshop practices, and design courses, which are essential for developing practical engineering competencies. Both programs also recognize the importance

of food systems and post-harvest engineering, maintaining courses on food preservation, processing, and storage technologies.

Where the proposed program differs is in its systematic integration of data analytics across all core specializations—for example, applying data-driven approaches to machinery optimization, irrigation scheduling, crop monitoring, and process control in food engineering. Additionally, the proposed curriculum places greater emphasis on smart agriculture, precision farming, and digital decision-support systems, reflecting current national priorities such as the Digital Agriculture Mission.

2. In what ways is this proposal different from those programs? Please explain those differences.

While the proposed B.Tech. in Agricultural Engineering with Data Analytics retains the core structure of established programs such as IIT Kharagpur, it introduces several structural and curricular distinctions to address emerging needs in digital and data-driven agriculture.

A key difference lies in the systematic integration of data analytics and computational tools across the curriculum. In addition to foundational engineering subjects, the proposed program includes programming (e.g., Python), data analysis, machine learning fundamentals, and AI applications, with explicit linkage to agricultural use-cases such as yield prediction, irrigation scheduling, sensor data interpretation, and decision-support systems. In contrast, while IIT Kharagpur includes elements of instrumentation and modeling, these digital components are not uniformly embedded across all agricultural engineering domains.

The proposed program also introduces a structured specialization framework, organizing advanced coursework into four focused areas:
(i) Farm Machinery and Automation, (ii) Soil and Water Management Engineering, (iii) Food Processing and Post-Harvest Engineering, and (iv) Smart Agriculture.

While IIT Kharagpur offers electives across similar domains, the proposed structure provides a more explicit and guided pathway for domain-specific skill development, particularly integrating data analytics within each specialization.

Another distinction is the explicit inclusion of emerging technologies in agriculture, such as IoT-based monitoring systems, remote sensing applications, automation, robotics in agriculture, and controlled-environment agriculture. These topics are introduced not as standalone additions but as extensions of core engineering subjects, ensuring their application in real-world agricultural systems.

The proposed curriculum also places relatively greater emphasis on data-driven and precision agriculture approaches, including sensor-based irrigation, spatial data analysis, and AI-enabled crop management, reflecting recent national initiatives in digital agriculture. This represents an evolution from a primarily systems-design focus to a systems + data integration approach.

In terms of training structure, the program strengthens experiential learning components through structured internships, field-based projects, and integration of undergraduate research, particularly linked to agri-tech innovation and industry applications. While IIT Kharagpur includes project work and practical training, the proposed program formalizes these components with clearer alignment to industry sectors and emerging technology domains.

Additionally, the curriculum incorporates a more structured set of interdisciplinary and skill-based courses, including communication, management, and innovation-oriented electives, aimed at improving industry readiness and entrepreneurial capability, especially within the agri-tech ecosystem.

II. **Faculty and Governance:**

Provide a list of the faculty available to teach courses for this program.

1. Dr. Ranjeet Kumar Jha (SCENE)
2. Dr. Dericks P Shukla (SCENE)
3. Dr. Vivek Gupta (SCENE)
4. Dr. Aliva Nanda (SCENE)
5. Dr. Uday V Kala (SCENE)
6. Dr. Harshad K. Kulkarni (SCENE)
7. Dr. Sayantan Sarkar (SCENE)
8. Prof. Atul Dhar (School of Mechanical and Materials Engineering)
9. Dr. Tushar Jain (School of Computing and Electrical Engineering)
10. Prof. Shyam K. Masakapalli (School of Biosciences and Bioengineering)
11. Dr. Radhe Shyam Sharma (School of Computing and Electrical Engineering)
12. Dr. Amit Shukla (CAIR)

In case of interdisciplinary program, mention governances and execution mechanism of the programme:

Agricultural Engineering with Data Analytics program is an interdisciplinary program and a good number of the allied courses will be taught by faculty members from Civil Engineering, Environmental Engineering, Mechanical Engineering, and Computer Science. While the core faculty in SCENE will take a lead in governance and overall coordination, the associated faculty members from other streams will be contributing to teaching activities as per the need and their availability to bring out the best in this interdisciplinary program. Recruitment of around a few more faculty members in the area of Agricultural Engineering with Data

Analytics with expertise on smart agriculture, precision farming, agricultural automation, and other advanced areas are needed in the next few years.

III. Student interest: What measures of student interest in the program are there? How/why are the proposers convinced that students would want to take this program of study? (Attach Career and Placement Cell recommendation or any other)

Student interest in the proposed B.Tech. in Agricultural Engineering with Data Analytics is supported by both emerging academic trends and evolving career opportunities at the intersection of agriculture, engineering, and data sciences.

At the undergraduate level, there is a clear and growing preference among students for interdisciplinary programs that combine core engineering with computational and data-driven skills. The proposed program directly aligns with this trend by integrating agricultural engineering domains (farm machinery, soil and water systems, food processing) with programming, data analytics, and AI-based applications. This combination is particularly relevant for students seeking careers that are both technically rigorous and socially impactful, especially in areas such as food systems, climate resilience, and sustainable resource management.

From a career perspective, multiple sectors are actively creating demand for such skill sets. These include:

Agri-tech startups and digital agriculture platforms (AI-based advisory systems, precision farming solutions)

Farm machinery and automation industries (equipment design, sensor integration, robotics)

Irrigation and water resource companies (data-driven irrigation and watershed management)

Food processing and supply chain industries (process optimization, quality monitoring, cold-chain systems)

Government and development sectors (projects related to Digital Agriculture Mission, climate-resilient agriculture, and resource management).

The inclusion of four structured specialization pathways—Farm Machinery and Automation, Soil and Water Engineering, Food Processing, and Smart Agriculture with Data Analytics—provides students with clear and differentiated career tracks, which is a key factor influencing program choice at the undergraduate level. Unlike general programs, this structure allows students to align their academic pathway with specific industry domains.

In addition, the program incorporates computational and data science training (programming, data analysis, and AI/ML applications), which significantly broadens

employability. Graduates will not only be suited for core agricultural engineering roles but will also be competitive for data-driven roles in technology companies, analytics firms, and software-related sectors, addressing a key concern among students regarding career flexibility.

The program is further strengthened by planned internships, industry-linked projects, and undergraduate research opportunities, which provide early exposure to real-world applications and improve placement readiness. This practical orientation is an important factor in attracting students to emerging interdisciplinary programs.

Resources:

Additional Financial and Space Implications

Year	Semester	Lab Development required	Space required	Fund Required for development
1st	1.	Nil	Nil	Nil
	2.	Nil	Nil	Nil
2nd	3.	Yes	500 m^2	Instrument – 4.81 crore
	4.	Nil	Nil	Nil
3rd	5.	Yes	1000 m^2	Instrument – 6.18 crore
	6.	Yes	500 m^2	Instrument – 1.9 crore
4th	7.	Yes	Nil	Nil
	8.	Nil	Nil	Nil
		Total Budget required for instrument		**12.89 crore**

- Total space requires to be developed for Agricultural Engineering with Data Analytics around = 2000 m^2
- A dedicated building is in planning stage in south campus estimated cost is prepared based on plinth area according to CPWD norms = 14 Cr approximately
- Total budget required to be developed for agriculture engineering around = 12.89 +14 = **26.89 crore**

Additional requirements of faculty and non-teaching staff (Numbers and justification)

1. Around a few more faculty members with engineering background are needed to cater to the broad curriculum with a large number of elective courses.
2. For laboratory management, One Technical Officer and around Four lab assistants are needed.

IV. Origin and development of the proposal:

- Please mention the name for faculty involved in developing this proposal.
  1. Dr. Ranjeet Kumar Jha

- **Details of external industry experts and their recommendations (please include their evaluation)**
  1. Ashutosh Pandey, Assistant Director - Analytics & Modeling, Moody's.
  2. Aseem Garg, Consultant, Deloitte Touche Tohmatsu India LLP.

Detailed comments and their reply are given in the Appendix.

- **Details of external academia experts and their recommendations (please include their evaluation):**

1. Dr. Adarsh Kumar, Principal Scientist, Indian Council of Agricultural Research (ICAR), New Delhi, India.
2. Dr. Shyam Narayan Jha, Dy. Director General, ICAR
3. Prof. Sudhanshu Panda, Professor, University of North Georgia, USA.
4. Prof. Madan K. Jha, IIT KGP
5. Prof Chandranath Chatterjee, IIT KGP

Detailed comments and their reply are given in the Appendix.

- Proposers' faculty name and their signatures:

Name of Faculty members	**Signatures**
1. Dr. Ranjeet Kumar Jha	
2. Dr. Rajneesh Sharma	
3. Prof. Dipankar Deb	
4. Dr. Radheshyam Sharma	

- Technical Supporting Officers

Name	Signatures
1. Dr. Hemant Thakur	

Recommendations of Chairperson of School/ Centre

Signature with Date:

Dean (Students) recommendations on availability of hostels and other requirements:

Signature with Date:

Associate Dean (Courses) recommendation on class rooms availability and other academic infrastructure requirements:

Signature with Date:

Dean Finance recommendation on financial aspects (if any)

Signature with Date:

Dean Academics recommendations:

Recommended/Not Recommended

Signature with Date:

Appendix:

Industry experts:

1. Ashutosh Pandey, Assistant Director - Analytics & Modeling, Moody's.

Comment 1: If "Linear Algebra" is not already part of the core structure, I highly recommend including it as a core course, as it is fundamental to the subject.

Response: Linear Algebra is already being taught under IC Core course (IC 114).

Comment 2: If partial differential equations (PDEs) are not included in the curriculum, they should be integrated into the Calculus course to enhance mathematical foundations. It could be a basic introduction, instead of a deep course structure.

Response: PDEs is already included in our calculus curriculum.

Comment 3: 2-part course structure for industry relevancy:

Fundamentals of Data Science and AI in Agriculture - Semester 5 or 6 - Core Course

Applied Data Science in Agriculture - Semester 7 or 8 (Project Based) – Elective

Response: We already have dedicated courses to AI and ML (Data Science I,II, and III).

2. Aseem Garg, Consultant, Deloitte Touche Tohmatsu India LLP.

Comment 1: Having reviewed the curriculum, I would like to suggest the inclusion of two critical subjects as Discipline Electives: IoT Systems and Cloud Computing and Robotics and Drones in Agriculture

Response: These two courses are included in the DC/DE.

Academia experts

1. **Dr. Adarsh Kumar, Principal Scientist, Indian Council of Agricultural Research (ICAR), New Delhi, India.**

Comment 1:

The curriculum is perfect, maybe you can consider the following observation.

Table 2: List of IC Compulsory Courses

Introduction to Agricultural Engineering with Data Analytics- 2 CREDITS

Response: Initially, we added it to the IC course, but unfortunately, the IC courses can't be modified. As students gain exposure to courses across various specializations, they will develop deeper insights into Agricultural Engineering with Data Analytics. However, due to the current credit limitations, it is not feasible to accommodate this within the existing program structure.

Comment 2: Sensors must be part of "Smart Automation in Agriculture." Table 5: Discipline Core Courses.

Response: We have already added the suggested component in the listed DC/DE courses (AGXXX-Smart Automation in Agriculture).

Comment 3: Agricultural Risk Assessment can be a "Technology/technique for Agricultural Risk Assessment" (Table 6: Discipline Electives)

Response: The course name will be modified with discussion with the course development team.

2. Dr. Shyam Narayan Jha, Dy. Director General, ICAR

Comment 1: Total credits of 160 appears little low. Around 180 for IIT KGP and 6th Deans Committee report being followed in all Agricultural University).

Response: The course credit distribution for the proposed program follows the institute policy, maintaining a uniform credit structure across all schools.

Comment 2: Under IC group I do not see any course on modern fabrications/manufacturing (course being offered to other B.Tech. Engg. may be taken for here too).

Response: We have added Product Realization Technology (IC141 –Revised) in departmental electives.

Comment 3: Basic electronics (particularly basic theory and fabrications practical should be kept for modern age Agricultural Engineer)

Response: This course is already being offered under IC Core course – Applied Electronics (IC 161).

4) Under Discipline core courses

Comment 4a: The Two subjects i)Crop Production Technology - I (Field crops) & ii) Crop Production Technology - II (Horticultural crops) may be modified as i) Crop Production Technology - I (Field and Horticultural crops) & ii) Livestock Production Technology - II
Comment 4b: The courses on natural farming may be omitted. Even B.Sc Ag (6th Deans Committee) has only 2 credit hour course. These may be covered in Crop/animal production technologies courses as a module. Instead of these, courses on heat and mass transfer and unit operations needs to be added with 4 credits.

Response: The proposed program has been holistically designed to help students understand agricultural ecology, promote the principles of sustainable agriculture, and recognize the health and environmental impacts of food production. In this context, Natural Farming is a critical component and must be included to equip students with knowledge of ecologically sound and resource-efficient farming practices.

Comment 4c: In farm machinery two courses one on Farm machinery design and another on Dynamics of soil tillage and traction need to be added. Courses on tractors engines, loads etc need to be added.

Response: Farm machinery design will be covered under Theory and Design of Machine Elements course, and other components will be part of discipline elective course - Tractor and Power System.

Comment 4d: Principle of soil sciences and Soil mechanics have to be covered somewhere.

Response: The suggested course will be taught as a discipline core.

Comment 4e: Irrigation wells and pumps, Soil and Water Conservation Structures need to be added.

Response: These two courses will be covered under Irrigation Engineering and Hydraulic Structures, and Soil and Water Conservation Engineering, respectively.

Comment 4f: Food Safety and quality courses covering its basics and their determinations techniques (including nondestructive methods).

Response: This component is already part of the discipline core course – Food Science & Technology.

Comment 5: In Discipline electives: A course of Bioprocess Engg of 3 credits may be thought of to deal with secondary agriculture and high value addition.

Response: The suggested course is already part of the discipline elective.

Comment 6: A course on Instrumentation and process controls of 3 or 4 credits may be added.

Response: This component will be covered under Basic Electronics Lab, which is an IC Core course.

Comment 7: For name of Degree, I will suggest to have "Agricultural & Food Engineering" as in IIT Kharagpur. Hope attached file will help you finalize soon. Even if any thing requires, let me know.

Response: The final name of the degree program will be determined in consultation with the Board of Academics (BoA), taking into account employment opportunities and ensuring that the chosen title aligns with student career prospects.

3. Prof. Sudhanshu Panda, Professor, University of North Georgia, USA.

Comment 1: In the Institution Compulsory, I have added a NEW course, Natural Geohazards Proactive Management DSS. For IIT Mandi should be pioneer in developing this course because of its natural, geospatial, and environmental association in present day climate change scenario…It should be taught to all program majors…Agriculture Engineering Program must develop it.

Response: This suggestion will be duly considered for the development of a future development of an IC Course, potentially benefitting students across all programs, including this proposed program in Agricultural Engineering with Data Analytics.

Comment 2: In HSS/ISTP, MTP section, I have added an Engineering Seminar course in Communicative Competence section. It would be 1 credit and all students must attend to learn how to review research literatures and know about research principles through invited faculties to each class…

Response: The suggested course is already part of HSS.

Comment 3: Discipline Core, I did not change anything…It is good and involve advanced courses that are necessary in present day innovation period…

Response: Thank you for your appreciation

Comment 4: In Discipline Elective, I have added few advanced courses, such as i) Precision Climate-Smart Agriculture, ii) GeoAI Spatial Modeling in Agriculture DSS Development or Plain GeoAI in Ag DSS courses as they are the evolving technology-based courses in Agriculture…Check notes…

Response: Precision Climate-Smart Agriculture will be taught under the specialization in smart agriculture and AI. Furthermore, GeoAI and DSS related components will be covered under Remote Sensing and GIS, Hydroclimatology, and other smart agriculture courses.

Comment 5: I have deleted Tractor and Power Systems as it is very old type course and also taken out Computer Network (Telemetry) and suggested to add to IoT Systems and Clouds (Ag Instrumentation sans heavy machinery like tractors, power tillers, hydraulic pumps, etc.) as both complement to each other and must be taught together. For Ag. Engineers, it is a MUST course and especially, in India, where we do not learn about instruments and its actual in-situ applications for Agricultural Management DSS development. Think about moving this course to the Discipline Core section…

Response: The developed course curriculum approach at IIT Mandi will first teach the students about Tractor and Power Systems, and then IoT systems and clouds will be taught under discipline elective. Therefore, interlinking of these courses will provide them from the fundamental concept of tractor and power to the advanced systems used in these farm machineries.

Comment 6: In Free Elective section, I have added two new courses, i.e., Watershed Characterization and Agro-ecosystems and they are very advanced courses needed in the Climate Change area.

Response: The suggested component will be covered under Soil and Water Conservation Engineering.

4. Prof. Madan K Jha, Professor & HOD, IIT Kharagpur

Comment 1: Keep in mind that students must take fundamental courses and core courses in Agricultural Engineering with Data Analytics.

Subjects like Soil Physics, Engineering Mathematics, Thermodynamics, Irrigation and Drainage Engineering, Soil and Water Conservation Engineering, Instrumentation Engineering, Surface Water Hydrology, Groundwater Hydrology, Surveying, and Soil Mechanics, etc., should be taught at the UG level along with Fundamentals of AI/ML and its application in Agriculture, Data Science, and Robotics.

Response: All these courses have been covered under DC/DE.

5. Prof. Chandranath Chatterjee, Professor, IIT Kharagpur

I had a look at your curriculum. It is well-designed and covers new subjects pertinent to the

new developments in the field of Agricultural Engineering with Data Analytics. I have a few observations:

Comment 1: The course 'Soil and Water Conservation Engineering' is under 'IC Basket Courses'. It doesn't look very appropriate here. It should be either in Discipline Core or Discipline Electives.

Response: The suggested course has been moved under the discipline elective courses.

Comment 2: There should be a 'BTP - Bachelor's Thesis Project'. It helps students to get insight into a particular topic in which they are interested.

Response: IIT Mandi is offering Thesis Project for Bachelor's program under MTP I and II.

Comment 3: There should be more number of subjects under 'Discipline Electives and Free Electives'. You can have a look at the new AgFE curriculum of IIT KGP.

Response: We will keep adding more number of Discipline Electives and Free Electives as the proposed program progresses.

Comment 4: Many Institutes are nowadays offering a 'Semester Away Internship Programme (SAIP)' to the students. The students can take a semester off from their Institute and have practical experience in an Industry or another Research Institute. This helps in providing a good exposure to the students.

Response: IIT Mandi also offers this program for B.Tech. students.

Action taken for the queries of BoG Chairman, IIT Mandi

Comment 1: Job placement status of IIT Kharagpur (Agricultural and Food Engineering) AGFE Department

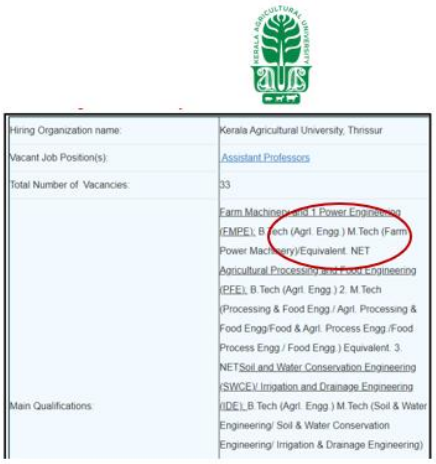
Response: *We have obtained the placement status of the AGFE Department, IIT Kharagpur, and provided in the following slide.*

Department	Year	Degree	Placement (%)
Agriculture & Food Engineering	2019-20	B.Tech.	72
	2020-21		77
	2021-22		71
	2022-23		42

	2023-24		58

Comment 2: The Department name should be according to the Government Organization's requirement.

Response: *Thank you for the suggestion, Sir! We will be keeping the name of the program – "Agricultural Engineering with Data Analytics with Data Analytics", as it aligns with the nomenclature used by government organizations for recruitment purposes.*

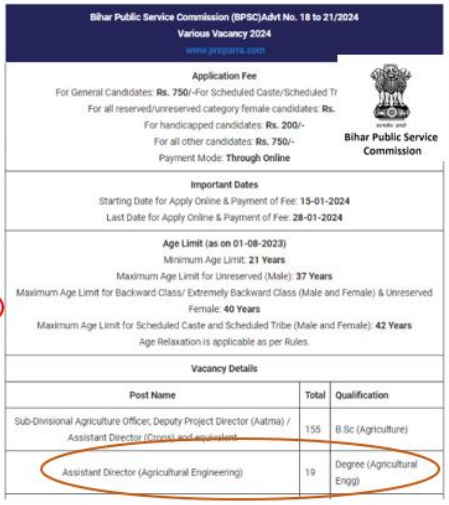


Hiring Organization name:	Kerala Agricultural University, Thrissur
Vacant Job Position(s):	Assistant Professors
Total Number of Vacancies:	33
Main Qualifications:	Farm Machinery and 1 Power Engineering (FMPE): B.Tech (Agrl. Engg.) M.Tech (Farm Power Machinery)/Equivalent. NET Agricultural Processing and Food Engineering (PFE): B.Tech (Agrl. Engg.) 2. M.Tech (Processing & Food Engg./ Agrl. Processing & Food Engg/Food & Agrl. Process Engg./Food Process Engg./ Food Engg.) Equivalent. 3. NETSoil and Water Conservation Engineering (SWCE)/ Irrigation and Drainage Engineering (IDE): B.Tech (Agrl. Engg.) M.Tech (Soil & Water Engineering/ Soil & Water Conservation Engineering/ Irrigation & Drainage Engineering)

UPSC

RECRUITMENT-V SECTION

Name of the post	Recruitment to 7 (seven) (UR - 4 EWS - 1 OBC - 2) vacancies for the post of Senior Agricultural Engineer, Department of Agriculture and Farmers Welfare, Ministry of Agriculture & Farmers Welfare.
Advt. No.	21/2022
Vacancy No.	22112101512
Essential Qualification (EQ)	ESSENTIAL QUALIFICATIONS: (A) EDUCATIONAL: Degree in Agricultural Engineering or Mechanical Engineering from a recognized University or Institution. (B) EXPERIENCE: Five years' experience in Operation and Maintenance of tractors, Agricultural Machinery and allied equipment including teaching experience in any Government or private listed organization. Or Five years' experience in handling independently testing and evaluation of farm machinery and agricultural implements in any Government or private listed organization.



Bihar Public Service Commission (BPSC)Advt No. 18 to 21/2024
Various Vacancy 2024
www.preparra.com

Application Fee
For General Candidates: Rs. 750/-For Scheduled Caste/Scheduled Tr
For all reserved/unreserved category female candidates: Rs.
For handicapped candidates: Rs. 200/-
For all other candidates: Rs. 750/-
Payment Mode: Through Online

Bihar Public Service Commission

Important Dates
Starting Date for Apply Online & Payment of Fee: 15-01-2024
Last Date for Apply Online & Payment of Fee: 28-01-2024

Age Limit (as on 01-08-2023)
Minimum Age Limit: 21 Years
Maximum Age Limit for Unreserved (Male): 37 Years
Maximum Age Limit for Backward Class/ Extremely Backward Class (Male and Female) & Unreserved Female: 40 Years
Maximum Age Limit for Scheduled Caste and Scheduled Tribe (Male and Female): 42 Years
Age Relaxation is applicable as per Rules.

Vacancy Details

Post Name	Total	Qualification
Sub-Divisional Agriculture Officer, Deputy Project Director (Aatma) / Assistant Director (Crops) and equivalent	155	B.Sc (Agriculture)
Assistant Director (Agricultural Engineering)	19	Degree (Agricultural Engg)

Comment 3: Financial implications for the lab setup – year-wise, and total budget.

Response: *We have assessed the requirements and prepared a year-wise laboratory setup budget, including total cost estimates, for this program in the following slides.*

Sr. No	Courses with available Lab facility
1	Water Resources Lab (SCENE)
2	Groundwater Hydrology Lab (SCENE)
3	Environmental Lab (SCENE)
4	Drone lab (CAIR)

5	Workshop
6	Geotechnical Engineering Lab (SCENE)
7	Control System (SCEE)
8	Remote sensing and GIS lab (SCENE)
9	Graphic Design Lab
10	Electronics Lab (SCEE)
11	Heat and mass transfer, Thermodynamics lab (SMME)

Sr. No	**Courses require development of lab facility**
1	Farm machinery & Power Engg. Lab
2	Natural Farming & Open Field Farming
3	Soil water conservation & Irrigation
4	Food Processing and Post-harvesting Lab
5	Agriculture automation & Precision farming lab

Year	Semester	Lab Development required	Space required	Fund Required for development
1st	1.	Nil	Nil	Nil
	2.	Nil	Nil	Nil
2nd	3.	Yes	500 m^2	Instrument – 4.81 crore
	4.	Nil	Nil	Nil
3rd	5.	Yes	1000 m^2	Instrument – 6.18 crore
	6.	Yes	500 m^2	Instrument – 1.9 crore
4th	7.	Yes	Nil	Nil
	8.	Nil	Nil	Nil
		Total Budget required for instrument		**12.89 crore**

Comment 4: Which part of the country smart Agricultural lab are located and how our students can go for training.

Response: *The centers are located across the country, and students will visit them to gain practical, experience-based knowledge through industrial training during summer and winter breaks.*

Institution	Lab Focus	Visiting Method
Center For Innovation & Development in Smart Agriculture (CIDSA), University of Agricultural Sciences , Bangalore	Automation, Drones, Precision Farming	Internships, electives
Software Technology Parks of India (STPI) - Fasal Lab, Akola, Maharashtra	Crop sensors, IoT, Drone tech	Workshops, certificate courses
Agri247 Training, Coimbatore, Tamil Nadu	Smart Irrigation, Drone & AI-based Farming	Online/in-person certificate programs
CropIn Technology, Bangalore	Digital and smart agricultural solutions	Internships, AI-ML Agri projects
Bharat Agri Smart Farming Hub, Mumbai	Precision Farming	Smart Agricultural management training
AgriStack Lab, Govt of India	Data Science, AI and digital; governance opportunities	Online and ICAR
AgNext Analytical Smart lab, Mohali, Punjab	Data Analytics, Food Quality and Remote Sensing	Training certification program
AgroStar Innovation Lab, Pune, Maharashtra	Field based agri-advisory exposure	Internships

Comment 5: Human resources and Recruitment

*Response: The details are provided in the table. S=30*4=120; F=12; Staff= 6*

Recruitment type	Requirement	Hired	To be Hired
Faculty Members	10	**4**	6
Technical Officer	1	**1**	0
Staff	6	**2**	4
Outsources field workers	10	0	10

Comment 6: A course on the disaster management in agriculture engineering

Response: *A course named as Agricultural Risk Assessment and management includes the Disaster management in agriculture engineering.*

Comment 7: Students Intake

Response: *30 per year.*

Comment 8: Students accommodation availability inside campus.

Response: *IIT Mandi has availability of hostels for new intake.*

Comment 9: Visits to identify the Farmers' problems in the different locations of India.

Response: *Four field visits are included in the curriculum during the 1,2,3 and 4 semester breaks.*