Annexure- 10

कुलसचिव कार्यालय
डायरी सं. 159
दिनांक 12-05-2023

Diary No.: CS/114
Date: 12/05/2023 (1)

Date: 12.05.2023

To,
The Hon'ble Vice Chancellor
Central University of South Bihar
Panchanpur, Gaya

Registrar
Put up in A.C.
12.5.23

कुलसचिव कार्यालय
डायरी सं. 3215
दिनांक 13.05.23

Subject: Submission of Minutes of Board of Studies Meeting held on 28th & 29th April 2023 along with course structure of **"M.Sc. in Artificial Intelligence"** as per NEP-2020.

Honorable Sir,

With reference to the Order No. CUSB/Acad/1-32013/AE2023 the Board of Studies meeting of the Department of Computer Science was held on 28th & 29th April 2023. The Board of Studies meeting along with the external experts was successfully conducted. The Board of Studies members discussed and finalized the course structure of **"M.Sc. in Artificial Intelligence".** The minutes and course structure of "M.Sc. in Artificial Intelligence" is attached for your kind approval and necessary action.

Further, the DC (Computer Science) meeting was held on 11.05.2023 with regard to the upcoming session 2023-24, the minimum and essential requirements given below for smooth running of the programme:

1. At least 20 numbers high end PC's.
2. One classroom equipped with smart board.
3. The DC requests on projector for computer lab as the lab based courses will be conducted in the lab.

Submitted for your kind approval and necessary order, please.

With kind regards,

Prabhat Ranjan 12/05/23

(Dr. Prabhat Ranjan)
Associate Professor & Head,
Department of Computer Science

Head
Department of Computer Science
Central University of South Bihar, Gaya

S.O. (Acad) 15/5/23

Enclosure:

1. Minutes of Meeting of AI experts with BoS held on 28th & 29th April 2023.
2. Minutes of Meeting of BoS held on 29th April 2023.
3. Minutes of DC Meeting held on 11.05.2023.

Shri Rajnarain

Central University of South Bihar

Minutes of the Meeting

Department of Computer Science

Date: 11/05/2023

A meeting of the Departmental Committee was held on 11/05/2023 at 2:45 PM in chairmanship of Head, Dr. Prabhat Ranjan to discuss the recommendation of Expert committee along with BOS members held on 28th and 29th April, 2023.
The following members of Departmental Committee were present:-

1. Dr. Prabhat Ranjan (Head of Department)
2. Dr. Jainath Yadav
3. Dr. Nemi Chandra Rathore
4. Dr. Piyush Kumar Singh

The following recommendations were taken place:-

1. As per recommendation mentioned in point no. 16 of the minutes of meeting of Expert committee along with BOS members held on 28th and 29th April, 2023,the recommended number of PCs is 50 along with 20 workstations in separate High end computing lab for M.Sc. (AI) programme. The DC is in view of the above mentioned recommendations.
2. As per recommendation mentioned in point no. 17 of the minutes of meeting of Expert committee along with BOS members held on 28th and 29th April, 2023, the DC is in view that additional some subject experts/ faculty in AI domain is required to run the programme.
3. The DC recommended two separate classrooms equipped with smart board.

Further, in upcoming session 23-24, minimum and essential requirements are given below for smoothly running the programme:

1. At least 20 numbers high end PC's.
2. One classroom equipped with smart board.
3. The DC requests one projector for computer lab as the lab based courses will be conducted in the lab.

The Meeting ended with vote of thanks to the chair.

P.K.S. 11.05.2023 — 11/05/23 — Jainath Yadav 11/5/23 — 11/5/23

Dr. Piyush Kumar Singh | Dr. Nemi Chandra Rathore | Dr. Jainath Yadav | Dr. Prabhat Ranjan
Head
Dept. of Computer Science

Central University of Bihar
Department of Computer Science
Minutes of the Meeting of AI Experts with BOS held on 28th & 29th, April 2023

A Brainstorming session and meeting of external AI experts with members of Board of Studies was held on 28-29 April 2023 to discuss the course structure/syllabus of M.Sc. in Artificial Intelligence programme as per NEP-2020.

The following members were present.

1. Dr. Prabhat Ranjan	-	Head of Department (Chairman)
2. Prof. Ashutosh Kumar Singh, NIT, Kurukshetra	-	External AI Expert
3. Prof. T. V. Vijay Kumar, JNU	-	External AI Expert
4. Prof. M. P. Singh, NIT-Patna	-	External AI Expert
5. Prof. Subhash Chandra Yadav, CUJ, Rachi	-	External BOS Member
6. Dr. Asif Ekbal, IIT-Patna	-	External AI Expert
7. Dr. Pankaj Mishra	-	Cognate Member
8. Dr. Nemi Chandra Rathore	-	Member
9. Dr. Jainath Yadav	-	Member
10. Dr. Piyush Kumar Singh	-	Member

The committee discussed course structure of M.Sc. in Artificial Intelligence keeping in view of requirement of industry ready for both service sector and development sector. Recommendations of the committee are as follows:

1. The committee suggested the semester wise course structure including core subjects and list of electives.
2. The committee recommended to keep maximum five/ six courses per semester.
3. The committee recommended to include minimum two AI based laboratory in first to third semester to develop sufficient skill in AI courses.
4. The committee recommended that only one core subject in 3rd semester and rest all courses have been recommended as elective courses.
5. A course "Indian Knowledge System" of two credits has been included in first semester under Discipline Based Core Course (DBCC).
6. A course "Human Values and Professional Ethics" two credits has been included in first semester under Discipline Based Core Course (DBCC).
7. Two Open Elective Interdisciplinary Courses (OEICs) will be opted by students during entire period of programme.

8. The committee recommended to prepare the detailed syllabus in the line of requirement of AI.
9. The committee included new courses namely, Human Computer Interaction, Time Series Analysis & Forecasting, Cyber Security, Data Visualization, Python programming & AI LAB, and Mathematical Foundation for AI, Big Data courses.
10. The experts recommended to include non-credit course namely, IPR, Innovation and Entrepreneurship, soft skills etc.
11. For first semester, the committee recommended following courses:

First Semester – Core			
Course Type	**Courses**	**L-T-P**	**Credits**
DBCC	Python programming & AI LAB	2-0-2	4
DBCC	Artificial Intelligence	3-1-0	4
DBCC	Mathematical Foundation for AI	3-1-0	4
DBCE	ELECTIVE$	3-0-2	4
DBCC	Indian Knowledge System	1-1-0	2
DBCC	Human Values and Professional Ethics	2-0-0	2
Total Credits			**20**
First Semester – Electives			
Course Type	**Courses**	**L-T-P**	**Credits**
DBCE	Distributed Systems	3-1-0	4
DBCE	Statistical Methods	3-1-0	4
DBCE	Theory of Computation	3-1-0	4
DBCE	Design & Analysis of Algorithms	3-1-0	4

12. For second semester, the committee recommended following courses:

Second Semester – Core			
Course Type	**Courses**	**L-T-P**	**Credits**
DBCC	Machine Learning	3-0-1	4
DBCC	Research Methodology	3-1-0	4
DBCC	Big Data	3-1-0	4
DBCE	ELECTIVE		4
DBCE	Open Elective		

29/04/23 29-04-2023 29/4/23 29/4/23 29-4-23 29/04/20

MENC	Mandatory Elective Non-Credit Course-1	-	Non-credit
Total Credits			**20**
Second Semester – Electives			
Course Type	**Courses**	**L-T-P**	**Credits**
DBCE	Computer Graphics	3-1-0	4
DBCE	Data Networks	3-1-0	4
DBCE	Software engineering	3-1-0	4

13. For third semester the committee recommended following courses:

Third Semester – Core			
Course Type	**Courses**	**L-T-P**	**Credits**
DBCC	Artificial Neural Network and Deep Learning	3-0-1	4
DBCE	Elective	3-0-1	4
DBCE	Elective	--	4
DBCE	Elective	--	4
OEIC	Open Elective	--	4
MNEC	Mandatory Elective Non-Credit Course-2	-	Non-credit
Total Credits			**20**
Third Semester – Electives			
Course Type	**Courses**	**L-T-P**	**Credits**
DBCE	Next Generation Networks	3-1-0	4
DBCE	Time Series Analysis & Forecasting	3-0-1	4
DBCE	Cyber Security	3-1-0	4
DBCE	Soft Computing	3-0-1	4
DBCE	Speech Processing and Recognition	3-0-1	4
DBCE	Social Network Analytics	3-0-1	4
DBCE	Natural Language Processing	3-0-1	4
DBCE	Digital Image Processing	3-0-1	4
DBCE	Quantum Computing	3-1-0	4
DBCE	Intelligent Systems and Robotics	3-1-0	4
DBCE	Cloud Computing	3-1-0	4
DBCE	Virtual Reality	3-1-0	4
DBCE	Internet of Things	3-1-0	4

DBCE	Edge & Fog Computing	3-1-0	4
DBCE	Blockchain Technology	3-1-0	4
DBCE	Human Computer Interaction	3-1-0	4
DBCE	Data Visualization	3-1-0	4
DBCE	Computer Vision	3-1-0	4

For fourth semester the committee recommended that the following project may be done in industry/ academia (within university/ outside university/ R&D institutions):

	Fourth Semester		
DBCC	Project in Industry/Academia	-	20
Total Credits			**20**

14. For the course "Project in Industry/Academia" the students are allowed to do project preferably in Industry under the supervision of faculty from Department.
15. The committee recommended to prefer use open source software(s).
16. The committee recommended that a High end computing lab may be set up to provide hand-on-experience. Suggestive equipment /software are mentioned below:

Name of Equipment

1. Intel® Xeon® Platinum Processor CPU (Intel® Xeon® Platinum 8462Y+ Processor (60M Cache, 2.80 GHz), 64 GB RAM, 1 TB SSD and 2 TB HDD
2. Intel Core (TM) i7 with Latest Gen, 32or more GB RAM, 256-512 GB SSD, 1TB HDD, GeForce RTX 4090, IPS Display, -keyboard and mouse – 50 PCs
3. At Least 20 workstations
4. Nvidia Jetson Nano kit
5. GPU BASED SERVERS
   - Intel® Arc™ A-Series Graphics With Enough Memory and Data backup
6. EYE TRACKER

SOFTWARE (SUGGESTED OPEN SOURCE SOFTWARE)

1. NVidia AI/Deep Learning Software / Libraries
2. Muclipse 1.3
3. Junit 4.3
4. EclEmma Code Coverage 3.1.1
5. TensorFlow

6. PyTorch
7. Keras

17. The committee suggest to recruit subject experts/ faculty to run the programme smoothly. Department may float the elective courses as per availability and expertise of the faculty members across semester. Department may also float some elective course in first semester without violating maximum credit requirement.
18. Committee also recommended to invite visiting professors/ professionals from IIT's, NIT's and other reputed institutions/ Organizations to conduct lectures in the programme in hybrid mode (offline/online mode).

The Course Structure and syllabus has been prepared and recommended by the Committee is attached. The ~~infrastructure~~ and lab required to run the programme is also attached herewith.

Meeting ended with thanks to the members.

Dr. Piyush Kumar Singh

Dr. Nemi Chandra Rathore

Dr. Pankaj Mishra

Dr. Asif Ekbal

Dr. Jainath Yadav

Prof. M. P. Singh

Prof. Subhash Chandra Yadav

Prof. Ashutosh Kumar Singh

Prof. T. V. Vijay Kumar

Dr. Prabhat Ranjan

INFRASTRUCTURE AND LAB REQUIREMENT

The High end computing lab may be set up to provide hand-on-experience. Suggestive equipment /software are mentioned below:

NAME OF EQUIPMENT

1. Intel® Xeon® Platinum Processor CPU (Intel® Xeon® Platinum 8462Y+ Processor (60M Cache, 2.80 GHz), 64 GB RAM, 1 TB SSD and 2 TB HDD
2. Intel Core (TM) i7 with Latest Gen, 32or more GB RAM, 256-512 GB SSD, 1TB HDD, GeForce RTX 4090, IPS Display, -keyboard and mouse – 50 PCs
3. At Least 20 workstations
4. Nvidia Jetson Nano kit
5. GPU BASED SERVERS

– Intel® Arc™ A-Series Graphics With Enough Memory and Data backup

6. EYE TRACKER

SOFTWARE (SUGGESTED OPEN SOURCE SOFTWARE)

1. NVidia AI/Deep Learning Software / Libraries
2. Muclipse 1.3
3. Junit 4.3
4. EclEmma Code Coverage 3.1.1
5. TensorFlow
6. PyTorch
7. Keras

Central University of Bihar
Department of Computer Science
Minutes of the Meeting of Board of Studies held on 29th, April 2023

A meeting of the members of Board of Studies was held on 29th April, 2023 (at 3:30 PM onwards) to finalize the course structure/syllabus of M.Sc. in Artificial Intelligence. The BoS members has incorporated the recommendations received from brainstorming session that was followed by meeting of external AI experts from JNU, IIT, NIT and other Central Universities on 28th and 29th April-2023.

The following members were present.

1. Dr. Prabhat Ranjan - Head of Department (Chairman)
2. Prof. S. C. Yadav - External Member
3. Dr. Pankaj Mishra - Cognate Member
4. Dr. Nemi Chandra Rathore - Member
5. Dr. Jainath Yadav - Member
6. Dr. Piyush Kumar Singh - Member

Recommendations of the BoS were as follows:

1. For smooth and effective conduction of the AI based courses and its related laboratory work through blended or hybrid mode subject experts may be hired from Institutes of National Repute or recruit subject expert.
2. Due to scarcity of laboratory, the committee recommends to adopt only one laboratory based course in the first semester from the forth coming academic session 2023-24. And committee also recommends to adopt the suggestions of AI Expert committee in near future as per the availability of AI laboratory in the department.
3. Course curriculum frame works and detailed syllabus of M.Sc. in Artificial Intelligence after incorporating core papers, elective papers in each semester suggested by AI experts are as mentioned.

29.04.2023 29/04/23 29/04/23 29/04/23

M. Sc. in Artificial Intelligence Course Structure & Syllabus (NEP-2020)
(2023 Onwards)
Total Credits – 80

First Semester			
Course Code	**Courses**	**L-T-P**	**Credits**
CAI81DC00104	Python Programming & AI LAB	2-0-2	4
CAI81DC00204	Artificial Intelligence	3-1-0	4
CAI81DC00304	Mathematical Foundation for AI	3-1-0	4
CAI81DC00402	Indian Knowledge System	1-1-0	2
CAI81DC00502	Human Values and Professional Ethics	2-0-0	2
	Elective-I (Within Department)		
Total Credits			**20**

First Semester – Electives			
Course Code	**Courses**	**L-T-P**	**Credits**
CAI81DE00604	Distributed Systems	3-1-0	4
CAI81DE00704	Statistical Methods	3-1-0	4
CAI81DE00804	Theory of Computation	3-1-0	4
CAI81DE00904	Design & Analysis of Algorithms	3-1-0	4

Second Semester			
Course Code	**Courses**	**L-T-P**	**Credits**
CAI82DC01004	Machine Learning	3-0-1	4
CAI82DC01104	Research Methodology	3-1-0	4
	Elective-II (Within Department)/ SWAYAM	-	4
	Elective-III (Within Department)/ SWAYAM	-	4
	Open Elective-I / SWAYAM	-	4
	Mandatory Elective Non-Credit Course-1	-	Non-credit
Total Credits			**20**

Second Semester – Electives			
Course Code	**Courses**	**L-T-P**	**Credits**
CAI82DE01204	Computer Graphics	3-1-0	4
CAI82DE01304	Wireless Sensor Networks	3-1-0	4

CAI82DE01404	Software Engineering	**3-1-0**	**4**
CAI82DE01504	Digital logic and Design	**3-1-0**	**4**
CAI82DE01604	Modelling and Simulation	**3-1-0**	**4**
CAI82DE01704	Internet Technologies	**3-0-1**	**4**

Third Semester			
Course Type	**Courses**	**L-T-P**	**Credits**
CAI91DC01804	Artificial Neural Network and Deep Learning	3-0-1	4
CAI91DC01904	Big Data Analytics	3-1-0	4
	Elective-IV (Within Department)/ SWAYAM	--	4
	Elective-V (Within Department)/ SWAYAM	--	4
OEIC	Open Elective-II*/SWAYAM	--	4
MENC	Mandatory Elective Non-Credit Course-2	-	Non-credit
Total Credits			**20**

Third Semester – Electives			
Course Code	**Courses**	**L-T-P**	**Credits**
CAI91DE02004	Soft Computing	**3-0-1**	4
CAI91DE02104	Speech Processing and Recognition	**3-0-1**	4
CAI91DE02204	Social Network Analytics	**3-0-1**	4
CAI91DE02304	Natural Language Processing	**3-0-1**	4
CAI91DE02404	Digital Image Processing	**3-0-1**	4
CAI91DE02504	Quantum Computing	**3-1-0**	4
CAI91DE02604	Intelligent Systems and Robotics	**3-1-0**	4
CAI91DE02704	Cloud Computing	**3-1-0**	4
CAI91DE02804	Virtual Reality	**3-1-0**	4
CAI91DE02904	Internet of Things	**3-1-0**	4
CAI91DE03004	Edge & Fog Computing	**3-1-0**	4
CAI91DE03104	Blockchain Technology	**3-1-0**	4
CAI91DE03204	Computer Vision	**3-1-0**	4
CAI91DE03304	Data Visualization	**3-1-0**	4
CAI91DE03404	Human Computer Interaction	**3-1-0**	4
CAI91DE03504	Time Series Analysis & Forecasting	**3-0-1**	4

CAI91DE03604	Cyber Security	3-1-0	4

	Fourth Semester		
CAI92DC03704	Project in Industry/Academia	-	20
Total Credits			**20**

Mandatory Elective Non-Credit Course (MENC)

Course Code	Course Title	Credits
CAI82ME03800	Innovation & Entrepreneurship	Non-Credit
CAI82ME03900	R Programming	Non-Credit
CAI91ME04000	Intellectual Property Rights	Non-Credit
CAI91ME04100	Soft Skill	Non-Credit
CAI91ME04200	Scientific Writing Tools	Non-Credit

4. The department will follow the coding standards / nomenclature of the courses as per the guidelines of NEP 2020 provided by Examination and University.

Meeting ended with vote of Thanks to the chair.

Dr. Piyush Kumar Singh

Dr. Nemi Chandra Rathore

Dr. Pankaj Mishra

Dr. Jainath Yadav

Prof. S. C. Yadav

Dr. Prabhat Ranjan

FEE STRUCTURE OF
M.SC. IN ARTIFICIAL INTELLIGENCE FOR ACADEMIC YEAR 2023-24

Particulars	M.Sc. in Artificial Intelligence (AI)
One Time Fee	
Admission	500
Enrolment No.	1000
Identity Card	100
Development Fee	1000
Security Deposite (Refundable)	1000
Course Work Fee	0
Psychological Lab/ Research Centre / Pedegogy Labs etc.	0
Tuition Fee	3500
Laboratory Fee	0
Computer Lab	5000
Evaluation Fee	500
Academic / Extension Activity Fee	0
Addt. Professional Enrichment Fee	0
Field Visit	0
Library / Magazine / News Letter	500
Cultural Activities	500
Games / Athletics	500
Econometric Lab Fee	0
Total Fee	14100
Vidyarthi Mediclaim Premium	618
Total Fee (with VMC)	14718
Notes:-	
- Hostel Fee @ Rs 9000/- per semester.	

29/04/23

29/04/23

29/04/23

29-04-23

29/04/23

29.04.2023