

Course Name: Certificate Course in Responsible Artificial Intelligence (CCRAI)

Course Objective: This course delves into advanced topics in Responsible AI, exploring cutting-edge concepts and strategies for developing ethical and unbiased artificial intelligence systems. Participants will gain in-depth knowledge and practical skills to address challenges related to bias, fairness, privacy, and accountability in AI applications.

Course Prerequisite:

Education: Any Engineering, Science, Statistics, (10+2+3/ 10+2+4) OR higher qualification

Experience: Basic logical mindset and familiarity with python. Elementary knowledge of linear algebra, statistics and machine learning concepts is desirable.

Course Outcome: Students who complete this course will gain a foundational understanding of responsible AI principles and strategies. They will learn how to evaluate and implement responsible AI techniques and frameworks, ensuring ethical and unbiased AI applications. Participants will be equipped to address societal implications and ethical considerations in AI development.

Course Duration: 80 Hrs (8 hours/ day for 2 Weeks)

Course Outline:

| S. No. | Course Modules | Duration (Hrs) |
|--------|---|----------------|
| 1 | Data Science Crash Course | 06 |
| 2 | Ethical AI Frameworks | 06 |
| 3 | Synthetic Data Generation | 08 |
| 4 | Algorithm Fairness Tools | 08 |
| 5 | AI Bias Mitigating Strategies | 08 |
| 6 | Machine Unlearning | 08 |
| 7 | Explainable AI (XAI) Frameworks | 08 |
| 8 | Privacy Enhancing Strategies | 08 |
| 9 | AI Ethical Certifications and Governance Testing Frameworks | 08 |
| 10 | Live Project | 12 |
| | Total | 80 |

Detailed Course Content:

1. Data Science Crash Course (6 hours)

- Introduction to Data Science.
- Basics of Data Analysis and Visualization
- Hands-on Exercises (Tools: Python, NumPy, Pandas, Matplotlib, Seaborn)

2. Ethical AI Frameworks (6 hours)

- Principles of Ethical AI
- Exploration of Prominent Frameworks
- Real-world Implications and Considerations

3. Synthetic Data Generation (8 hours)

- Need for Synthetic Data
- Tools and Techniques (Tools: Faker, Data Synthesizer)
- Ensuring Alignment with Genuine Data

4. Algorithm Fairness Tools (8 hours)

- Overview of Algorithmic Bias.
- Fairness Evaluation Tools (Tools: AI Fairness 360, Fairlearn)
- Implementation and Interpretation

5. AI Bias Mitigating Strategies (8 hours)

- Identifying and Analyzing Bias
- Mitigation Techniques (e.g., re-sampling, adversarial training)
- Case Studies and Practical Applications

6. Machine Unlearning (8 hours)

- Importance and Role in AI
- Techniques for Unlearning Biases
- Practical Implementation

7. Privacy Enhancing Strategies (8 hours)

- Addressing Data Privacy Concerns
- Techniques (e.g., anonymization, differential privacy)
- Balancing Privacy and AI Utilization

8. Explainable AI (XAI) Frameworks (8 hours)

- Need for Model Interpretability
- Techniques and Tools (e.g., SHAP, LIME)
- Application in Different Domains

9. AI Ethical Certifications and Governance Testing Frameworks (8 hours)

- Understanding Ethical Certifications
- Criteria and Assessment Process
- Case Studies of Certified AI Systems
- Importance of Governance in AI -
- Components of Testing Frameworks (e.g., A.I. Verify)
- Application and Practical Testing

10. In-depth Domain Project (12 hours)

- Applying Responsible AI Concepts
- Real-world Project Implementation
- Project Evaluation and Discussion