CSE400: Fundamentals of Probability in Computing

Lecture 3: Introduction to Probability Theory

Lecture Scribe for Exam Preparation

Contents

1 Course Information

1.1 Instructor

- **Dr. Dhaval Patel**

- Role: Instructor

- Office: Faculty Office (Room-210)

- Email: dhaval.patel@ahduni.edu.in

- Areas of Interest:

    - xG Networks
    - Applied ML / DL / RL
    - AutoML
    - Intelligent Transportation Systems
    - Life Sciences
    - Behaviour Modelling using AI

1.2 Teaching Assistants

- Deep Patel – BTech CSE (3rd Year)

- Prapti Patel – BTech CSE (4th Year)

- Raj Koticha – BTech CSE (4th Year)

- Ritu Patel – BTech CSE (4th Year)

- Rushi Moliya – BTech CSE (4th Year)

- Ura Modi – BTech CSE (3rd Year)

1.3 Course Platform

- Active Learning Platform: Campuswire

- Used for:

    - Anonymous participation
    - Posting and back-channel communication
    - Real-time feedback and polling
    - Direct messaging with instructor/TAs

1.4 Lecture Schedule

- Section 1: 9:30 AM – 11:00 AM (Tuesday, Thursday), GICT Room-136

- Section 2: 1:00 PM – 2:30 PM (Tuesday, Thursday), GICT Room-137

1.5 Discussion and Contact

- Contact hours: 24x7 through Campuswire

- Best practice: Post queries on Campuswire

- Private discussions via direct message

- External engagement and counselling via email

2 Why Study Probability in Computing?

2.1 Motivation

Probability plays a major role in:

- Daily life conversations

- Decision making under uncertainty

- Analytical reasoning

2.2 Engineering Applications

- Speech Recognition

- Radar Systems

- Communication Networks

These systems rely heavily on probabilistic modelling and reasoning.

3 Learning Philosophy

3.1 Growth Mindset

- Failure is an opportunity to grow

- Challenges help improve abilities

- Feedback is constructive

- Effort and attitude determine abilities

3.2 Fixed Mindset (Contrast)

- Failure defines ability limits

- Avoid challenges

- Give up when frustrated

- Stick to known approaches

Students are encouraged to adopt a growth mindset.

4 Active Learning and Participation

Active learning is emphasised through:

- Online participation

- Question-driven discussion

- Real-time feedback

- Collaborative problem solving

5 Project Component (30%)

5.1 Team Formation

Deadline: January 17, 2026 (EOD)

5.2 Major Milestones

1. **M1**: Team formation, problem identification, motivation

2. **M2**: Mathematical modelling (Random variables, PMF/PDF, CDF, joint distributions)

3. **M3**: Coding and simulation

4. **M4**: Inference and randomized algorithm implementation

5. **M5**: Apply randomized algorithm to domain problem

6. **M6**: Derive bounds, analysis, final submission

5.3 Deliverables

- Codes

- Reports

- Videos

- Decision logs and documentation

5.4 Evaluation

- Continuous milestone evaluation

- Mid-semester assessment

- Final viva and submission

6 Lecture Scribe Requirements

6.1 Types

- Lecture scribe

- Project scribe

6.2 Lecture Scribe

- Prepared by assigned groups

- Minimum 8–10 pages

- Must reflect lecture content

- Include additional examples from textbooks

6.3 Project Scribe

- Decision logs

- Constraints and alternatives

- Evidence-based reasoning

- Trade-off matrices

7 Multimodal Deliverables

Each milestone requires:

- 10–15 minute explanation video

- Coding or simulation demonstration

- Conceptual explanation of work done

8 UG Research Programme (UGRP)

8.1 Philosophy

- Multidisciplinary learning

- Research-driven education

- Experiential learning

- 4D Model: Discover, Design, Develop, Deliver

8.2 T-shaped Engineer Concept

- Depth in one technical discipline

- Breadth across multiple domains

- Collaboration ability

9 Conclusion

This lecture introduced:

- Course structure and logistics

- Importance of probability in computing

- Learning philosophy

- Project structure and evaluation

- Research orientation and UGRP

Students are expected to actively participate, adopt a growth mindset, and engage deeply with probabilistic thinking throughout the course.