

## S. Ajayan Mathematics Lesson Plan Series

### Order of Lessons

1. How AI 'Thinks' – Spam Filters and Math Basics
2. You Be the AI – Sorting Emails and Analyzing Patterns
3. Can AI Be Fair? Ethics, Bias, and Building Trust

## Instructional Considerations

### Further Reading & Videos

- **CrashCourse: Artificial Intelligence (YouTube Playlist)**

A fast-paced, student-friendly series covering AI basics, machine learning, data, and ethics—great for flipped classrooms or enrichment.

 <https://www.youtube.com/playlist?list=PL8dPuuaLjXtOfse2ncvffeeITrqvhrz8H> (CrashCourse AI Series)

- **Khan Academy: Probability and Statistics**

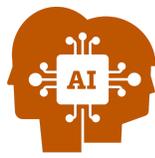
Reinforces math concepts like mean, median, frequency, probability, and error rate—skills directly used in this lesson.

 <https://www.khanacademy.org/math/statistics-probability> (Khan Academy – Statistics & Probability)

- **EdTech Magazine: Ethical AI in Education**

Introduces real-world ethical implications of AI, bias in data, and responsible use in schools and beyond.

 <https://edtechmagazine.com/k12/article/2020/02/ethical-ai-education-and-beyond> (Ethical AI in Education)



- **CS is Elementary – AI Literacy Toolkit**

Helpful for scaffolding AI concepts and discussions, including lesson extensions and visuals.

<https://csiselementary.org/resources/ai-literacy-toolkit/> ( AI Literacy Toolkit (PDF))

## **Extension Activities**

- **Design a Spam Filter (AI Classifier Challenge)**

Students create a rule-based spam filter using word frequency, probability, and decision logic. Then compare their classifier’s performance against peers.

- **Bias in Data Project**

Students analyze sample datasets for bias (e.g., cultural assumptions, gender bias, incomplete patterns) and suggest fairer training data.

- **AI Around Me: Real-World Scavenger Hunt**

Students research or journal AI uses in daily life (e.g., YouTube recommendations, autocorrect, smart assistants) and categorize as rule-based vs. ML-based.

- **Math Reflection Journal**

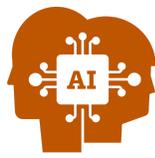
After each phase, students write short reflections on how math (probability, statistics, mean, mode) influences AI decision-making.

## **Differentiation & Accessibility**

- Provide visual supports: anchor charts, probability trees, color-coded data tables for pattern recognition.
- Offer sentence stems for discussions (e.g., “The probability that... is \_\_,” “I noticed that spam emails often include...”).
- Use Google Sheets or printed tables for math tasks depending on tech availability.
- Allow flexible grouping to support students at different math levels.
- For EL or SPED learners, provide graphic organizers for classification tasks or email sorting.
- Provide visual flashcards for key terms (algorithm, bias, probability, spam, neural network).
- Use a Frayer Model or graphic organizer for each core term.

## **Technology & Classroom Logistics**

- If devices are limited, use printed or projected datasets. For full access, allow students to use spreadsheet tools (e.g., Google Sheets) to calculate means and probabilities.
- If AI tools are allowed (e.g., ChatGPT, Teachable Machine), model safe and ethical use, providing sample prompts for students.



- Mix groups by math ability and interest to encourage peer learning.
- Be intentional in guiding classroom conversations around fairness, data representation, and real-world impacts.

## Spreadsheet Templates (Optional):

- Provide simple Google Sheets or Excel templates pre-formatted for students to enter email data and automatically calculate:
  - Frequency counts (e.g., count of “FREE” or exclamation marks)
  - Conditional probabilities (e.g.,  $P(\text{Spam} | \text{Feature})P(\text{Spam} | \text{Feature})$ )
  - Error rates
- Templates can include built-in formulas and example data to guide student calculations.

## Access Guidance for AI Tools:

- If using AI tools like ChatGPT or Teachable Machine:
  - Model safe, ethical use and responsible prompting.
  - Provide sample prompts related to spam detection or simple classifiers.
  - Set clear expectations about data privacy and academic integrity.
  - Offer tutorials or walkthroughs for tool navigation and input formatting.

## Tech Logistics Tips:

- For limited device availability, rotate group access or use projected shared screens.
- Provide printed or digital worksheets as alternatives when technology is unavailable.
- Encourage collaboration and peer support when using digital tools.