Data Skills Pathway Student Expectations Guide

For students enrolled in ATSC 494 (Data Skills Pathway)
Aligned with the Undergraduate Expectations Guide

1) What is the Data Skills Pathway?

The **Data Skills Pathway** is a 15-week, hands-on course where students learn practical data and research skills by working on a project connected to their own interests.

Students begin by exploring a topic they care about. With help from mentors, they turn that interest into a real problem that can be studied using data. Students may work with data related to weather, aviation, aerospace, sensors, engineering, cybersecurity, Artificial Intelligence, environmental science, or other applied research areas.

The pathway is designed for students at different experience levels. You do **not** need to be an expert in programming, data analysis, or research before joining. The goal is to learn step by step while working on a real project.

By participating in the pathway, students will practice how to:

- define a project idea with a mentor,
- search for background information and scientific papers,
- work with real datasets,
- organize files and document work,
- use tools such as Excel, Python, Jupyter notebooks, Google Scholar, and Zotero,
- create figures, tables, scripts, summaries, or other project outputs,
- communicate progress and results clearly.

The pathway helps students build the habits expected in research and technical work: planning tasks, managing time, documenting steps and results, and communicating progress using evidence such as plots, tables, scripts, or saved outputs.

2) Program Structure and What Happens in Each Stage

The pathway is embedded in a 15-week, credit-bearing course, **ATSC 494**, and is organized into four stages. The original guide already organizes the program into stages from orientation to final mini-project and presentations.

Stage 1: Explore Your Interests

Students learn about the Data Skills Pathway, course expectations, mentors, available projects, the Atmos Wiki, pre-surveys, and lab safety.

During this stage, students will:

- learn how the pathway works,
- meet instructors, mentors, and other students,
- review the Expectations Guide and Participants Guide,
- explore possible project areas,
- share their interests and goals,
- begin thinking about a topic they may want to explore.

Goal: Identify a topic or general area of interest.

Stage 2: Define a Data-Based Problem

Students work with mentors to turn a broad interest into a focused question or problem that can be explored using data.

Examples:

- “I am interested in aerospace” may become “How can weather data support safer UAS operations?”
- “I am interested in sensors” may become “How can sensor data be used to detect changes in visibility?”
- “I am interested in cybersecurity” may become “How can data patterns help identify unusual system activity?”

During this stage, students will:

- discuss project ideas with mentors,
- choose or refine a project topic,
- identify possible data sources,
- search for background information or scientific papers,
- prepare a short project brief,
- define what they want to produce by the end of the pathway.

Goal: Turn an interest into a clear project question that can be explored using data.

Stage 3: Build Data Skills Through Your Project

Students begin working with data and learning the tools needed for their project.

Depending on the project, students may learn how to:

- organize files and folders,
- work with Excel, CSV files, Python, or Jupyter notebooks,
- clean and check data,
- create figures, plots, maps, or tables,
- search for papers using Google Scholar or library tools,
- save and organize references using Zotero,
- read and summarize scientific papers,
- use basic Artificial Intelligence or machine learning concepts,
- work with sensor, weather, aviation, engineering, or cybersecurity datasets,
- document steps and results.

During Thursday meetings, students may share updates, figures, papers, questions, challenges, or early results. Mentors may also provide short tool sessions that are useful for the whole group.

Goal: Learn practical data skills while making progress on your own project.

Stage 4: Share Your Results and Plan Your Next Step

Students prepare a short final project update. The final project does not need to be publication-level work. The goal is to clearly explain the project question, data, method, result, limitations, and next step.

Final products may include:

- a figure or table,
- a short script or notebook,
- a cleaned dataset or data summary,
- a short written report,
- a poster or presentation,
- a short bibliography or reference list,
- a project reflection,
- a next-step plan for continuing the work.

Goal: Communicate your work clearly and leave with something useful for future research, internships, or career opportunities.

3) Core Expectations for Every Pathway Student

The pathway is designed to mirror real research and technical work. Students are expected to participate actively, communicate clearly, and make steady progress. The original guide emphasizes steady progress, professional communication, and evidence-based check-ins.

Consistent Participation and Weekly Progress

Students are expected to attend Thursday meetings when possible and make progress each week. Progress can be small, but it should be steady.

Students should come prepared to share:

- what they worked on,
- what they completed,
- what they are still trying to understand,
- what they plan to do next.

Professional Communication

Students should communicate early when they are stuck. Before asking for help, students should try reasonable troubleshooting steps, such as checking instructions, reviewing examples, verifying file paths, or rerunning code with a small test.

When asking for help, students should share useful evidence, such as:

- error messages,
- screenshots,
- logs,
- plots,
- file paths,
- code snippets,
- notes on what they already tried.

Meeting and Check-In Expectations

During check-ins or Thursday updates, students should be ready to answer three simple questions:

- What did I complete this week?
- What question, challenge, or blocker do I have?
- What is my next step?

Students may share a plot, table, script, notebook, paper summary, draft figure, dataset issue, or project update.

4) Documentation requirements

Documentation is required so that research work is organized, understandable, and reproducible. Students should document their work as they go, not only at the end of the semester. The attached guide states that documentation should include data sources, preparation steps, analysis choices, outputs, results, quality checks, and next steps.

Each student should maintain documentation in the **Student-Mentor Workspace** or another approved location.

Minimum documentation should include:

- project title and mentor,
- project question or goal,
- data source and time range,
- files used or created,
- data preparation steps,
- analysis choices and assumptions,
- outputs such as plots, tables, scripts, notebooks, or folders,
- results and quality checks,
- papers, reports, datasets, or references used,
- next steps and open questions.

Recommended format:

- use dated entries,
- use short headings,
- include links or paths to outputs,
- write enough detail so another student or mentor can understand what was done.

Good documentation does not need to be long. It needs to be clear, organized, and updated regularly.

5) Data Quality Expectations

Real data are not perfect. Datasets may include missing values, outliers, inconsistent units, time problems, formatting issues, sensor errors, or uncertainty. The original guide expects students to identify issues, describe them clearly, make reasonable cleaning decisions, and document what was done.

Students are expected to:

- inspect data before using it,
- identify possible data problems,
- ask questions when something does not make sense,
- avoid changing data without a clear reason,
- document cleaning steps,
- keep raw data separate from processed data,
- explain how results were checked.

Students should not try to make results look better by removing inconvenient data. If something looks wrong, students should report it, investigate it, and document what they found.

6) Integrity, Ethics, and Responsible Sharing

Research work must be honest, careful, and transparent. The original guide states that students should not fabricate results, plagiarize, or share project data, code, results, or ideas outside the team without approval.

Students must:

- be honest with data and results,
- not fabricate or alter results dishonestly,
- give proper credit for papers, code, datasets, methods, figures, and ideas,
- cite sources used in project work,
- follow team rules for project materials,
- ask before sharing data, code, draft results, plots, figures, or project ideas outside the team,
- ask before using project work in a poster, resume portfolio, personal website, class project, or public presentation.

Students will also learn basic reference practices, including how to use Google Scholar and Zotero to organize papers and create a short bibliography.

7) Backups and File Safety

Students must protect project files. Do not keep the only copy of important work on a personal computer, USB drive, or personal cloud storage. Use approved shared storage locations whenever possible.

Students are expected to:

- save files in the correct shared location,
- use clear file names,
- keep raw data separate from processed data,
- avoid overwriting earlier versions,
- keep track of versions using dates, version numbers, or repository commits,
- ask the mentor where files should be stored.

Project work should be organized so another team member can open the files and understand what they contain without guessing.

8) Required Deliverables

By the end of the pathway, students should complete a small but useful project product. The original guide identifies a written mini-project report and oral or poster presentation as required deliverables.

Updated required deliverables include:

- updated Student-Mentor Workspace,
- learning plan,
- work schedule,
- short project brief,
- weekly progress notes,
- at least one paper summary or short reference list,
- organized project files,
- one project output, such as a figure, table, script, notebook, dataset summary, or workflow,
- short interpretation of results,
- final presentation, poster, short report, or briefing,
- short reflection on skills learned and possible next steps.

The final product should show what the student worked on, what data or tools were used, what was learned, and what could happen next.

9) How Performance is Evaluated During The Data Skills Pathway?

Students are evaluated on effort, progress, communication, documentation, and project contribution. The attached guide lists reliability, communication, documentation, skill growth, and project contribution as evaluation areas.

Students will be evaluated based on:

- **Reliability:** attending meetings when possible, following the agreed schedule, and completing tasks.
- **Communication:** asking questions early, explaining problems clearly, and responding to feedback.
- **Documentation:** keeping work organized, traceable, and easy to review.
- **Skill Growth:** improving over time and applying what is learned.
- **Project Contribution:** producing useful outputs that help move the project forward.

Students are not expected to know everything at the beginning. They are expected to participate, learn, communicate, and make steady progress.

10) Pathway Connection to Paid Opportunities

The Data Skills Pathway is designed to prepare students for future research, internships, and data-driven careers. The attached guide states that students who complete the pathway typically start internships faster and work more independently because they have practiced the expected habits.

Strong participation in the pathway can help students prepare for:

- undergraduate research,
- paid research roles,
- summer internships,
- technical projects,
- graduate school,
- professional opportunities in data-driven fields.

By the end of the pathway, students should be able to explain their project, describe the skills they learned, and show a concrete product such as a figure, script, notebook, dataset summary, report, poster, or presentation.

End-of-training check (True/False)

1. **T/F**: Students should make steady progress each week instead of waiting until the end of the semester.
2. **T/F:** Students should communicate early if they are stuck or if their schedule changes.
3. **T/F**: Students should bring evidence of progress to meetings, such as a plot, table, script, paper summary, error message, or draft output.
4. **T/F**: Documentation should be updated throughout the semester, not only at the end.

5. **T/F**: Students should keep raw data separate from processed data and final outputs.
6. **T/F**: Students should ask before sharing project data, code, figures, results, or ideas outside the team.
7. **T/F**: Students should give proper credit when using papers, code, datasets, figures, methods, or ideas from others.
8. **T/F**: Students should use tools such as Google Scholar, Zotero, Excel, Python, or Jupyter when they are useful for the project.
9. **T/F**: A final project product can be a figure, table, script, notebook, dataset summary, short report, poster, or presentation.
10. **T/F**: The goal of the pathway is to learn practical data skills while making progress on a project connected to the student's interests.