Name:\_\_\_\_\_\_ Brian Mapes\_\_\_\_\_\_\_\_\_\_\_

**ATM 651: Introduction to Atmospheric Dynamics, Fall 2024, Brian Mapes**

Intake questionnaire to help us all know each other, & help me tailor the class…

***Not a test***, just to help me see where to focus. Please be verbose & as honest as willing!

Getting to know you a bit:

“Hometown”, college, prior town... helps me use geography to prop up my memory, thank you

Boulder, CO (BHS 1981), Caltech (chemistry ’85), UW-Seattle PhD 1992

How did you get interested in atmospheric science? Sky events, or the idea of a sphere-planet?

Sky: storms, first flight (so solid looking! Wanna go!)

Also: physics-math wiz in cold war, didn’t wanna work for da man. Also: games with siblings 🡪 love strategies & statistics type thinking.

What program are you in? PhD advisor & topic? MPS & track?

50-50 MPS-PhD, One recent MS (superstudent-psueudoTA?)

Might you please list other classes and their times & days, for devising meetups & makeups?

RSMAES MW, after class best times. I go to office (MSC361) right from here and welcome follows, drop-ins, indivd. appts (12, 12:30, 1, 1:30,…)

Others: (Matt decided yet?)

Mon-Weds 9am Marine,GIS \*\*US\*\* 12pm Comp,Obstr 1:30Turb? 4:30 GFD 1

Tu-Th 9am Math? 10:30 PhysO 12pm ClimChg

Fri 12pm Obstr,AWF 1-4: OCE 608 4:30 GFD 1?

How do you learn best? Visual, written oral, a mix?

1. Visual, 2. Evocative [word](http://what3words.com/)=concept, 3. ‘game grip’ on math

(gimme = inputs+work)

How do you accumulate material? How do you take notes (paper? tablet? typing/computer)?

Paper in folders/heaps. Email folders. Computer folders in Box. Dropbox/[Goodreader](https://www.goodreader.com/) (notability recommended) on iPad. [Hypothes.is](https://hypothes.is/groups/B1L9AYkW/atm651?q=&more_info=) channels (Web or local files!).

How do you prefer to get on-paper type math/physics assignments? Electronic, printed?

3 Paper, 4 Electronic/iPad, others either

Any study habits/advice that may interest me & maybe others? Mind maps, note app/services?

Flash cards, repetition. [Mindmaps](http://mindnode.com/)/[CMS](http://obsidian.com/). Headphones. “Why” problems. Group discussion. Write down & read aloud. Many practice problems.

How’s your computer skill? Windows, Mac? Cloud backup? Any experience in open source scientific software worlds (Github, Python, R, …)? Or commercial (Matlab, IDL, …)?

Python wins, 100% have touched it. One IDV user! (Kim!)

|  |  |  |  |
| --- | --- | --- | --- |
| Gradient | Divergence \* | Streamline \*\* | Trajectory \*\* |
| Laplacian \*\* | Conservation law \* | Pressure | Acceleration |
| Frequency (of wave) | Period (of wave) | Wavelength | Amplitude |
| Flux \*\* | Force | Momentum | Vorticity \*\* |
| Kinetic energy | Potential energy | Entropy \*\* | Enthalpy \*\* |
| Hydrostatic bal \* | Geostrophic bal \* | Thermal Wind \*\* | Parcel \* |
| Timescale \*\* | Synoptic \*\* | Mesoscale \*\* | Anomaly |

*Any other words or ideas you have heard about & have curiosities or questions about?*

Chaos, Parameterization

*Have you ever read a research article, or written one? Online, printouts? If so, how do you assimilate such material into your growing worldview? Take notes (store/access them how?) Margin notes on printouts? Do you keep a notes/blog digital archive?*

Brian: read 1000, wrote 100. Tried it all: Papers, [Mendeley](http://mendeley.com/). Word ([goog](http://docs.google.com/)) vs. Latex/[Overleaf](http://overleaf.com/). Dropbox+[Goodreader](http://goodreader.com/) on iPad. Hypothes.is Presentations because I never forget what I’ve said to a group (ulp).

Others: highlighter/margin/stickynotes on paper or [iPad annotatord](https://www.goodreader.com/) Screenshots (where?) Google docs or notebook (paper!).Github.

*Computers again*: What coding language(s) are you best at? Where do you type? (command line, Jupyter notebook/lab, a GUI Development Environment, an application like Matlab or IDL, other?) Got a GitHub account? What is your interest level in computing-based homeworks or projects?

Python in Jupyterlab after painful transition years from IDL, Matlab.

Others: Plenty of interest. Let’s do an xarray data HW at some point, in your Python (miniconda, learn conda/mamba env & install) or Colab.

Have you been using the new AI tools? For what, which one(s)? (language, image)? What do you think they are especially good or bad for, looking ahead 5-10 years?

Brian: free versions (GPT, Claude, Perplexity). Code for sure, incl. LaTeX! Words and names to find other fields’ terminology.

Others: code most useful, & dully well-read tutor/librarian. Chores.

*Project ideas*: Class will culminate in projects, which may be individual or team. Any ideas at the outset about something you’d like to learn or master and share with the class? Readings, calculations, small research efforts? *Find your curiosity, and try to keep it in sight*, it is the most reliable resource for pulling you through the work (so much better than push-type motivations!)

Weather, turbulence, clouds, Impacts (TCs, ARs, ENSO, Severe).

Forecasting (trad vs. ML).

Readings, some say.

Skill-building (extending from class labs), others seek.

Anything else?

You’ll hear all too much from me about me. Eyerolls welcomed & noted. Prof. neuroses:

1. “I’m not doing enough” (boring, under/over-rehearsed, too little)

but: “I perpetuate a bad ol days physical sciences hazing chain”

Yet: “I can’t pass them on w/o toil and right/wrong slaps” (see 1.)

Others: Beautiful career dreams! Worries about preparation/readiness. Tons of goodwill toward it all! Group assignments/projects? Ready…

About the material:

Algebra, trig (sine and cosine), calculus (derivatives & integrals, exp & log). Complex exp()

*Derivative:* What property of a curve f(x) or a surface Z(x,y) does a *derivative* measure?

“SLOPE” – idea was to keep a grip on sense of it (shape, visceral), if xyZ screams ‘space’

Advanced: If we have temperature in space & time as T(x,y,z,t), what are vs. ?

Some know! The heart of the intro material! [WH Section 1.2](https://hypothes.is/a/XDkcFl-_Ee-QowMy-VGA1w)  and will revisit in class

*Second derivative:* What property of a curve f(x) or a surface Z(x,y) does it measure?

“CURVATURE” – idea was to keep a grip on sense of it (shape, visceral), if xyZ is ‘space’

*Ordinary differential equation* (ODE): What f(t) satisfies df/dt = 3f?

What function is the same as its derivative? Hint: you know this one. Now there’s just a 3

*Scalar & vector fields in physics, with units: Fluid dynamics or electricity/magnetism?*

Crucial. Let’s do it. French Revolutionaries died for our Scientific Enlightenment!!

*Partial differential equation* (PDE): heard of diffusion? advection? *Div, grad, curl?*

Prof neurosis: I’m not earning pay, they know all this, I’m boring them. Ha ha

*Statistics:* What is a PDF, what is the mean, what is standard deviation?

Everyone has some sense

*Chaos and complexity:* Fundamental limits to predictability, heard/learnt about it?

One of the biggest ideas of the late 20th century!! And the 19th (Poincare, Lyapunov)

*Synoptics:* What is a trough, and where are the clouds and rain typically in relation to it?

Soon, these scales and conventional wisdoms. Some know them and can teach us

*Storms:* Why do cloudy updrafts rise? How long does rain take to form in a cloud & why?

Instability is a core “dynamics” concept. This is an application.

Prioritize the concept, not the application details! (in thermodynamics)

Microphysics is complicated, but: orders of magnitude size growth takes time (mins/hours) even for particles going from tiny to small!