ATM B.S. REQUIRED COURSES (CORE)

Fall 1
PHY 140 – Physics 1
PHY 145 – Physics Lab 1
CHM 120 – Chemistry 1
MAT 112 – Calculus 1

Fall 2
ATM 209 – Weather Workshop
ATM 210 – Atmos. Structure,
 Thermo., Circulation
MAT 214 – Calculus 3

Fall 3
ATM 316 – Dynamics 1
ATM 320 - Thermodynamics

Fall 4
ATM 418 – Dynamics 3

Spring 1
PHY 150 – Physics 2
MAT 113 – Calculus 2

Spring 2
ATM 211 – Weather Analysis & Fcst.
ATM 315 – Env. Stats. and Comp.
 [or fall 2]
MAT 311 – Differential Equations

Spring 3
ATM 317 – Dynamics 2
ATM 321 – Physical Meteorology
ATM 350 – Meteo. Data & Visualization

Spring 4
ATM 419 - NWP

ATM B.S. ELECTIVES

ATM 301 – Surface Hydrology and Hydrometeorology
ATM 305 – Global Physical Climatology
ATM 306 – Climate Variability and Climate Change
ATM 307 – Intro. Atmospheric Chemistry
ATM 311 – Severe and Hazardous Weather and Forecasting
ATM 327 – Meteorological and Environmental Measurement
ATM 335 – Meteorological Remote Sensing
ATM 400 – Synoptic Meteorology I
ATM 401 – Synoptic Meteorology II
ATM 404 – Oceans and Climate
ATM 405 – Water and Climate Change
ATM 408 – Hydrometeorology
ATM 409 – Atmospheric Precipitation Processes
ATM 413 – Weather, Climate Cha., and Soc. Impacts
ATM 414 – Air Pollution Meteorology
ATM 415 – Climate Laboratory
ATM 421 – Tropical Meteorology
ATM 490/497/498/499

- 12 credits required
- One of ATM 311 or 405
- 3 max. 490
- 6 max. 497/498/499

- **Required climate / climate change course**
    Update writing requirement?

- **Too many electives?**
    Or… should ATM 490 not count towards elective credits?

- **Computer programming course (CSI 201? 204?)**

- **ATM 210 / 315 sections for ATM and ENV**

- **Need list of objectives for ATM (and ENV)**
    …What do we want the students to know upon graduation?

AMS DEGREE EQUIVALENT COURSEWORK (2010)

Mathematics

- Differential and integral calculus
- Vector and multivariable calculus
- Probability and applied statistics

Physics

- Fundamentals of mechanics
- Basic thermodynamics
- Electromagnetic radiation
- Electricity and magnetism

Chemistry

- Atomic structure and chemical bonding
- Properties of gases

b. Required skills and competencies

In addition to knowledge of specific topics in atmospheric science, competency in the following areas is essential. Opportunities for enhancement of these skills within discipline-specific coursework is strongly recommended.

Scientific computing

- Experience using a high-level structured programming language (e.g., C, C++, Python, Matlab, IDL, or Fortran)
- Ability to apply numerical and statistical methods to atmospheric science problems

Oral, written, and multimedia communication

- Ability to create and deliver scientific presentations using appropriate multimedia techniques
- Demonstrated effectiveness in oral discussion and interpretation of current weather events and forecasts
- Ability to write an effective scientific report
- Ability to effectively communicate with technical and lay audiences using scientific evidence

Meteorological measurements

- Sensor performance characteristics and sources of error
- Quality assurance, standards, and evaluation of data
- Surface and upper-air weather instrumentation
- Principles and interpretation of weather radar
- Principles and interpretation of weather satellite data
- Profiling systems (radio frequency, acoustical, and optical)

Physical meteorology

- Atmospheric thermodynamics
- Radiation in the atmosphere
- Cloud and precipitation physics
- Atmospheric electricity and optics

Dynamic meteorology

- Governing equations
- Geostrophic, gradient, and thermal winds
- Circulation and vorticity
- Quasigeostrophic theory
- Atmospheric waves
- Baroclinic and barotropic instability

Synoptic meteorology

- Subjective weather analysis
- Objective weather analysis
- Predictability and chaos theory
- Structure of synoptic-scale weather systems
- Jet stream dynamics
- Cyclogenesis and frontogenesis
- Weather forecasting concepts
- Precipitation types and hydrometeorology
- Use of numerical weather prediction products in forecasting

Mesoscale meteorology

- Air mass boundaries (fronts, drylines, and outflows)
- Mesoscale instabilities
- Fundamentals of the planetary boundary layer
- Mesoscale boundary layer phenomena
- Single, multi-, and supercellular convection
- Mesoscale convective systems
- Severe weather
- Tropical cyclones
- Orographic mesoscale phenomena

Climate dynamics

- General circulation of the atmosphere and ocean
- Regional climates and microclimates
- Intraseasonal and interannual climate variations, including El Niño/Southern Oscillation
- Long-range weather forecasting
- Climate data analysis
- Reconstruction of past climates
- Climate models
- Causes of past and future climate change

Capstone experience

- Undergraduate research project, or
- Career-focused internship, or
- Capstone course

WHAT DID YOU LIKE ABOUT OUR ATMOS. SCI. PROGRAM?

Loved the students and the staff. I always felt welcomed. Internship opportunities are amazing (really loved my broadcast one). It feels like I am free to chose my own path. My advisor was super helpful as well.

The availability of internships is very helpful. I think it's something that not too many majors put much effort into but this one does a great job. It is so important to have that experience not just to put on your resume but to get a good feel for what a career in the field can look like! I also enjoy the lineup of courses, and how much many of them tie into each other.

Just about everything!

I really liked how many internship opportunities there were. I also like the myriad of classes we take.

The NWS internship opportunity, The existence of the map room, the dedication to programming in meteorology

Love that all the teachers are involved in student's interests and always willing to help

The program is very good for several reasons from the internships available in the Mesonet and the NWS office giving students a chance to try out the different sectors of the field. I enjoyed almost all of the ATM classes I've taken, but ATM 419 really stands out as it feels like an opportunity to work with a model and learn the basics of how models work and with how much we use models it feels important to understand how they work and the limitations of them. The freshman seminar is really fantastic because you get to meet some of your future professors and start thinking about the different areas of atmospheric science outside of forecasting.

WHAT DID YOU NOT LIKE ABOUT OUR ATMOS. SCI. PROGRAM?

• I still don't know or have never met some well known professors in the department. I wish I had been informed that there is a lot of computer map making so I could have invested my time in some coding classes.

• For the most part the program is perfect. My only complaint would be the amount of work that stacks up from the multiple ATM classes, but that comes with territory of the major and is expected. Possibly moving ATM 419 to the fall semester of senior year would allow students to use what they learned in other ATM classes.

• The ability to gain coding experience early on to be better prepared for the upper level classes

WHAT CHANGES/EFFORTS WOULD YOU RECOMMEND TO MAKE THE CLIMATE IN THE DEPARTMENT MORE SUPPORTIVE TO YOUR EXPERIENCE AS A MAJOR?

- I have had several long absences for medical reasons. I felt coming back that I wasn't given fair or proper treatment in time for me to catch up on work as well as having to take zeros on quizzes to be dropped instead of allowing me to take them.

- Overall the experience of the major and the department is fantastic. However, maybe requiring students to meet with their adviser during the semester or at least placing emphasis on the advantages to discussing the major and their current classes with their adviser.

DO YOU HAVE ANY SPECIFIC CONCERNS OR RECOMMENDATIONS FOR HOW THE PROGRAM COULD BE IMPROVED?

• Add a computer science class requirement to freshman year

• More intro to computer programming classes, make a website from the department that lists all available internships and scholarships so people have an idea of whats's available.

• The only thing I can think of that would have been helpful is the availability of more programming experience. Or even suggestions for other classes in the Comp. Science department or something like that. I feel that I've fallen a little short on programming experience for what is often expected in the workplace for the field. Nothing too big, because there is always time to learn!

DO YOU HAVE ANY SPECIFIC CONCERNS OR RECOMMENDATIONS FOR HOW THE PROGRAM COULD BE IMPROVED?

- Have class in the Mohawk tower.

- None, I love it

- I think adding more computer program based classes or suggesting those classes from COM-SCI would be an improvement. I've noticed on many employment postings, an interest in those who know at least python, but also have knowledge of other computer languages.