



NORTH CAROLINA AGRICULTURAL AND TECHNICAL STATE UNIVERSITY

Spring 2026 Course Syllabus

College of Science & Technology

Physics

NOTE: Students are responsible for reading, understanding, and following the syllabus.

Undergraduate Course Information

Course Name: Atmospheric Thermodynamics

Course Number/Section: ASME 231

Credit Hours: 3

Days and Times: 15:30 – 16:45 TR

Class Location: Gibbs 302

Instructor Contact Information

Instructor: Dr. Yuh-Lang Lin

Office Location: 302H Gibbs

Email Address: ylin@ncat.edu

Office Phone: 336-285-2127

Communication

Students will receive an answer to all communications by email within 48 hours excluding holidays. The secondary point of contact will be the TA, Jackson Wiles, whose email address is shown below.

Teaching Assistant:

Student Hours

17:00-18:00 TR. For a longer discussion, email to make an appointment.

Monday Tuesday Wednesday Thursday Friday

Course Prerequisites

PHYS 241 or equivalent

Course Description

This course covers the general aspects of thermodynamic physical processes occurring within the atmosphere. Topics included are thermodynamics systems, equation of state for ideal gases, Charles' law, Boyle's law, a mixture of gases, the first law of thermodynamics, internal energy, specific heats and enthalpy, adiabatic processes, potential temperature, Carnot's cycle, the second law of thermodynamics, entropy, moisture variables, phase transitions, Clausius-Clapeyron equation, moist adiabats, thermodynamic diagrams, hydrostatic equation, geopotential, scale height and the hypsometric equation, thickness, and heights of constant pressure surfaces, Reduction of pressure to sea level, dry and moist adiabatic lapse rates, parcel method, potential or convective instability, slice method of stability analysis, entrainment into cumulus clouds, bubble and plume theories, introduction to numerical cloud modeling.

Student Learning Objectives/Outcomes (SLO)

Objective: Use analytical thinking skills to evaluate information critically

Outcome: Students will demonstrate the ability to answer conceptual questions on examination questions.

Objective: Effectively relate basic ideas and concepts to more sophisticated atmospheric systems.

Outcome: Students will demonstrate the ability to employ critical thinking in answering

short questions as well as solving problems on examinations.

Objective: Use a wide range of disparate information and knowledge to draw references and summarize various concepts, theories, and observational evidence in the literature.

Outcome: Students will demonstrate the ability to absorb various concepts, theories and observations in assigned references and summarize and present them to the class.

Required Textbooks and Materials

Required Texts: Introduction to Theoretical Meteorology by S. L. Hess, Krieger Publishing Co., Reprint Ed. 1979 “Lecture Notes” by Yuh-Lang Lin, NCAT, will be posted on the [Mesolab](#) website.

Required Materials: N/A

Suggested Course Materials

Suggested Readings/Texts:

- (1) A First Course in Atmospheric Thermodynamics by W. Petty, Sundo Publishing Co., 2008
- (2) An Introduction to Atmospheric Thermodynamics by A. A. Tsonis, Cambridge, 2007, 2nd Ed.

Suggested Materials: N/A

Grading Policy

Course Grade Scale *[Undergraduate level courses]*

94% and above	A	83% - 80%	B-	69% - 67%	D+
93% - 90%	A-	79% - 77%	C+	66% - 60%	D
89% - 87%	B+	76% - 74%	C	59% - 0%	F
86% - 84%	B	73% - 70%	C-		

Grading Allocation

Course grades are based on a weighted grading scale of 100%. The breakdown for the course is as follows:

- 5% Participation
- 30% Labs
- 30% Midterm
- 35% Final Exam

Course Policies

Use Of Blackboard as The Learning Management System

Blackboard is the primary online instructional and course communications platform. Students can access the course syllabus, assignments, grades, and learner support resources. Lecture notes will be posted on the [Mesolab](#) website. Students are encouraged to protect their login credentials, complete a Blackboard orientation and log in daily to the course.

Make-Up Exams No make-up exams.

Extra Credit N/A

Late Work A penalty will be applied for the late submission of assignments.

Use of AI Not Allowed

Special Assignments N/A

Class Schedule [\[See here for a complete calendar\]](#)

Presentation Schedule

Date	Pres. #	Presentation Title	Remarks (Sec.)
1/13	1	Introduction to the Course and Labs	1.1
1/15	2	Basic Concepts	1.2
1/20	3	Equation of State of an ideal Gas	2.1 (Lab 1)
1/22	4	A Mixture of Ideal Gases	2.2 (Lab 2)
1/27	5	Work	3.1
1/29	6	Heat	3.2a
2/3	7	Kinetic Theory of Gases	3.2b (Lab 3)
2/5	8	First Law of Thermodynamics	3.3
2/10	9	Internal Energy, Heat Capacity & Enthalpy	3.4 (Lab 4)
2/12	10	Adiabatic Process	3.5
2/17	11	Carnot Cycle	4.1
2/19	12	Carnot Cycle	4.1
2/24	13	Second Law of Thermodynamics	4.2 (Lab 5)
2/26		Midterm	
3/2-3/6		Spring Break	
3/10	14	Entropy	4.3
3/12	15	Water-Air System – Isotherms on the Phase Diagram	5.1 (Lab 6)
3/17	16	Thermal Properties of Water Substance	5.2
3/19	17	Equation of State for Moist Air-I	5.3
3/24	18	Equation of State for Moist Air-II	5.3 (Lab 7)
3/26	19	Phase Change & Latent Heat	5.4
3/31	20	The Clausius-Clapeyron Equation	5.5
4/3	21	Saturated Adiabatic Process	5.6
4/7	22	Moisture Variables - I	5.7
4/9	23	Moisture Variables - II	5.7 (Lab 8)
4/14	24	Thermodynamic Diagrams	6.1
4/16	25	Thermodynamic Diagrams	6.1
4/21	26	Thermodynamic Diagrams	6.1 (Lab 9)
4/23	27	Hydrostatic Equilibrium, Geopotential & Scale Height	7.1
4/28	28	Hypsometric Equation	7.2 (Lab 10)
4/30		Review	
5/4-5/8		Final Exam	

* These descriptions and timelines are subject to change at the discretion of the instructor.

College Policies

Academic Integrity Policy: <https://www.ncat.edu/cost/files/cost-academic-integrity-policy-finaldraft.pdf>

Grade Appeal Policy: <https://www.ncat.edu/cost/student-success/grade-appeal-policy-2022.pdf>

Both are binding.

[Distance Learning Policies]

List any distance learning policies here if appropriate.

University Policies

[Aggies-Care Link](#)

AI Course Guidance: AI is not permitted on this course.

Ethical Use First Steps: AI is not permitted on this course.

Guidance for the syllabus: AI is not permitted on this course.

Class Attendance and Participation

Students are expected to attend class and participate on a regular basis in order to successfully achieve course learning outcomes and meet federal financial aid requirements ([34 CFR 668.22](#)). Active participation may consist of course interactions with the content, classmates, and/or the instructor. Examples of academically-related course activities include, but are not limited to:

- Completing and submitting assignments, quizzes, exams, and other activities within Blackboard or through Blackboard (3rd-party products).
- Participating in course-related synchronous online chats, discussions, or meeting platforms such as Blackboard Collaborate in which participation is tracked.

Note: Uploading assignments through Blackboard presents a challenge for Chromebook users in locating the files for submission. If you use a Chromebook, please be sure you also have access to a Mac computer or Windows computer so you can fully participate in your Blackboard class. For more information about student computer recommendations, please visit <https://hub.ncat.edu/administration/its/computer-recommendations.php>.

Participation & Financial Aid Requirements

- **Regular participation is required to:**
 - Successfully complete the course
 - Stay eligible for federal financial aid ([34 CFR 668.22](#))
 - [N.C. A&T Financial Aid Eligibility](#)
- **Examples of academic participation include:**
 - Submitting assignments, quizzes, and exams in Blackboard
 - Participating in online discussions, chats, and live class sessions (e.g., Blackboard Collaborate, or other activities designated by the instructor)

Technology Reminder

- Chromebook users may have difficulty uploading files to Blackboard.
- Students using Chromebooks should **also have access to a Mac or Windows computer**.
- View recommended student computer requirements here: <https://hub.ncat.edu/administration/its/computer-recommendations.php>

Classroom Citizenship

Courtesy, civility, and respect must be the hallmark of your interactions. It is expected that students will conduct themselves in a courteous manner to fellow students and the instructor.

Cell Phone Usage

Cell phone use inside classrooms during class periods is prohibited. Be advised that placing or receiving calls, as well as conversing on cell phones during class, shall be considered as disruptive behavior for students and may be subject to the procedures on Disruptive Students in the Classroom.

Compliance with the Americans with Disabilities Act

North Carolina A&T State University (N.C. A&T) is committed to following the requirements of the Americans with Disabilities Act Amendments Act (ADAAA) and Section 504 of the Rehabilitation Act.

If you need an academic accommodation based on the impact of a disability, you must initiate the request with the Office of Accessibility Resources (OARS) and provide documentation in accordance with the Documentation Guidelines at N.C. A&T. Once documentation is received, it will be reviewed. Once approved, you must attend a comprehensive meeting to receive appropriate and reasonable accommodations. If you are a student registered with OARS, you must complete the Accommodation Request Form to have accommodations sent to faculty.

OARS is located in the Academic Classroom Building, Room 302 and can be reached at 336-334-7765, or by email at accessibilityresources@ncat.edu. Additional information and forms can be found on the internet at <https://www.ncat.edu/provost/academic-affairs/accessibility-resources/index.php>.

Please note: Accommodations are not retroactive and begin once the Disability Verification Form is provided to faculty.

Title IX

North Carolina A&T State University is committed to providing a safe learning environment for all students—free of all forms of discrimination and harassment. Sexual misconduct and relationship violence in any form are inconsistent with the university’s mission and core values, violate university policies, and may also violate federal and state law. Faculty members are considered “Responsible Employees” and are required to report incidents of sexual misconduct and relationship violence to the Title IX Coordinator. If you or someone you know has been impacted by sexual harassment, sexual assault, dating or domestic violence, or stalking, please visit the Title IX website to access information about university support and resources <https://www.ncat.edu/legal/title-ix/index.php>. If you would like to speak with someone confidentially, please contact the Counseling Services at 336-334-7727 or the Student Health Center at 336-334-7880.

General University Information

QEP: TEAM

North Carolina A&T’s Quality Enhancement Plan is a requirement of regional accreditation with the Southern Association of Colleges and Schools Commission on Colleges. The title of N.C. A&T’s plan is Toward Enhanced Achievement in Mathematics, or QEP: TEAM. The purpose: to improve student success, specifically student performance in general education mathematics courses.

Mathematics is important to all learners, not just STEM majors. Math mastery is essential for many career paths and for use in our daily lives beyond N.C. A&T. Research shows that learning mathematics makes us better critical thinkers and problems solvers. Many students report struggles with mathematics coursework. The extensive level of mathematics support now provided by A&T – all of it, free of charge for all students – has proven to be effective for students who have taken advantage of it. That support includes individual and group tutoring and a new online mathematics platform, ALEKS -- a research-based learning program that uses artificial intelligence to provide engaging, customized instruction tailored to individual learner needs.

No matter your history with mathematics, it is NOT impossible to learn! Stay engaged, and take advantage of the free A&T support. You'll not only grow more comfortable with mathematics, you'll become more confident in your abilities, and that will lead to success in the classroom.

For more information about QEP: TEAM, please click on the following link or scan the QR Code: QUALITY ENHANCEMENT PLAN: TOWARD ENHANCED ACHIEVEMENT IN MATHEMATICS (QEP: TEAM) | 2021–2026 (ncat.edu)



Technical Requirements

Students are to refer to the Information Technology (IT) Services student computer requirement list to determine the minimum technical requirements based on College specifications.

Link: <https://hub.ncat.edu/administration/its/computer-recommendation.php>

Online Orientation Requirement

All new students at North Carolina Agricultural and Technical State University are required to complete an online orientation, which includes familiarizing themselves with the LMS tools (Blackboard) and online learning strategies before starting their first course. <https://bit.ly/AggieOnlineLearningOrientation>

How to Enroll

<https://bit.ly/AggieOnlineLearningOrientationSelfEnroll>

Technical Support

If you experience any problems with your N.C. A&T account, you may call Client Technology Services (formerly Aggie Tech Support and Help Desk) at 336-334-7195, or visit

<https://hub.ncat.edu/administration/its/dept/ats/index.php>

Field Trip Policies / Off-Campus Instruction and Course Activities

Off-campus, out-of-state, and foreign instruction and activities are subject to state law and university policies and procedures regarding travel and risk-related activities. Information regarding these rules and regulations may be found at

<https://hub.ncat.edu/administration/business-and-finance/comptroller/acct-off/travel-services/student-travel.php>

[Student Travel Procedures and Student Travel Activity Waiver](#)

Other Relevant Policies

[Family Educational Rights and Privacy Act \(FERPA\)](#)

[Sexual Misconduct Policy \(Title IX website\)](#)

[Student Complaint Policy](#)

[Student Religious Observance](#)

[Undergraduate Grade Appeal Process](#)

Student Conduct and Discipline

North Carolina A&T State University has rules and regulations that govern student conduct and discipline meant to ensure the orderly and efficient conduct of the educational enterprise. It is the responsibility of each student to be knowledgeable about these rules and regulations.

Please consult the following about specific policies such as academic dishonesty, cell phones, change of grade, disability services, disruptive behavior, general class attendance, grade appeal, incomplete grades, make up work, student grievance procedures, withdrawal, etc.:

- [Undergraduate Catalog](#)
- [Graduate Catalog](#)
- [Student Handbook](#)

Academic Dishonesty Policy

Academic dishonesty includes but is not limited to the following:

1. Cheating or knowingly assisting another student in committing an act of cheating or other academic dishonesty;
2. Plagiarism (unauthorized use of another's words or ideas as one's own), which includes but is not limited to submitting exams, theses, reports, drawings, laboratory notes or other materials as one's own work when such work has been prepared by or copied from another person;
3. Unauthorized possession of exams or reserved library materials; destroying or hiding source, library or laboratory materials or experiments or any other similar actions;
4. Unauthorized changing of grades, or marking on an exam or in an instructor's grade book or such change of any grade record;
5. Aiding or abetting in the infraction of any of the provisions anticipated under the general standards of student conduct;
6. Hacking into a computer and gaining access to a test or answer key prior to the test being given. N.C. A&T reserves the right to search the emails and computers of any student suspected of such computer hacking if a police report of the suspected hacking was submitted prior to the search; and
7. Assisting another student in violating any of the above rules.

A student who has committed an act of academic dishonesty has failed to meet a basic requirement of satisfactory academic performance. Thus, academic dishonesty is not only a basis for disciplinary action but may also affect the evaluation of a student's level of performance. Any student who commits an act of academic dishonesty is subject to disciplinary action.

In instances where a student has clearly been identified as having committed an act of academic dishonesty, an instructor may take appropriate disciplinary action, including a loss of credit for an assignment, exam, or project; or awarding a grade of "F" for the course, subject to review and endorsement by the chairperson and dean. Students may also be referred to the Dean of Students Office for further disciplinary sanctions for violating the [Student Code of Conduct](#).

The Office of Accessibility Resources

The Office of Accessibility Resources (OARS) works collaboratively with students, faculty, and staff to create a universally accessible campus where programs and services are usable by all people, to the greatest extent possible. OARS provides the campus community with resources and services for individuals with disabilities to achieve social justice and equity. New and returning students who request accommodations due to a disability or medical condition are

responsible for registering with OARS, submitting documentation, knowing and following the policies and procedures of OARS located on our [Get Connected](#) webpage. OARS is located in the Academic Classroom Building, Room 302.

Phone: 336-334-7765

Email: accessibilityresources@ncat.edu or oars@ncat.edu

Office of Veteran & Military Affairs

The Office of Veteran and Military Affairs (OVMA) is here to meet the needs of our students who are veterans, service members, dependents of service members, and/or veterans. The OVMA certifies your educational benefits throughout each academic year. The OVMA is also prepared to advise and counsel you in regard to any veteran or education-related concerns. The OVMA serves as the liaison between veteran students and the Department of Veterans Affairs. It assists eligible veteran students in understanding their educational benefits, provide guidance on procedural requirements, and certify, register, and report enrollments to the VA to ensure veterans receive their benefits in a timely manner.

The OVMA is located in The Aggie Student V.E.T.S. Center at The Oaks.

Phone: 336-398-8651

Counseling Services

Counseling Services, an International Accreditation of Counseling Services (IACS) accredited unit in the Division of Student Affairs, offers a variety of services to help all currently enrolled North Carolina A&T students address challenges and difficulties they may face. Services are designed to help students understand themselves better, create and maintain healthy relationships, improve their academic performance, and make satisfying career and life choices. *If you are experiencing distress, they provide a safe and confidential environment for counseling. You may contact Counseling Services at 336-334-7727 or stop by our office in Murphy Hall, Suite 109.*

Tutorial Services

The mission of CAE Tutorial Program is to empower students for academic success within a safe and inclusive learning environment. Our goal is to provide academic support by offering a broad range of tutoring services for those students desiring to improve their in-class performance. When you schedule a tutoring session, you can get help with preparing for an upcoming exam or with covering difficult concepts you want to master.

North Carolina A&T State University has partnered with Upswing to help students find, schedule, and book tutoring sessions both in-person and virtually. Through a web-based tutoring platform, you can schedule FREE tutoring lessons with Upswing's online tutors, or with North Carolina A&T State University in-person tutors, for a variety of subjects. Go to ncat.upswing.io and log in with your Aggie OneID credentials to get started, or contact the Center for Academic Excellence at 336-334-7855.

Technology Support

Client Technology Services

Client Technology Services (CTS), a unit within Information Technology Services (ITS), provides frontline technical support for students, faculty, and staff. CTS supports desktop computing, university-approved software, and technology needs across academic and residential labs as well as administrative offices. The team also assists with account access issues—including password resets and authentication support—to ensure secure and reliable access to university systems and resources.

Phone: 336-334-7195

Email: itservicedesk@ncat.edu

Submit a Ticket: <https://support.ncat.edu/>

Blackboard Log-In

<https://blackboard.ncat.edu/webapps/portal/frameset.jsp>

Username: OneID username (i.e., text to the left of the @ symbol)

Password: OneID password

Default Password Format: abcd1234!NCAT! (abcd = First 4 letters of your OneID, 1234 = Last 4 numbers in your Banner ID)

For assistance with OneID accounts, contact Client Technology Services at 336-334-7195.

Blackboard Support

Phone: 743-249-8700

Note: After obtaining a new NCAT email account, it may take up to 48 business hours to establish Blackboard access.