Course Approval Form

For approval of new courses and deletions or modifications to an existing course.

registrar.gmu.edu/facultystaff/curriculum

Action Requested:

- [X] Create new course
- [ ] Inactivate existing course
- [ ] Modify existing course (check all that apply)
  - [ ] Title
  - [ ] Credits
  - [ ] Repeat Status
  - [ ] Grade Type
  - [ ] Prereq/coreq
  - [ ] Schedule Type
  - [ ] Restrictions
  - [ ] Other:

Course Level:

- [x] Undergraduate
- [ ] Graduate

College/School: COS **Department:** AOES

Submitted by: Barry Klinger **Ext:** 9227 **Email:** bklinger@gmu.edu

Subject Code: CLIM **Number:** 429

(Do not list multiple codes or numbers. Each course proposal must have a separate form.)

Effective Term:

- [x] Fall
- [ ] Spring
- [ ] Summer

Year 2014

Title:

Current: Atmospheric Thermodynamics

Banner (30 characters max including spaces): Atmospheric Thermodynamics

New:

Credits: (check one)

- [x] Fixed: 3 or
- [ ] Variable: to

Repeat Status: (check one)

- [x] Not Repeatable (NR)
- [ ] Repeatable within degree (RD)
- [ ] Repeatable within term (RT)

Maximum credits allowed:

Grade Mode: (check one)

- [X] Regular (A, B, C, etc.)
- [ ] Satisfactory/No Credit
- [ ] Special (A, B C, etc. +IP)

Schedule Type: (check one) LEC can include LAB or RCT

- [x] Lecture (LEC)
- [ ] Lab (LAB)
- [ ] Recitation (RCT)
- [ ] Internship (INT)
- [ ] Independent Study (IND)
- [ ] Seminar (SEM)
- [ ] Studio (STU)

Prerequisite(s):

CLIM 111 and MATH 114; or permission of instructor

Corequisite(s):

Instructional Mode:

- [X] 100% face-to-face
- [ ] Hybrid: ≤ 50% electronically delivered
- [ ] 100% electronically delivered

Restrictions Enforced by System: Major, College, Degree, Program, etc. Include Code.

Are there equivalent course(s)?

- [ ] Yes
- [x] No

If yes, please list

Catalog Copy for NEW Courses Only (Consult University Catalog for models)

Description (No more than 60 words, use verb phrases and present tense)	**Notes** (List additional information for the course)
Thermodynamics of the atmosphere, properties of dry and moist air, air parcel as a thermodynamic system, atmospheric stability and convection, cloud formation and stability indices.	

Indicate number of contact hours: Hours of Lecture or Seminar per week: 3 Hours of Lab or Studio:

When Offered: (check all that apply) [x] Fall [ ] Summer [ ] Spring

Approval Signatures

Department Approval Date

College/School Approval Date

If this course includes subject matter currently dealt with by any other units, the originating department must circulate this proposal for review by those units and obtain the necessary signatures prior to submission. Failure to do so will delay action on this proposal.

Unit Name	Unit Approval Name	Unit Approver's Signature	Date

For Graduate Courses Only

Graduate Council Member

Provost Office

Graduate Council Approval Date

For Registrar Office's Use Only: Banner_____Catalog_____

revised 11/8/11

Course Proposal Submitted to the Curriculum Committee of the College of Science

1. COURSE NUMBER AND TITLE: CLIM 429 Atmospheric Thermodynamics

Course Prerequisites: CLIM 111 and MATH 114 (or equivalent); or permission of instructor

Catalog Description:
Thermodynamics of the atmosphere, properties of dry and moist air, air parcel as a thermodynamic system, atmospheric stability and convection, cloud formation and stability indices

2. COURSE JUSTIFICATION:

The new course is a renumbered version of CLIM 309. The change to 429 is based on feedback from SCHEV during the (ongoing) approval process. The course is more appropriate as a 400 level course than as a 300 level course. The title has been changed from "Introduction to Atmospheric Thermodynamics" to simply "Atmospheric Thermodynamics", which also helps clarify that this is an upper level course.

Course Objectives:

Students will be able to (1) Develop an understanding of atmospheric thermodynamic processes;
(2) Acquire the mathematical skill and physical principles of atmospheric thermodynamics;
(3) Apply the mathematical skill and physical principles to solving atmospheric thermodynamics problems.

Course Necessity:
Atmospheric thermodynamics is one of the core foundations of meteorology. Concepts are applied to weather analyses and forecasting.

Course Relationship to Existing Programs:

This course will fulfill the requirement of the US OPM requirement on GS-1340 Meteorology series in atmospheric thermodynamics.

Course Relationship to Existing Courses:
This course builds on the fundamental of atmospheric science and introduces students to atmospheric thermodynamics, complements atmospheric dynamics, synoptic meteorology as the core of meteorology

3. APPROVAL HISTORY:
New course

4. SCHEDULING AND PROPOSED INSTRUCTORS:

Semester of Initial Offering: Fall 2014

Proposed Instructors: Long Chiu

5. TENTATIVE SYLLABUS: see following page

CLIM 429 Atmospheric Thermodynamics

Instructor: Long Chiu

Catalogue Description:
Thermodynamics of the atmosphere, properties of dry and moist air, air parcel as a thermodynamic system, atmospheric stability and convection, cloud formation and stability indices

Course Objectives:
Students (1) Develop an understanding of atmospheric thermodynamic processes; (2) Acquire the mathematical skill and physical principles of atmospheric thermodynamics; (3) Apply the mathematical skill and physical principles to solving atmospheric thermodynamics problems.

Prerequisites: CLIM 111 and MATH 114, or permission of instructor

Grading: Home work: 30%**,** Mid-term: 30%, Final: 40%
There are 6 HW problem sets. Each set carries 5% of total grade. HW problems are due the week after they are assigned.

Course Text:
Petty, G. W., 2008: A First Course in Atmospheric Thermodynamics, Sundog Pub., Madison Wisconsin, 334pp
This book may be purchased directly from the publisher Sundog Publishing, LLC or through on-line booksellers.

Course Resources:
Atmospheric sounding http://weather.uwyo.edu/upperair/sounding.html
AMS glossary of meteorology http://glossary.ametsoc.org/wiki/Main_Page

Tentative Syllabus and Schedule

Week (Monday of week)	Topics	Reading	HW assignment
1 (Jan 20, Monday no class)	Atmospheric composition and structure; Math review	Section 1.1; 1.2 Appendix C	
2 (Jan 27)	Temperature, problem solving tutorial	1.3; Appendix B	
3 (Feb 3)	Thermodynamic systems and variables, equation of state of dry air	2.1; 2.2; 3.1	HW#1
4 (Feb 10)	Equation of state of moist air, buoyancy	3.2; 3.3; 3.4; 3.5	HW#2
5 (Feb 17)	Pressure	4.1; 4.2	
6 (Feb 25)	Pressure application and First law of thermodynamics	4.3; 5.1; 5.2	HW#3
7 (Mar 4)	Dry adiabatic process	5.3; 5.4	Mid-term
8 (Mar 10)	Spring Recess (no class)		
9 (Mar 17)	Heat engines, Carnot cycle;	5.5; 5.6; 5.7;	

10 (Mar 24)	Skew-T diagram; Second Law	5.8; 6.1; 6.2;	HW#4
11 (Mar 31)	Moist processes; Clausius-Clapeyron equation	7.1; 7.2; 7.3; 7.4	
12 (Apr 7)	Moisture variables, LCL, moist adiabatic lapse rate	7.5; 7.6; 7.7	HW#5
13 (Apr 14)	Equivalent potential and web-bulb temperature	7.8; 7.9;7.10	
14 (Apr 21)	Atmospheric stability	8.1; 8.2; 8.3	HW#6
15 (Apr 28)	Atmospheric convection and stability indices	8.4; 8.5	
(May 7-24)	Final Exam		