FORMAT 2

Submit originals (including syllabus) and one copy and electronic copy to the **Faculty Senate Office**
See http://www.uaf.edu/uafgov/faculty-senate/curriculum/course-degree-procedures-/ for a complete description of the rules governing curriculum & course changes.

CHANGE COURSE (MAJOR) and DROP COURSE PROPOSAL

Attach a syllabus, except if dropping a course.

SUBMITTED BY:

Department	Atmospheric Sciences	College/School	CNSM
Prepared by	Barbara Day	Phone	7368
Email Contact	bdday@alaska.edu	Faculty Contact	Javier Fochesatto, foch@gi.alaska.edu, x7602

1. COURSE IDENTIFICATION: As the course now exists.

Dept	Course #	No. of Credits
ATM	615	3

COURSE TITLE Cloud Physics

2. ACTION DESIRED: √ Check the changes to be made to the existing course.

Change Course	X	If Change, indicate below what is changing.	Drop Course	

NUMBER		***TITLE***		***DESCRIPTION***	
PREREQUISITES*				***FREQUENCY OF OFFERING***	

*Prerequisites will be *required* before a student is allowed to enroll in the course.

CREDITS (including credit distribution)		***COURSE CLASSIFICATION***	
ADD A STACKED LEVEL *(400/600) Include syllabi.*	X	Dept. ATM	Course # 415

How will the two course levels differ from each other? How will each be taught at the appropriate level?:

Stacked course applications are reviewed by the (Undergraduate) Curricular Review Committee and by the Graduate Academic and Advising Committee. Creating two different syllabi—undergraduate and graduate versions—will help emphasize the different qualities of what are supposed to be two different courses. The committees will determine: 1) whether the two versions are sufficiently different (i.e. is there undergraduate and graduate level content being offered); 2) are undergraduates being overtaxed?; 3) are graduate students being undertaxed? In this context, the committees are looking out for the interests of the students taking the course. Typically, if either committee has qualms, they both do. More info online – see URL at top of this page.

ADD NEW CROSS-LISTING		Dept. & No.		Requires approval of both departments and deans involved. Add lines at end of form for additional signatures.
STOP EXISTING CROSS-LISTING		Dept. & No.		Requires notification of other department(s) and mutual agreement. Attach copy of email or memo.
OTHER (specify)				

3. COURSE FORMAT

NOTE: Course hours may not be compressed into fewer than three days per credit. Any course compressed into fewer than six weeks must be approved by the college or school's curriculum council **and** the appropriate Faculty Senate curriculum committee. Furthermore, **any core course compressed to less than six weeks must be approved by the Core Review Committee.**

COURSE FORMAT: (check **all** that apply)		*1*		*2*		*3*		*4*		*5*	X	*6 weeks to full semester*
OTHER FORMAT (specify all that apply)												
Mode of delivery (specify lecture, field trips, labs, etc.)	Lecture											

RECEIVED
SEP 11 2015
Dean's Office
College of Natural Science & Mathematics

Governance
10/02/15 MR

4. **COURSE CLASSIFICATIONS:** (undergraduate courses only. Use approved criteria found in Chapter 12 of the curriculum manual. If justification is needed, attach separate sheet.)

H = Humanities		S = Social Sciences	

Will this course be used to fulfill a requirement for the baccalaureate core?	YES		NO	

IF YES*, check which core requirements it could be used to fulfill:

O = Oral Intensive, *Format 6 also submitted		W = Writing Intensive, *Format 7 submitted		X = Baccalaureate Core	

4.A ***Is course content related to northern, arctic or circumpolar studies? If yes, a "snowflake" symbol will be added in the printed Catalog, and flagged in Banner.***

YES		NO	X

5. **COURSE REPEATABILITY:**

Is this course repeatable for credit?	YES		NO	X

Justification: Indicate why the course can be repeated (for example, the course follows a different theme each time).	

How many times may the course be repeated for credit?		TIMES

If the course can be repeated with variable credit, what is the maximum number of credit hours that may be earned for this course?		CREDITS

6. <u>COMPLETE</u> CATALOG DESCRIPTION including dept., number, title, credits, credit distribution, cross-listings and/or stacking, clearly showing the changes you want made. (<u>Underline new wording</u> ~~strike through old wording~~ and use complete catalog format including dept., number, title, credits and cross-listed and stacked.)

Example of a <u>complete</u> description:

PS F450 Comparative ~~Aboriginal~~ <u>Indigenous</u> Rights and Policies (s)
3 Credits
Offered As Demand Warrants
~~Case-study~~ <u>Comparative</u> approach ~~in assessing Aboriginal~~ <u>to analyzing Indigenous</u> rights and policies in different nation-state systems. ~~Seven Aboriginal situations~~ <u>Multiple countries and specific policy developments</u> examined for factors promoting or limiting self-determination. Prerequisites: Upper division standing or permission of instructor. (Cross-listed with ANS F450.) (3+0)

<u>ATM F415 Cloud Physics</u>
<u>3 Credits</u>
<u>Offered Spring Even-numbered Years</u>
<u>Cloud physics develops the thermodynamic phases of water in the atmosphere from microscale to macroscale processes. The understanding of clouds and their role in the earth system requires knowing fundamental thermodynamic properties of condensed water vapor, atmospheric aerosols, nucleation, condensation and growth of water droplets and ice crystals and development of precipitation. The major topics of this course are ice and mixed-phase clouds, anthropogenic and non-anthropogenic modification of cloud and cloud radiative influences. The course will also cover the topics of thunder cloud, fog and ice-fog formation. Remote sensing and laboratory techniques and their importance in cloud physics research are highlighted. The course includes the collection and analysis of polarimetric Lidar data and laboratory microscopic examination of ice crystals. Prerequisites/Co-requisites: ATM F401. Stacked with ATM F615. (3+0)</u>

ATM F615 Cloud Physics
3 Credits
Offered Spring Even-numbered Years
Cloud physics develops the thermodynamic phases of water in the atmosphere from microscale to macroscale processes. The understanding of clouds and their role in the earth system requires knowing fundamental thermodynamic properties of condensed water vapor, atmospheric aerosols, nucleation, condensation and growth of water droplets and ice crystals and development of precipitation. The major topics of this course are ice and mixed-phase

clouds, anthropogenic and non-anthropogenic modification of cloud and cloud radiative influences. The course will also cover the topics of thunder cloud, fog and ice-fog formation. Remote sensing and laboratory techniques and their importance in cloud physics research are highlighted. The course includes the collection and analysis of polarimetric Lidar data and laboratory microscopic examination of ice crystals. Prerequisites: ATM F601; graduate standing; or permission of instructor. Stacked with ATM F415. (3+0)

7. *COMPLETE CATALOG DESCRIPTION AS IT SHOULD APPEAR AFTER ALL CHANGES ARE MADE:*

ATM F415 Cloud Physics
3 Credits
Offered Spring Even-numbered Years
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8. *GRADING SYSTEM: Specify only one.*

LETTER:	X	PASS/FAIL:	

9. *ESTIMATED IMPACT*

WHAT IMPACT, IF ANY, WILL THIS HAVE ON BUDGET, FACILITIES/SPACE, FACULTY, ETC.

No Impact.

10. *LIBRARY COLLECTIONS*

Have you contacted the library collection development officer (kljensen@alaska.edu, 474-6695) with regard to the adequacy of library/media collections, equipment, and services available for the proposed course? If so, give date of contact and resolution. If not, explain why not.

No		Yes		**Professor has talked to the librarian and all the requested materials will be available at the Keith Mather Library.**

11. IMPACTS ON PROGRAMS/DEPTS:

What programs/departments will be affected by this proposed action?
Include information on the Programs/Departments contacted (e.g., email, memo)

None

12. POSITIVE AND NEGATIVE IMPACTS

*Please specify **positive and negative** impacts on other courses, programs and departments resulting from the proposed action.*

Positive impact is that undergraduates majoring in the sciences will be able to take this course.

13. JUSTIFICATION FOR ACTION REQUESTED

The purpose of the department and campus-wide curriculum committees is to scrutinize course change and new course applications to make sure that the quality of UAF education is not lowered as a result of the proposed change. Please address this in your response. This section needs to be self-explanatory. If you ask for a change in # of credits, explain why; are you increasing the amount of material covered in the class? If you drop a prerequisite, is it because the material is covered elsewhere? If course is changing to stacked (400/600), explain higher level of effort and performance required on part of students earning graduate credit. Use as much space as needed to fully justify the proposed change and explain what has been done to ensure that the quality of the course is not compromised as a result.

This course is beneficial for undergraduates at UAF majoring in math or science who may be considering graduate studies in atmospheric sciences, environmental sciences or geosciences with emphasis in remote sensing.

APPROVALS: (Forms with missing signatures will be returned. Additional signature blocks may be added as necessary.)

Uma S. Bhatt Uma S Bhatt	Date	9/29/15	
Signature, Chair, Program/Department of:	Atmospheric Sciences		
	Date	10-1-15	
Signature, Chair, College/School Curriculum Council for:	CNSM		
	Date	10/1/15	
Signature, Dean, College/School of:	CNSM		

Offerings above the level of approved programs must be approved in advance by the Provost (e.g., non-graduate level program offering of a 600-level course):

	Date	
Signature of Provost (if applicable)		

ALL SIGNATURES MUST BE OBTAINED PRIOR TO SUBMISSION TO THE GOVERNANCE OFFICE.

	Date	

Signature, Chair
Faculty Senate Review Committee: ___Curriculum Review ___GAAC

___Core Review ___SADAC

Cloud Physics ATM-415/615

Tuesday & Thursday 2:00 to 3:30 Room (TBD)
Instructor: Dr. Javier Fochesatto
Office: Akasofu 317
Email: foch@gi.alaska.edu
Phone: 474-7602
Office Hours: Tuesday & Thursday 3:30-5:00 PM following class and by appointment
Course texts:
"A Short Course on Cloud Physics" Rogers and Yau
"Microphysics of Clouds and Precipitation" Pruppacher and Klett
"Physics and Dynamics of Clouds and Precipitation" Wang
"Thermal Physics of the Atmosphere" Ambaum
Course Notes and Lectures

Course Overview
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Grading
Grades will be determined by combining scores obtained in the exams as well as based on homework/paper reading assignments. In the case of graduate students enrolled in ATM-615 a research paper is required for course completion. The grade breakdown is given below. Exam duration is scheduled for 1.5 hours duration.

	ATM-415	ATM-615
Homework/paper assignment	40%	20%
Exam 1	15%	15%
Exam 2	15%	15%
Exam 3	30%	30%
Research Paper	Not required	20%

Cumulative (%)	Grade
97 - 100%	A^+
92 - 96%	A
88 - 91%	A^-
84 - 87%	B^+
80 - 83%	B
76 - 79%	B^-
73 - 75%	C^+
69 - 72%	C
65 - 68%	C^-
62 - 64%	D^+
58 - 61%	D
54 - 57%	D^-
<54%	F

Exams and Homework
Students Enrolled in ATM-415
Homework comprises basic numerical problems combined with occasional topics requiring further development. Your homework needs to be submitted in electronic form using the publication template of the *American Meteorological Society* including figures, tables, formulas and references. Latex format is also accepted.
Exams 1 and 2 cover material from previous weeks while **exam 3** is cumulative. It is important for you to elaborate the exams in detail so that a partial grade can be assigned in case the point has not been fully developed. Describing your rationale behind the response is important even if a numerical answer was not achieved. Students enrolled in ATM-415 will be required to solve only 4 out of 5 total questions.
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Research paper comprises a research topic of interest that you will select and discuss with me. The paper needs: 1) Introduction and topic background including references obtained from a comprehensive literature search; 2) Description of methodology or theory; 3) Data processing or data discussion highlighting how this work has advanced or can advance cloud and aerosol research; 4) Discussion and conclusions. Topics of interest are available for your selection. Research paper is due the week before the end of classes and can be submitted at any time. The paper will be defended either in the departmental seminar or in class.

Ethics
I encourage originality in your paper development as well as correct behavior during exams. Plagiarism and cheating are matters of serious concern for students and academic institutions. This is true in this class as well. The UAF Honor Code (or Student Code of Conduct) defines academic standards expected at the University of Alaska Fairbanks, which will be followed in this class. Plagiarism and cheating will be graded with an automatic F.

Disabilities
The Office of Disability Services implements the Americans with Disabilities Act (ADA), and insures that UAF students have equal access to the campus and course materials. We will work with the Office of Disabilities Services (203 WHIT, 474-7043) to provide reasonable accommodation to students with disabilities.

Important Dates
Drop Day 1/29
Las day for Withdrawals 03/25
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4	02/2-4	Aerosol deliquescence, cloud droplets, nucleation, condensation and coalescence. HW2
5	02/9-11	Cloud formation. Cloudiness cycle. Cloud radiative properties and role in climate
6	02/16-18	Exam 1. Ice nuclei, growth and aggregation
7	02/23-25	Formation of crystals. Observation methods and radiative properties. HW3
8	03/1-3	Cirrus cloud formation, properties and structure analysis
9	03/8-10	Mixed-phase cloud characteristics and properties.HW4
10	03/15-17	Spring recess (no classes)
11	03/22-24	Mixed-phase cloud models and challenges
12	03/29-31	Exam 2. Continental and marine stratocumulus cloud. Boundary-Layer clouds
13	04/5-7	Precipitation and observation methodologies
14	04/12-14	Analysis of remote sensing data ground base and satellite
15	04/19-21	Thunder cloud and lightning. Weather modification: contrails, ice fog, biological and artificial clouds
16	04/26-28	Review and Exam 3
17	05/3-5	Paper presentations

Student Learning Outcomes

By the end of the semester successful students should be able to understand and explore thermodynamics processes in the atmosphere related to aerosol cloud interaction, cloud formation, microphysics and dynamics. Express these processes into equations; understand and solve fundamental problems related to atmospheric thermodynamics in the context of cloud research and quantitatively describe typical microscale and macroscale (e.g. nucleation, freezing, supercooled clouds, etc). Fundamental goals are that you develop skills to analyze and interpret lidar, radar and satellite data and identify microphysical and dynamic processes. This includes application of learned material to different problems or putting learned material together in a new context to solve a problem where atmospheric thermodynamic variables plays a fundamental role. In addition the student will be exposed to read, understand and critically discuss journal articles in the mainstream of cloud and aerosol physics scientific literature. Apply concepts from this class to their own research where applicable (Pass comprehensive exam in Cloud Physics for ATM Ph.D. program).

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