

Submit original with signatures + 1 copy + electronic copy to Faculty Senate (Box 7500).
See <http://www.uaf.edu/uafgov/faculty-senate/curriculum/course-degree-procedures/> for a complete description of the rules governing curriculum & course changes.

TRIAL COURSE OR NEW COURSE PROPOSAL

SUBMITTED BY:

Department	Physics	College/School	CNSM
Prepared by	C. P. Price	Phone	x6106
Email Contact	cpprice@alaska.edu	Faculty Contact	C. P. Price

1. ACTION DESIRED (CHECK ONE): Trial Course New Course

2. COURSE IDENTIFICATION: Dept **PHYS** Course # **351** No. of Credits **2**

Justify upper/lower division status & number of credits: **The prerequisites for this course include PHYS 301 and PHYS 341. This course will meet for twenty-eight hours.**

3. PROPOSED COURSE TITLE: **Thermal Physics**

4. To be CROSS LISTED? YES/NO No If yes, Dept: Course #

NOTE: Cross-listing requires approval of both departments and deans involved. Add lines at end of form for additional required signatures.

5. To be STACKED? YES/NO No If yes, Dept. Course #

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.

6. FREQUENCY OF OFFERING: **Spring**
Fall, Spring, Summer (Every, or Even-numbered Years, or Odd-numbered Years) – or As Demand Warrants

7. SEMESTER & YEAR OF FIRST OFFERING (AY2013-14 if approved by 3/1/2013; otherwise AY2014-15) **AY2014-15**

8. 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. Furthermore, **any core course compressed to less than six weeks must be approved by the Core Review Committee.**

COURSE FORMAT: (check all that apply)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input checked="" type="checkbox"/> 6 weeks to full semester
OTHER FORMAT (specify)						
Mode of delivery (specify lecture, field trips, labs, etc)						

9. CONTACT HOURS PER WEEK: **2** LECTURE hours/weeks LAB hours/week PRACTICUM hours/week

Note: # of credits are based on contact hours. 800 minutes of lecture=1 credit. 2400 minutes of lab in a science course=1 credit. 1600 minutes in non-science lab=1 credit. 2400-4800 minutes of practicum=1 credit. 2400-8000 minutes of internship=1 credit. This must match with the syllabus. See <http://www.uaf.edu/uafgov/faculty-senate/curriculum/course-degree-procedures-/guidelines-for-computing/> for more information on number of credits.

OTHER HOURS (specify type)

10. **COMPLETE CATALOG DESCRIPTION** including dept., number, title, credits, credit distribution, cross-listings and/or stacking (50 words or less if possible):

Example of a **complete** description:

FISH F487 W, O Fisheries Management

3 Credits Offered Spring

Theory and practice of fisheries management, with an emphasis on strategies utilized for the management of freshwater and marine fisheries. Prerequisites: COMM F131X or COMM F141X; ENGL F111X; ENGL F211X or ENGL F213X; ENGL F414; FISH F425; or permission of instructor. Cross-listed with NRM F487. (3+0)

PHYS 351 "Thermal Physics" (2 credits)

Classical macroscopic thermodynamics; systems and states, equations of state, the first and second laws of thermodynamics and their consequences, entropy, enthalpy, Helmholtz and Gibbs functions, equilibrium, Maxwell's relations. **Prerequisites: PHYS F212X, F220, F301, F341. (2+0)**

11. **COURSE CLASSIFICATIONS:** Undergraduate courses only. Consult with CLA Curriculum Council to apply S or H classification appropriately; otherwise leave fields blank.

H = Humanities

S = Social Sciences

Will this course be used to fulfill a requirement for the baccalaureate core? **If YES, attach form.**

YES:

NO:

X

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

O = Oral Intensive, **Format 6**

W = Writing Intensive, **Format 7**

X = Baccalaureate Core

11.A **Is course content related to northern, arctic or circumpolar studies? If yes, a** added in the printed Catalog, and flagged in Banner.

"snowflake" symbol will be

YES

NO

X

12. **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?

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

TIMES

CREDITS

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

13. **GRADING SYSTEM:** Specify only one. Note: Changing the grading system for a course later on constitutes a Major Course Change - Format 2 form.

LETTER:

X

PASS/FAIL:

RESTRICTIONS ON ENROLLMENT (if any)

14. **PREREQUISITES**

PHYS 212; PHYS 220; PHYS 301; PHYS 341; or permission of instructor.

These will be required before the student is allowed to enroll in the course.

15. **SPECIAL RESTRICTIONS, CONDITIONS**

16. **PROPOSED COURSE FEES**

\$

Has a memo been submitted through your dean to the Provost for fee approval?

Yes/No

17. **PREVIOUS HISTORY**

Has the course been offered as special topics or trial course previously?

Yes/No

Yes

If yes, give semester, year, course #, etc.:

Spring 2013 (and to be re-offered Spring 2014.)

18. ESTIMATED IMPACT

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

Physics Department has offered this course once already as a Trial Course, and will be offering it again this academic year. It is part of the program offerings, and there is thus no net impact on budget, facilities/space, faculty, etc.

19. 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

Library support is unchanged from previous (see above).

20. 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)

No departmental or programmatic impacts.

21. POSITIVE AND NEGATIVE IMPACTS

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

If this course is not offered, students will not complete the outcomes goals for the undergraduate program.

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. Use as much space as needed to fully justify the proposed course.

This action will convert a successfully offered Trial Course to permanent status.

This course, and the companion course PHYS 451 "Statistical Physics", present topics in classical thermodynamics/thermal physics and in statistical mechanics in a sequence that provides better support for those topics. The curricular trend at peer and peer-aspirant institutions is to separate the two topics, as is proposed here and in the associated course proposal for PHYS 451 "Statistical Physics". Absent these courses, students will not be able to achieve all of the outcomes goals for the BS Physics program.

APPROVALS: Add additional signature lines as needed.

SEE ATTACHED SIGNATURES

	Date	
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Signature, Chair, Program/Department of:

	Date	
--	------	--

Signature, Chair, College/School Curriculum Council for:

	Date	
--	------	--

Signature, Dean, College/School of:

Offerings above the level of approved programs must be approved in advance by the Provost.

	Date	
--	------	--

Signature of Provost (if above level of approved programs)

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APPROVALS: Add additional signature lines as needed.

 Date 12 SEP 2013
Signature, Chair, Program/Department of:

 Date 9-23-13
Signature, Chair, College/School Curriculum Council for: CNSM

 Date 9-24-2013
Signature, Dean, College/School of:

Offerings above the level of approved programs must be approved in advance by the Provost.

Signature of Provost (if above level of approved programs) Date

ATTACH COMPLETE SYLLABUS (as part of this application). This list is online at:

<http://www.uaf.edu/uafgov/faculty-senate/curriculum/course-degree-procedures-/uaf-syllabus-requirements/>

The Faculty Senate curriculum committees will review the syllabus to ensure that each of the items listed below are included. If items are missing or unclear, the proposed course (or changes to it) may be denied.

SYLLABUS CHECKLIST FOR ALL UAF COURSES

During the first week of class, instructors will distribute a course syllabus. Although modifications may be made throughout the semester, this document will contain the following information (as applicable to the discipline):

1. Course information:

☐ Title, ☐ number, ☐ credits, ☐ prerequisites, ☐ location, ☐ meeting time
(make sure that contact hours are in line with credits).

2. Instructor (and if applicable, Teaching Assistant) information:

☐ Name, ☐ office location, ☐ office hours, ☐ telephone, ☐ email address.

3. Course readings/materials:

☐ Course textbook title, ☐ author, ☐ edition/publisher.
☐ Supplementary readings (indicate whether ☐ required or ☐ recommended) and
☐ any supplies required.

4. Course description:

☐ Content of the course and how it fits into the broader curriculum;
☐ Expected proficiencies required to undertake the course, if applicable.
☐ Inclusion of catalog description is *strongly* recommended, and
☐ Description in syllabus must be consistent with catalog course description.

5. ☐ Course Goals (general), and (see #6)

6. ☐ Student Learning Outcomes (more specific)

7. Instructional methods:

☐ Describe the teaching techniques (eg: lecture, case study, small group discussion, private instruction, studio instruction, values clarification, games, journal writing, use of Blackboard, audio/video conferencing, etc.).

8. Course calendar:

☐ A schedule of class topics and assignments must be included. Be specific so that it is clear that the instructor has thought this through and will not be making it up on the fly (e.g. it is not adequate to say "lab". Instead, give each lab a title that describes its content). You may call the outline Tentative or Work in Progress to allow for modifications during the semester.

9. Course policies:

☐ Specify course rules, including your policies on attendance, tardiness, class participation, make-up exams, and plagiarism/academic integrity.

10. Evaluation:

☐ Specify how students will be evaluated, ☐ what factors will be included, ☐ their relative value, and ☐ how they will be tabulated into grades (on a curve, absolute scores, etc.) ☐ Publicize UAF regulations with regard to the grades of "C" and below as applicable to this course. (Not required in the syllabus, but is a convenient way to publicize this.) Link to PDF summary of grading policy for "C":

http://www.uaf.edu/files/uafgov/Info-to-Publicize-C_Grading-Policy-UPDATED-May-2013.pdf

11. Support Services:

☐ Describe the student support services such as tutoring (local and/or regional) appropriate for the course.

12. Disabilities Services: Note that the phone# and location have been **updated**. <http://www.uaf.edu/disability/> The Office of Disability Services implements the Americans with Disabilities Act (ADA), and ensures that UAF students have equal access to the campus and course materials.

☐ State that you will work with the Office of Disabilities Services (208 WHITAKER BLDG, 474-5655) to provide reasonable accommodation to students with disabilities.

5/21/2013

Thermal Physics
PHYSICS 351 – Spring 2015

Syllabus

Instructor: Channon Price, REIC 120, x6106, cpprice@alaska.edu

Office Hours: TBD

Class meets: TBD (times [equalling two hours per week], days of week, location)

Credits: 2 credits.

Prerequisites: PHYS F212X, PHYS F220, PHYS F301, PHYS F341.

Text: Equilibrium Thermodynamics, by Adkins, Cambridge, 3rd ed; ISBN 978-0521274562

Course Description: Classical macroscopic thermodynamics; systems and states, equations of state, the first and second laws of thermodynamics and their consequences, entropy, enthalpy, Helmholtz and Gibbs functions, equilibrium, Maxwell's relations. This course covers the first half of the topics of the statistical mechanics, and is required for the BS Physics program.

Grading: The course grade will be based upon the following weighting:

Participation in Recitation	10%
Homework	20%
Quizzes	10%
Mid-Term Exam	20%
Final Exam	40%

On Assessments: There will be a homework assignment each week; they are due one week after they are assigned. Thus, a homework assigned on a Thursday is due the following Thursday. The homework assignments will be posted on the web as well as in the glass hallway case assigned to this class. You are encouraged to work with others on the homework but the work you turn in should be your own. Verbatim copies are easily detected and will result in both papers receiving a zero. (See the section on plagiarism below.) Several short quizzes will be given during classtime throughout the semester. They will be closed book and no calculators will be allowed (or needed!). There will be one mid-term exam (Thursday, 5 March 2015) and one final exam. The mid-term exam will be a one-hour, closed book exam given during regular class time. The final exam will be held according the the published UAF schedule. Make-up exams are considered only in the event of documented inability to take the examination with the rest of the class.

Instructional Methods: This is primarily a lecture course, but one half hour of the second class meeting of each week will be used for recitation. The purpose of the recitation is to provide the students with an opportunity to explore the lectures and homeworks further. It is intended that the recitation will be in the form of a group discussion of topics introduced by the students, as motivated by course readings, lectures and assignments.

Preparation for the course: completion of the prerequisites should prepare the student to handle the physical, mathematical and computational structures in this course, in particular, advanced kinematics, generalized coordinates, and conserved quantities for systems of particles.

Learning Outcomes: Students who complete PHYS 351 will understand the concept of the state of system and the temperature of a system, be able to manipulate equations of state for adiabatic and isothermal changes, have been introduced to the concept of entropy, be able to understand and carry out Legendre transformations among the thermodynamic potentials, and have the grounding in classical thermodynamics necessary for completing study of the statistical mechanics.

Course Goals: Students will learn the physical principles of the classical thermodynamics, and be prepared to advance to the study of the statistical mechanics.

Support Services: As this course is intended for upper division Physics majors, support services for the students in the course are provided during the instructor's office hours.

Special Needs: 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 accomodation to students with disabilities.

Plagiarism: Plagiarism and cheating are serious matters for students and academic institutions. The UAF Honor Code (or Student Conduct Code) defines the academic standards expected at the University of Alaska and which will be followed in this class. The Code reads, in part:

"Students will not collaborate on any quizzes, in-class exams, or take-home exams that will contribute to their grade in a course, unless permission is granted by the instructor of the course. Only those materials permitted by the instructor may be used to assist in quizzes and examinations. Students will not represent the work of others as their own. A student will attribute the source of information not original with himself or herself (direct quotes or paraphrases) in compositions, theses and other reports. Not work submitted for one course may be submitted for credit in another course without the explicit approval of both instructors. Violations of the Honor Code will result in a failing grade for the assignment and, ordinarily, for the course in which the violation occurred. Moreover, violation of the Honor Code may result in suspension or expulsion."

Calendar:

Week / Lecture topics

1. Basic concepts, equilibrium, temperature, zeroth law
2. First Law of Thermodynamics, State variables: $E=E(T,V)$, *etc.*
3. Entropy and the 2nd Law of Thermodynamics
4. Carnot cycle, combined 1st and 2nd laws, TdS equations
5. TdS examples, ideal gas, Van der Waals gas, porous plug experiment
6. Exam review and mid-term exam
7. Free energy, F & G, Maxwell's conditions
8. Latent heat, Clausius-Clapeyron equation
9. Rubber-band thermo, black-body spectrum
10. Thermodynamics of magnetism, 3rd Law of Thermodynamics
11. Black hole thermodynamics
12. Kinetic theory
13. Maxwell velocity distribution
14. Thermal diffusion