University of Hawaii Community Colleges
Proposal to Initiate, Modify or Delete a Course

1. Type of Action
   - ☑ A. Addition  ☑ Regular or ☐ Experimental or ☐ Other (click and type to specify)
   - ☐ B. Deletion
   - ☐ C. Modification: ☐ in credits  ☐ in title  ☐ in number or alpha
     ☐ in prerequisites or co-requisites  ☐ Other (click to specify)

2. New Alpha, Number and Title
   - Physics 170

3. Credits 4 credits

4. Old Alpha, Number and Title
   - General Physics I

5. Credits *

6. New Catalog Description
   - This is the first of a rigorous, calculus-based, course in physics for the professional or engineering majors. The study of the concepts of physics including the fundamental principles and theories of mechanics, energy, waves, and thermodynamics.

7. Select box and type specific information in text box.
   - Prerequisite: credit for Math 205 or Math 206 or equivalent. Corequisite: Phys 170L and credit for, or concurrent registration in Math 206, Math 242, or Math 252 Program. Program. ☒ can fulfill Nat Sci: Physical If Math 216 may be substituted with consent.

8. Student Contact Hours Per Week
   - Lecture 4
   - Lecture/Lab
   - Lab

9. Proposed Date of First Offering
   - Semester Spring 2007
   - Year 2007

10. This course Makes No Difference in the number of credits required for the program/core.

11. Equivalent or similar courses offered in the UH System:

<table>
<thead>
<tr>
<th>Campus</th>
<th>Alpha, Number, Title</th>
<th>Campus</th>
<th>Alpha, Number, Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>UH Hilo</td>
<td>Physics 170</td>
<td>KapiolaniCC</td>
<td>Physics 170</td>
</tr>
<tr>
<td>UH Manoa</td>
<td>Physics 170</td>
<td>KauaiCC</td>
<td>Physics 170</td>
</tr>
<tr>
<td>West Oahu</td>
<td>None</td>
<td>LeewardCC</td>
<td>Physics 170</td>
</tr>
<tr>
<td>HawaiiCC</td>
<td>None</td>
<td>MauiCC</td>
<td>Physics 170</td>
</tr>
<tr>
<td>HonoluluCC</td>
<td>Physics 170</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

12. This course is (check one and click in appropriate textbox and provide details):
   - ☐ Already articulated with Physics 170 General Physics I
   - Provide details of existing or desired articulation (date, college(s), purposes, pre-major, etc.) in this space:

   ☒ Appropriate for Articulation with Physics 170 General Physics I
   - Provide details of existing or desired articulation (date, colleges(s), purposes, pre-major or major, etc.) in this space:

   ☐ Not yet appropriate for Articulation.

13. Reason for Initiating, Modifying or Deleting Courses or Other Pertinent Comment:
   - To provide a physics course for physics, astronomy, or engineering majors.

Requested by: [Signature]  1/17/04
Department Chairperson

Approved by: [Signature]  1/12/04
Curriculum Committee Chairperson

[Signature]  1/14/04
Faculty Senate Chairperson

[Signature]  1/16/04
Dean of Instruction

[Signature]  1/10/04
Provost

CCCM #6100 (Amended for WCC use October 2002)
University of Hawaii Community Colleges  
Proposal to Initiate, Modify or Delete a Course

Levels of Review of Course Proposal at Windward Community College

Course Alpha, Number, and Title: Physics 170 General Physics I

<table>
<thead>
<tr>
<th>Signatures</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joseph E. Castel</td>
<td>12-4-03</td>
</tr>
<tr>
<td>David R. B.</td>
<td>12/4/03</td>
</tr>
</tbody>
</table>

2. Department

<table>
<thead>
<tr>
<th>Department Chairperson</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>David R.</td>
<td>12/1/03</td>
</tr>
</tbody>
</table>

Was this course discussed in a department meeting? ☐ Yes ☐ No

3. Division

<table>
<thead>
<tr>
<th></th>
<th>Dates</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>5/4/04</td>
</tr>
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</table>

4. Curriculum Committee Review

<table>
<thead>
<tr>
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<th>Disapproved</th>
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</thead>
<tbody>
<tr>
<td>☑</td>
<td>☐</td>
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Reason:

<table>
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<tr>
<th></th>
<th>10/12/04</th>
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<tbody>
<tr>
<td></td>
<td>Curriculum Committee Chairperson</td>
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</table>

CCCM #6100 (Amended for WCC use October 2002)
University of Hawaii Community Colleges
Proposal to Initiate, Modify or Delete a Course
New Course Proposal Form – Go to next page for Course Modification)

WCC Form for New Course Proposals
(This sheet was originally pink.)

1. How is this course related to the education needs and goals of the College/Department/Community as reflected in the EDP/ADP?

   The department is tasked to provide a physical science requirement for the liberal arts students. This course will provide preparation for students seeking more scientifically oriented careers, such as physics, astronomy, or engineering.

2. Provide details of any additional staff, equipment, facilities, library/media material, faculty preparation and other financial support that would be required to implement this course. (Include an estimate of the actual cost of supplies and equipment.) What has been done to provide for these additional costs for the proposed date of offering? Who will teach the course?

   An additional instructor will be required. The equipment and facilities are identical to those used in the current physics 151 course.

3. Is a similar course taught elsewhere in the UH system? Yes If yes, provide details of how this course differs from existing similar courses.

   This course, as proposed, is taught elsewhere in the UH system with no differences.

4. Is this course experimental and/or unique to Windward Community College? No If yes, provide rationale and details of its impact on the College Curriculum

5. Is a similar course taught in the upper division level by a 4-year UH college? No If yes, explain why this course is appropriate at the lower division or how it differs from its upper division counterpart.

6. Please attach a complete course outline. Your course outline should address all the items listed in the Guidelines for Course Outlines.

7. If this course is numbered 100 or above or appropriate for transfer to a 4-year college, complete and attach WCC Form for Transfer Courses (blue). See criteria for transfer courses.
University of Hawaii Community Colleges
Proposal to Initiate, Modify or Delete a Course
Articulation with 4-year UH Campus Form

WCC Form for Transfer Courses
(To be completed for articulation with any 4-year UH campus)
(This sheet was originally blue.)

Course Alpha and Number Physics 170 General Physics I

Submitted by J. Hudson/J. Ciotti

Date March 2, 2004

1. List the counterpart to this course on any 4-year UH campus. Describe the relationship between the course any related baccalaureate program area.

   This is the first of a rigorous, calculus based, course for professional or engineering majors. The study of the concepts of physics including the fundamental principles and theories of mechanics, energy, waves, and thermodynamics, with an emphasis on problem solving. As such, any quantitative science major could make use of this course to fulfill a Natural Science requirement. This course is referred to as Physics 170 General Physics I at UH Manoa.

2. Is this course taught or accepted by major accredited colleges or universities? Give one or two examples.
   
   Yes. Georgetown University

3. Please attach a complete course outline if you have not done so already. Your course outline should address all the items listed in the Guidelines for Course Outlines.
University of Hawaii Community Colleges
Proposal to Initiate, Modify or Delete a Course
Articulation with 4-year UH Campus Form

COURSE ARTICULATION FORM (GENERAL EDUCATION CORE)

ORIGINATING CAMPUS: Windward Community College DATE SUBMITTED: December 11, 2003

COURSE ALPHA & NUMBER: Physics 170 SEMESTER CREDITS: 4

COURSE TITLE: General Physics I

DATE OF OUTLINE: December 11, 2003

(** Representative outline, no multiple syllabi, please.)

1. Articulation committee to review this course:

   Standing Committees
   - Written Communication
   - Mathematical & Logical Thinking
   - World Civilizations
   - Languages
   - Arts & Humanities
   - Natural Science
   - Social Science

2. The information in this item is required by the reviewing committee so that it has a starting point for reviewing the course. It is the responsibility of the submitting campus to do the necessary research to provide this information.

   In the opinion of the originating campus, this course is equivalent to the following and/or meets the criteria for the indicated core categories. Every core category space, except your own campus, must be filled in (can include 'none'). An equivalent course, if known, may be helpful to committee members but is not required.

<table>
<thead>
<tr>
<th>Receiving Campus</th>
<th>Equivalent Course (Alpha and Number)</th>
<th>Core Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>UH Hilo</td>
<td>Physics 170</td>
<td>NS II</td>
</tr>
<tr>
<td>UH Manoa</td>
<td>Physics 170</td>
<td>DP</td>
</tr>
<tr>
<td>UH West Oahu</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Hawaii CC</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Honolulu CC</td>
<td>Physics 170</td>
<td>NS II</td>
</tr>
<tr>
<td>Kapiolani CC</td>
<td>Physics 170</td>
<td>NS II</td>
</tr>
<tr>
<td>Kauai CC</td>
<td>Physics 170</td>
<td>NS II</td>
</tr>
<tr>
<td>Leeward CC</td>
<td>Physics 170</td>
<td>NS II</td>
</tr>
<tr>
<td>Maui CC</td>
<td>Physics 170</td>
<td>NS II</td>
</tr>
<tr>
<td>Windward CC</td>
<td></td>
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</tr>
</tbody>
</table>

3. If submitted electronically, I understand that this outline will be posted to a publicly accessible web site to enable open access for reviewing committees and campuses. The outline will be taken off the site upon completion of the review.

Typed Name or Signature

Note: If possible submit coversheet and course outline electronically as e-mail attachments (preferably in 'pdf' format). If submitting in printed form, 20 copies of coversheet and course outline are required for distribution for appropriate review.

Note: UCA Clearinghouse
John Muth, Office of the Chancellor for Community Colleges, is acting as staff to the University Council on Articulation and is responsible for tracking all courses submitted for articulation.
COURSE/CATALOG DESCRIPTION
Physics 170/ This is the first of a rigorous, calculus based, two semester course for professional or engineering majors. The study of the concepts of physics including the fundamental principles and theories of mechanics, energy, waves, and thermodynamics.

COURSE NAME
General Physics I

COURSE ALPHA
Physics 170

CREDIT/CONTACT HOURS
4 credits/4 hours of lecture per week
List hours per week of lecture, lab, and/or other activities and total student contact hours per week.

PREREQUISITES REQUIRED
Credit for, or concurrent registration in Math 206, Math 242, or Math 252. Math 216 may be substituted with consent.

CO-REQUISITES
none

RECOMMENDED PREPARATION AND BASIC SKILLS
This is a general physics course with an emphasis on problem solving. The student should understand algebra, trigonometry, and analytic geometry, as well as to be able to perform basic differentiation and integration.

If the course involves the use of mathematics, indicate the level of quantitative reasoning required.

SPECIFIC COURSE OBJECTIVES
Upon successful completion of PHYS 170, the student will be able to:
- demonstrate an understanding of the scientific method and the units by which quantitative measurements are made
- demonstrate an understanding of motion and the apply kinematical equations to problems pertaining to linear motion, projectile motion, and motion in more than one dimension
- demonstrate an understanding of forces and apply the laws of dynamics as they pertain to motion and equilibrium
- demonstrate an understanding of torque and apply the laws of rotational dynamics as they pertain to rotational motion and equilibrium
- demonstrate an understanding of momentum and its application to collisions and systems of many particles
- demonstrate an understanding of work, energy, and power; how they are
related, as well as their application to problem solving
- demonstrate an understanding of wave phenomena and other oscillatory
methods of energy transfer
- demonstrate an understanding of temperature and the laws of thermodynamics

What knowledge and/or skills will successful completion of the course develop in the student?

METHOD OF INSTRUCTION
The lecture method will be used for this course. Students will be assigned weekly
homework assignments to aid them in their understanding of the material covered.
The assignments, and their solutions, will be discussed during the appropriate
class sessions.

COURSE CONTENT AND APPROXIMATE TIME TO BE SPENT ON EACH TOPIC

<table>
<thead>
<tr>
<th>No. of 50 Minute Periods</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Scientific Method</td>
<td></td>
</tr>
<tr>
<td>What is an Hypothesis</td>
<td>[1]</td>
</tr>
<tr>
<td>Measurement and Reality</td>
<td></td>
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<tr>
<td>Operational Definition of Measurement</td>
<td></td>
</tr>
<tr>
<td>Why Metric?</td>
<td></td>
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<tr>
<td>Dimensional analysis</td>
<td></td>
</tr>
<tr>
<td>Density</td>
<td></td>
</tr>
<tr>
<td>3. Linear Motion</td>
<td>[3]</td>
</tr>
<tr>
<td>Displacement, Velocity, and Speed</td>
<td></td>
</tr>
<tr>
<td>Instantaneous Velocity and Speed</td>
<td></td>
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<tr>
<td>Acceleration</td>
<td></td>
</tr>
<tr>
<td>Graphical methods of analysis</td>
<td></td>
</tr>
<tr>
<td>One dimensional motion with Constant Acceleration</td>
<td></td>
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<tr>
<td>Freely Falling Objects</td>
<td></td>
</tr>
<tr>
<td>Coordinate Systems</td>
<td></td>
</tr>
<tr>
<td>Vector and Scalar Quantities</td>
<td></td>
</tr>
<tr>
<td>Vector Properties; Translation and Resolution</td>
<td></td>
</tr>
<tr>
<td>Unit Vectors</td>
<td></td>
</tr>
<tr>
<td>5. Motion in Two Dimensions</td>
<td>[3]</td>
</tr>
<tr>
<td>Displacement, Velocity, and Acceleration Vectors</td>
<td></td>
</tr>
<tr>
<td>Two Dimensional Motion with Constant Acceleration</td>
<td></td>
</tr>
<tr>
<td>Projectile Motion</td>
<td></td>
</tr>
<tr>
<td>Uniform Circular Motion</td>
<td></td>
</tr>
</tbody>
</table>
6. Dynamics and the Laws of Motion
   - Newton's First Law and Inertia
   - Newton's Second Law and Force
   - Newton's Third Law and Collisions
   - Frictional Forces
   - Equilibrium

7. Work and Kinetic Energy
   - Work done by a Constant Force
   - Work done by a Varying Force
   - Kinetic Energy and the Work-Energy Theorem
   - Power

   - Potential Energy
   - Conservative and Non-conservative Forces
   - Conservation of Mechanical Energy
   - Work done by Non-conservative Forces
   - Conservative Forces and Potential Energy

9. Linear Momentum and Collisions
   - Linear Momentum and its Conservation
   - Impulse and Momentum
   - Collisions
   - One Dimensional Collisions
   - Two Dimensional Collisions
   - Center of Mass
   - Motion of Many Particle Systems

10. Rotational Motion
    - Angular Displacement, Velocity, and Acceleration
    - Rotational Inertia
    - Rotational Kinematics
    - Rotational Kinetic Energy
    - Work and Power in Rotational Motion

11. Torque and Angular Momentum
    - Rolling Motion of a Rigid Object
    - Torque
    - Angular Momentum
    - Conservation of Angular Momentum

12. Gravitation
    - Kepler's Laws of Planetary Motion
    - Newton's Law of Universal Gravitation
    - Measuring the Universal Gravitation Constant
The Gravitational Field
Gravitational Potential Energy

13. Oscillations
Simple Harmonic Motion
Energy of a Simple Harmonic Oscillator
The Pendulum
The Mass-Spring System
Simple Harmonic Motion and Uniform Circular Motion

14. Wave Motion
Transverse and Longitudinal Wave Motion
One Dimensional Traveling Wave
Superposition and Interference
Wave Speeds and Resonance
Sinusoidal Waves
Doppler Effect

15. Temperature and Heat
Temperature and the Zeroth Law of Thermodynamics
Celsius, Fahrenheit, and Kelvin Scales
Thermal Expansion

16. Kinetic Theory of Gases
Heat and Internal Energy
Heat Capacity and Specific Heat
Latent Heats
Work and Energy in Thermodynamic Processes
The First Law of Thermodynamics

17. Entropy and the Second Law of Thermodynamics
Heat Engines and The Second Law of Thermodynamics
Carnot Engines and Efficiency
Reversible and Irreversible Processes
Entropy and Time

A proposed semester schedule is acceptable.

TEXT(S)
Possible texts include:
1. Fundamentals of Physics (5th Ed.)
   D. Haliday, R. Resnick, and J. Walker; J. Wiley & Sons Inc.
   College level reading. Roughly 50% of the text will be covered.

2. Physics for Scientists and Engineers (5th Ed.)
   R. Serway, R. Beichner, and J. Jewett; Saunders College Publishing
   College level reading. Roughly 50% of the Text will be covered.
REFERENCE AND SUPPLEMENTARY MATERIALS

In addition to the above mentioned texts, a number of text books used in introductory physics courses may be helpful to the student. Conceptual physics texts are available at the library. The student is expected to purchase a scientific calculator.

LIST MATERIALS THAT MAY BE FOUND IN THE LIBRARY THAT WILL CONTRIBUTE TO THE COURSE.

COURSE REQUIREMENTS

The student taking Physics 170 should be able to read at the English 100 level, have taken Math 205 (or its equivalent), and should have credit for, or be concurrently registered in Math 206. The student will be given a weekly problem assignment that will be collected at the beginning of the first lecture of the week. Three midterm examinations will be given throughout the semester. All students are expected to take the cumulative final exam.

LIST ANY PROJECTS, FIELD TRIPS, EXPERIMENTS, REPORTS, INDEPENDENT WORK, ETC., WHICH WILL BE REQUIRED OR EXPECTED OF STUDENTS FOR THE COURSE.

EVALUATION

The final grade will be determined by a cumulative point total at the end of the semester based on the following weights:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework</td>
<td>10%</td>
</tr>
<tr>
<td>Midterm I</td>
<td>18%</td>
</tr>
<tr>
<td>Midterm II</td>
<td>18%</td>
</tr>
<tr>
<td>Midterm III</td>
<td>18%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>36%</td>
</tr>
</tbody>
</table>

The following scale will be used to determine the final grades:

- A 90 - 100%
- B 80 - 90%
- C 70 - 80%
- D 55 - 65%
- F <55%

IDENTIFY METHODS OF EVALUATION WHICH WILL BE EMPLOYED TO DETERMINE IF THE COURSE OBJECTIVES ARE BEING MET (E.G., WRITTEN EXAMINATIONS, ATTENDANCE, PROJECTS). SPECIFY THE GRADING PROCEDURE TO BE USED IN THE COURSE.
Physics 170
General Physics I

Instructor: Lecturer
Office: Office hours:
Telephone: e-mail:

Textbook: *Fundamentals of Physics* (5th Ed.)
D. Haliday, R. Resnick, and J. Walker; J. Wiley & Sons Inc.

Prerequisite: Concurrent registration in Math 206, Math 242, or Math 252. Math 216 may be substituted with consent.

Course Description: This course is the first semester of a rigorous, calculus based study of physics. The primary topics of study deal with kinematics, dynamics, waves, and thermodynamics with an emphasis on problem solving. A conceptual understanding of physics principles will act as the foundation for further quantitative analysis.

Course Goals: Upon successful completion, the student will:
1. demonstrate a solid conceptual understanding of kinematics, dynamics, wave phenomena, and thermodynamics.
2. solve applicable problems using differential calculus and vector analysis.
3. apply the laws of physics to computational problems in kinematics, dynamics, wave phenomena, and thermodynamics.

Materials Auxiliary: A simple calculator (non-QWERTY type) is required. For ESL students, a language exchange text may be used during exams, *but no electronic translators will be allowed.*

Grading: The final grade will be determined by a cumulative point total at the end of the semester based on the following:
- Homework: 10%
- Exam I: 18%
- Exam II: 18%
- Exam III: 18%
- Final Exam: 36%

The following scale will be used to determine the final grades:
- A: 90 - 100%
- B: 80 - 90%
- C: 65 - 80%
- D: 55 - 65%
- F: < 55%
If an exam is missed, it can be made up providing the arrangements for the makeup exam are agreed to before the original exam time; i.e. *You need to inform the instructor before the time of the exam that you will be missing.* A valid excuse is required. A letter grade will be awarded based on the overall percentage scored. All students are required to take the comprehensive final exam at the end of the semester.

**Schedule: (tentative)**

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic:</th>
<th>Reading:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Orientation</td>
<td>Handout</td>
</tr>
<tr>
<td></td>
<td>Measurement</td>
<td>Chap. 1</td>
</tr>
<tr>
<td></td>
<td>Linear Motion</td>
<td>Chap. 2</td>
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<tr>
<td></td>
<td>Vectors</td>
<td>Chap. 3</td>
</tr>
<tr>
<td></td>
<td>Projectile Motion</td>
<td>Chap. 4</td>
</tr>
<tr>
<td></td>
<td><strong>Exam I</strong></td>
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<tr>
<td></td>
<td>Dynamics I</td>
<td>Chap. 5</td>
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<tr>
<td></td>
<td>Dynamics II</td>
<td>Chap. 6</td>
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<tr>
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<td>Work &amp; Kinetic Energy</td>
<td>Chap. 7</td>
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<td>Potential Energy &amp; Conservation</td>
<td>Chap. 8</td>
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<td>Collisions</td>
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<td>Rotations</td>
<td>Chap. 11</td>
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<td>Torque &amp; Angular Momentum</td>
<td>Chap. 12</td>
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<td>Gravitation</td>
<td>Chap. 14</td>
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<td></td>
<td><strong>Exam III</strong></td>
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<tr>
<td></td>
<td>Oscillations</td>
<td>Chap. 16</td>
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<td>Waves</td>
<td>Chap. 17 &amp; 18</td>
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<td>Temperature &amp; Heat</td>
<td>Chap. 19</td>
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<td></td>
<td>Kinetic Theory of Gases</td>
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<td></td>
<td>Entropy</td>
<td>Chap. 21</td>
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<tr>
<td></td>
<td><strong>Final Exam</strong></td>
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</table>

**Addendum:** If, during an exam, you are paged or called by cellular phone, this must be an emergency. As such, the exam will be immediately collected, and you are dismissed. No makeup will be possible.