# http://www.ric.edu/webcommunications/images/SealWithText_Small_Black.pngUNDERGRADUATE CURRICULUM COMMITTEE (UCC)PROPOSAL FORM

## Cover page roll over blue text to see further important [instructions](#instructions): please read.

**N.B. DO NOT USE HIGHLIGHT, JUST DELETE THE WORDS THAT DO NOT APPLY TO YOUR PROPOSAL**

**ALL numbers in section (A) need to be completed, including the impact ones.**

|  |  |  |
| --- | --- | --- |
| A.1. [Course or program](#Proposal) | **physics 311** |  |
| [Replacing](#Ifapplicable)  |  |  |
| A.2. [Proposal type](#type) | **Course: revision**  |  |
| A.3. [Originator](#Originator) | **Andrea Del Vecchio** | [Home department](#home_dept) | **Physical Sciences** |
| A.4. [Rationale](#Rationale) | **Three credits has really never been sufficient to cover all of the material listed in the course description. In particular, statistical mechanics has not been well covered. This course will also have computational physics elements introduced into it. A four credit course will allow us to cover the additional material.** |
| A.5. [Date submitted](#date_submitted) | **3/31/17** | A.6. [Semester effective](#Semester_effective)  | Fall, 2017 |
| A.7. [Resource impact](#Resource) | *[Faculty PT & FT](#faculty" \o "Need to hire new full-time or part-time faculty? This is where you indicate if this proposal will be affecting FLH in your department/program.)*:  | **One additional load hour every other year** |
|  | [*Library*:](#library) | **None** |
|  | [*Technology*](#technology) | **None** |
|  | [*Facilities*](#facilities): | **none** |
| A.8. [Program impact](#prog_impact) | **This would affect only the physics and physics secondary education programs.** |
| A.9. [Student impact](#student_impact) | **This will allow students to have a more through introduction to thermodynamics within the 300 level course.** |
| A.10. The following screen tips are for information on what to do about catalog copy until the new CMS is in place; check the “Forms and Information” page for updates. [Catalog page.](#catalog)  [Where are the catalog pages](#catalog)? [Several related proposals](#catalog)? Do **not** list catalog pages here. **All** catalog copy for a proposal must be contained within a **single** file; put page breaks between sections. Make sure affected program totals are correct if adding/deleting course credits. |

B. [NEW OR REVISED COURSES](#delete_if) **DELETE THE WORDS THAT DO NOT APPLY TO YOUR PROPOSAL within specific categories, but do not delete any of the categories. DO NOT use highlight. Delete this whole page if this proposal does not include a new or revised course.**

|  | Old ([for revisions only](#Revisions)) | New |
| --- | --- | --- |
| B.1. [Course prefix and number](#cours_title)  | **PHYS 311** | **PHYS 311** |
| B.2. Cross listing number if any |  |  |
| B.3. [Course title](#title)  | **Thermodynamics** | **Thermodynamics** |
| B.4. [Course description](#description)  | This is an introduction to the laws of thermodynamics and its application to equilibrium systems, such as ideal gases, phase transformations, solutions and chemical reactions, and elementary statistical mechanics. Lecture. | This is an introduction to the laws of thermodynamics and its application to equilibrium systems, such as ideal gases, phase transformations, solutions and chemical reactions, and elementary statistical mechanics. Lecture. |
| B.5. [Prerequisite(s)](#prereqs) | **PHYS 200, MATH 213** | **PHYS 200, MATH 213** |
| B.6. [Offered](#Offered) | **Fall** **Odd years**  | **Fall** **Odd years**  |
| B.7. [Contact hours](#contacthours)  | **3** | **4** |
| B.8. [Credit hours](#credits) | **3** | **4** |
| B.9. [Justify differences if any](#differences) |  |
| B.10. [Grading system](#grading)  | **Letter grade**  | **Letter grade**  |
| B.11. [Instructional methods](#instr_methods) | **Lecture**  | **Lecture**  |
| B.12.[Categories](#required) | **Required for major/minor**  | **Required for major/minor**  |
| B.13. Is this an Honors course? | **NO** | **NO** |
| B.14. [General Education](#ge)N.B. Connections must include at least 50% Standard Classroom instruction. |  **NO**  | **NO****:** |
| B.15. [How will student performance be evaluated?](#performance) | **Attendance | Class participation | Exams | Presentations |Class Work | Quizzes | Projects |**  | **Attendance | Class participation | Exams | Presentations |Class Work | Quizzes | Projects |**  |
| B.16. [Redundancy statement](#competing) |  |  |
| B. 17. Other changes, if any |  |

| B.18**.** [**Course learning outcomes**](#outcomes) | [**Standard(s)**](#standards) | [**How will they be measured**](#measured)**?** |
| --- | --- | --- |
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| B.19. [**Topical outline**](#outline) |
| --- |
| 1. Introduction to the Thermodynamics
	1. Temperature
	2. Ideal Gases
	3. Kinetic Theory of Gases
	4. Heat and Work
	5. Heat capacity
	6. Rates of processes
2. The Second Law of Thermodynamics
	1. Two state systems
	2. Einstein model of a solid
	3. Large systems
	4. Entropy
3. Interactions in Large Systems
	1. Prediction of heat capacities
	2. Paramagnetism
	3. Mechanical equilibrium
	4. Diffusion and chemical potential
4. Heat Engines and Refrigerators
	1. Carnot cycle
	2. Refrigerators
	3. Real systems
5. Free energy and Chemical Thermodynamics
	1. Free energy and work
	2. Free energy and equilibrium
	3. Phase transformations of a pure substance
	4. Phase transformations of mixtures
	5. Dilute solutions
	6. Chemical equilibrium
6. Boltzmann statistics
	1. Partition function
	2. Average values
	3. Equipartition Theorem
	4. Maxwell distribution
7. Quantum statistics
	1. Gibbs factor
	2. Bosons and fermions
	3. Fermi-Dirac distribution
	4. Blackbody radiation
	5. Debye Theory of Solids
	6. Bose-Einstein distribtuion
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## D. Signatures

##### D.1. Approvals

* Changes that affect General Education in any way MUST be approved by ALL Deans and COGE Chair.
* Changes that directly impact more than one department/program MUST have the signatures of all relevant department chairs, program directors, and relevant dean (e.g. when creating/revising a program using courses from other departments/programs). Check UCC manual 4.2 for further guidelines on whether the signatures need to be approval or acknowledgement.
* Proposals that do not have appropriate approval signatures will not be considered.
* Type in name of person signing and their position/affiliation.
* Send electronic files of this proposal and accompanying catalog copy to curriculum@ric.edu and a printed or electronic signature copy of this form to the current Chair of UCC. Check UCC website for due dates.

| Name | Position/affiliation | [Signature](#_Signature" \o "Insert electronic signature, if available, in this column) | Date |
| --- | --- | --- | --- |
| Dr. Peter Meyer | Chair of Physical Sciences |  |  |
| Dr. Earl Simson | Dean of Arts of Sciences |  |  |
| Dr. Donald Halquist | Dean of the Feinstein School of Education and Human Development |  | Tab to add rows |

##### D.2. [Acknowledgements](#acknowledge)

| Name | Position/affiliation | [Signature](#Signature_2) | Date |
| --- | --- | --- | --- |
| Dr. Gerri August | Chair of Educational Studies |  |  |
|  |  |  |  |
|  |  |  | Tab to add rows |