# Course Information

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| Number: | SC330 |
| Name: | Physics |
| Description: | A survey of modern physics emphasizing concepts essential to a thorough understanding of the underpinnings of modern technology, particularly in the computer sciences. Topics include mechanics, light, sound, electricity and magnetism, as well as an introduction to the concepts of atomic theory and relativity. |
| Credit(s): | 3 |
| Offered (DAY schedule): | |
| Instructor Permission Required: | N |
| Pre-Requisite(s): | |

## Course Objectives

After completing this course, students will be able to: 1. Explain where scientific knowledge comes from; 2. Outline the atomic theory of matter; 3. Describe Newton's Laws of motion and gravity; 4. Describe the nature of energy and the laws of thermodynamics; 5. Describe the nature of light, electricity, and magnetism; 6. Outline relativity and quantum theory; 7. Explain why the nature of the atomic nucleus makes it possible to release large amounts of energy.

# THOMAS COLLEGE
## Waterville, Maine
### Department of Arts and Sciences
### Fall 2018

**Course Number:** SC330

**Credit Hours:** 3

**Course Title:** Physics

**Clock Hours:** 45

**Instructor:** Andres E. Morales

**Office:** Room AD109

**Office Hours:** Monday – Friday 11 am to 12 pm.

**Others:** By appointment

**e-mail:** moralesa@thomas.edu

**Required Text:** Hobson, Art. ***PHYSICS, Concepts and Connections,*** 5th Edition, Addison-Wesley, 2010.

**Course Description:** This course introduces the student to concepts essential to understanding the connections between science and modern technology. Topics include, from classical physics: mechanics, energy, Entropy and the second law of thermodynamics, electricity and magnetism; from modern physics: an introduction to the concepts of atomic, relativity, and quantum theory.

**Course Objectives and Outline:**
This course will proceed in concert with the learning objectives of Thomas College as represented in the core competences. Therefore, one of the main goals will be to develop an ability to communicate effectively and persuasively using a variety of forms including visual, tabular and conceptual models. Students will also be expected to demonstrate the ability to apply analytical and mathematical concepts and to communicate their findings using the most appropriate approach for a specific problem or project.

Upon completion of this course, the student should be able to:

- Explain where scientific knowledge come from.
- Describe Newton's laws of motion and gravity and its most important applications.
- Describe the nature of energy and the laws on thermodynamics.
- Describe the nature of light, electricity, and magnetism.

- Outline relativity (special and general) and quantum theory.
- Explain why the nature of the atomic nucleus makes it possible to release large amounts of energy.

**Course Requirements:**

**Grading:**

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| Quizzes/Homework | 25% |
| Exam 1 | 20% |
| Exam 2 | 20% |
| Attendance | 10% |
| Final Exam | 25% |

**Grading Ranges:**

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|---|---|---|---|---|---|
| 96 --- 100 | A | | 66 --- 70 | C |
| 91 --- 95 | A- | | 61 --- 65 | C- |
| 86 --- 90 | B+ | | 59 --- 60 | D+ |
| 81 --- 85 | B | | 57 --- 58 | D |
| 76 --- 80 | B- | | 55 --- 56 | D- |
| 71 --- 75 | C+ | | Under 55 | F |

There is a reading assignment for each chapter/topic. Students should come to class prepared to discuss and/or work on the material. Homework should be submitted on the due date, if submitted the next class period it will lose half credit; later than that, assignments will not be accepted. If more than two weeks' worth of assignments are not submitted, student will be dropped from this course.

**Exams**

Exams will be given at the end of major sections of the course. See the course schedule for tentative dates. There will be pop quizzes at the instructor discretion, regular quizzes will be previously announced.

**Attendance:**

Attendance is essential and required. If it is necessary to miss a class, you must notify the instructor via e-mail, or in person "prior" to the absence. Any make-up work allowed for these absences will take place at the instructor's discretion. Failure to either contact the instructor

before the absence or to complete the makeup work in a timely manner, typically one week, will result in a grade of "0". Perfect attendance will count 10% to the final course grade, while absences beyond three may result in three points per day being deducted from the final course grade. More than six (6) absences could result in class dismissal.

**Academic Honesty Policy:**

It is expected that you will make use of any resources available to as become proficient in the course objectives. This includes, but it is not limited to, obtaining help from reference materials, other members of the class, and tutoring through the Learning Center. Items you submit for evaluation must represent your own work. It is permissible to obtain help from other persons when completing assignments, but you should make sure that you are able to reproduce any problem that initially required assistance without any help. Any departure from these guidelines will be considered academic dishonesty and dealt with according to the procedure outlined in the student handbook. Possible consequences range from receiving a zero "0" on the item to receiving a zero "0" for the course, but all consequences will be determined at the instructor's discretion.

**Technology in the Classroom**

Please leave all electronic distractions, including laptops, cell phones, Kindles, tablets, etc. outside the classroom to minimize disruption unless they are specifically required for the course.

The lecture notes should be printed and stored in a binder to eliminate the need for a laptop in the classroom regularly.

**COURSE SCHEDULE (TENTATIVE)**

| DATE | TOPIC | ASSIGNMENT |
|---|---|---|
| Monday, Aug 27<br>Wednesday, Aug 29 | The way of Science: Experience and Reason | Read Chapter 1 |
| Friday, Aug 31 | Atoms: The Nature of Things | Read Chapter 2 |
| Wednesday, Sep 5 | Quiz No. 1 | |
| Friday, Sep 7 | How Things Move | Read Chapter 3 |
| Monday, Sep 10 | Why Things Move | Read Chapter 4<br>Sections: 4.1 to 4.4 |
| Wednesday, Sep 12 | Force Pairs, Momentum | Read Chapter 4<br>Sections: 4.5 to 4.7 |
| Friday, Sep 14 | Quiz No. 2 | |
| Monday, Sep 17 | Newton's Universe | Read Chapter 5<br>Sections 5.1 and 5.2 |

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| Wednesday, Sep 19 | Gravitational Collapse, Limitations of Newtonian Physics | Read Chapter 5<br>Sections: 5.3 to 5.6 |
| Friday, Sep 21 | Exam No. 1 | |
| Monday, Sep 24 | Work | Read Chapter 6<br>Sections: 6.1 to 6.3 |
| Wednesday, Sep 26 | Energy | Read Chapter 6<br>Sections: 6.4 and 6.5 |
| Friday, Sep 28 | Transformation of Energy, Power | Read Chapter 6<br>Sections: 6.6 and 6.7 |
| Monday, Oct 1 | Thermodynamics, Heat | Read Chapter 7<br>Sections: 7.1 to 7.3 |
| Wednesday, Oct 3 | Second Law of Thermodynamics: Entropy | Read Chapter 7<br>Sections: 7.4 to 7.6 |
| Friday, Oct 5 | Steam | Sections: 7.7 and 7.8 |
| Wednesday, Oct 10 | Quiz No. 3 | |
| Friday, Oct 12 | Electromagnetism | Read Chapter 8 |
| Monday, Oct 15 | Waves | Read Chapter 9<br>Sections: 9.1 and 9.2 |
| Wednesday, Oct 17 | Light | Read Chapter 9<br>Sections: 9.3 to 9. 6 |
| Friday, Oct 19 | Solar Radiation and Global Warming | Read Chapter 9<br>Sections: 9.7 to 9.9 |
| Monday, Oct 22 | Quiz No. 4 | |
| Wednesday, Oct 24 | Special Theory of Relativity | Read Chapter 10 |
| Friday, Oct 26 | General Theory of Relativity | Read Chapter 11 |
| Monday, Oct 29 | Exam No. 2 | |
| Wednesday, Oct 31 | The Quantum Revolution | Read Chapter 12<br>Sections: 12.1 to 12.3 |
| Friday, Nov 2 | Wave-particle Duality | Read Chapter 12<br>Sections: 12.4 to 12.6 |
| Monday, Nov 5 | The Uncertainty Principle | Read Chapter 13<br>Sections: 13.1 to 13.3 |
| Wednesday, Nov 7 | Quantum Reality | Read Chapter 13<br>Sections: 13.4 to 13.7 |
| Friday, Nov 9 | Quiz No. 5 | |
| Wednesday, Nov 14 | Nuclear Forces and Energy | Read Chapter 14<br>Sections: 14.1 to 14.3 |
| Friday, Nov 16 | Radioactivity | Read Chapter 14<br>Sections: 14.4 to 14.7 |
| Monday, Nov 19 | Fusion and Fission | Read Chapter 15<br>Sections: 15.1 to 15.4 |

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| Monday, Nov 26 | Applications | Read Chapter 15<br>Sections: 15.5 to 15.8 |
| Wednesday, Nov 28 | Quiz No. 6 | |
| Friday, Nov 30 | The Energy Challenge | Read Chapter 15<br>Sections: 16.1 to 16.3 |
| Monday, Dec 3 | Nuclear Power | Read Chapter 15<br>Sections: 16.3 to 16.7 |
| | Review Week – Presentations | |
| Monday, Dec 10 | FINAL EXAMS BEGIN | |