

STRING THEORY

SCHOOL OF DESIGN

Sci 145.C2 Physics

Winter 2024/5

Total Hours: 45

Quarter Credits: 4.5

Faculty Name: [add name]	Office Hours: [Day(s)] [Times](or by appointment)
Email: [add email] Phone: [add phone]	Class Hours: [Day(s)] [Times](or by appointment)

Course Description: Design leverages the unique physical properties of matter to fashion our world. This laboratory course provides a non-calculus study of the fundamental laws and properties of matter, mechanics, heat, and sound. This course places emphasis on how we measure and manipulate matter in order to leverage mathematical solutions to design problems based on an understanding of the underlying physical phenomena. This course also has a required weekly lab.

Prerequisites: None

IDeATE Program Educational Objectives Alignment: This course is designed to help students achieve the following IDeATE Program Educational Objectives:

- Think critically and creatively
- Apply knowledge to design challenges

Completion of this course will yield the following student learning outcomes:

- Construct core knowledge
- Innovate solutions

Course Learning Goals: The course is designed around the following learning goals. Upon completion of this course, students should be able to:

- Articulate the fundamentals of physics conceptually and mathematically through study and practice.
- Synthesize knowledge of physics to inform innovative product design.
- Use Design Thinking processes and computational thinking to express ideas and information with exactness, specificity, correct use of terminology, and refinement.

IDeATE Competencies and Mastery Credits:

Competencies	Course Specific Mastery Credits
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Inquiry	Hypotheses: Developing hypotheses and predictions
Design	Prototyping: Implement an idea in a tangible form.
Critical Thinking	Computational Thinking: Formulating problems and their solutions in a way that enables us to use a computer and other tools to help solve them.
Core Knowledge	Core STEM and Technology
Collaboration	Critique: Analyze the works and reasoning of peers and apply criteria to evaluate it.
Communication	Precision: Expressing ideas and information with exactness, specificity, correct use of terminology, and refinement
Engagement	Perseverance/Work Ethic: Committing to doing what you are tasked to do with integrity, quality, thoroughness, and attention to when others need it despite potential difficulties, failure, or opposition.

Course Materials:

Required Texts and Materials:

1. "College Physics" Textbook Equity Edition, Vol 1
2. 1800 Mechanical Movements, Devices, and Appliances by Gardner D. Hiscox

Mastery Grading System:

3.8 - 4.0 Exceeds Mastery	3.0 - 3.7 Mastery	2.0 - 2.9 Developing	1.0 - 1.9 Insufficient Evidence
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Whole number mastery grades (1 - 4) are recorded for each mastery credit (evidenced by products, performances, or assessments) with points used to compute a synthesized mastery course grade for each student at the end of each quarter. Students must earn a mastery course grade of 3.0 to evidence mastery of course learning goals. Students with a 2.0 or higher receive credit for a course and evidence readiness for any future learning for which this course serves as a prerequisite in the IDeATE program.

Course Schedule (subject to change, with notice):

Week #	Topics/Experiences	Content	Products/Performances/ Assessments
Week 1	EQ: How can deep knowledge of physics inform innovative product design?	College Physics Chapter 1	Content Quiz 1 Socratic Seminar 1: Essential Question Design Project: Choose a product with moving parts that doesn't work well Drawing digital journal entry 1
Week 2	Kinematics	College Physics Chapters 2 and 3	Content Quiz 2 Design Project: Background Research on product Drawing digital journal entry 2
Week 3	Dynamics	College Physics Chapters 4 and 5	Content Quiz 3 Design Project: Deep Dive(s) into physics content that directly impacts product innovation Drawing digital journal entry 3
Week 4	Circular Motion and Gravitation	College Physics Chapter 6	Content Quiz 4 Design Project: Empathize and Motion Lab. Drawing digital journal entry 4
Week 5	Energy	College Physics Chapter 7	Content Quiz 5 Design Project: Ideate and Energy Lab Drawing digital journal entry 5
Week 6	Momentum	College Physics Chapter 8	Content Quiz 6 Design Project: Initial prototype and draft design card content Drawing digital journal entry 6
Week 7	Torque and Rotational Motion How to engage in effective critique	College Physics Chapters 9 and 10	Content Quiz 7 Design Project: Critique round one and upleveling and Rotational Motion Lab Drawing digital journal entry 7
Week 8	Fluid Statics and Dynamics	College Physics Chapters 11 and 12	Content Quiz 8 Design Project: Prototype 2 and Dynamics Lab Drawing digital journal entry 8
Week 9	Synthesis of Science and Design	All texts and media	Content Quiz 9 Design Project: Critique round two and upleveling, finalize design card content.

Week #	Topics/Experiences	Content	Products/Performances/ Assessments
Week 10	EQ: How can deep knowledge of physics inform innovative product design? Product Prototype Gallery	Product prototypes	Socratic Seminar 3: Essential Question Product Prototype Gallery Walk Narrative Self-Reflection

Submission Dates:

SUBMISSION DATE	PRODUCT/PERFORMANCE/ASSESSMENT DUE
weekly on Fridays (Weeks 1-8)	Weekly content quizzes
TBD Week 1	EQ Socratic Seminar 1
TBD Week 1	Design Project Proposal
TBD Week 2	Design Project Background Research
TBD Week 3	Design Project Deep Dive Analysis
TBD Week 4	Design Project Empathy Map or Interview Motion Lab Report
TBD Week 5	Design Project Ideation Notes Energy Lab Report
TBD Week 6	Design Prototype 1
TBD Week 7	Written Peer Critique 1 Rotational Motion Lab Report
TBD Week 8	Design Prototype 2 Dynamics Lab Report
TBD Week 9	Product Design Card
TBD Week 9	Written Peer Critique 2
TBD Week 10	EQ Socratic Seminar 2
TBD Week 10	Narrative Reflection
TBD Week 10	Final Design Prototype

IDeATE PROGRAM POLICIES:

Academic Integrity: IDeATE students and professors uphold academic integrity as one of our highest priorities, and the String Theory School of Design investigates any allegation of violations of academic integrity. Violations include, but are not limited to: plagiarism, cheating, fabrication, and other forms of academic misconduct. Students who believe they have been wrongly accused or sanctioned have a right to an appeals process.

Attendance Requirements:

Students are expected to attend all classes, and must notify professors if they are not able to attend class for any reason. It is the student's responsibility to inquire about experiences, content, and work missed due to that absence. For further information on the attendance policy, please consult the IDeATE Program catalog.

Course Change Policy: IDeATE program faculty reserve the right to make changes to the course during the quarter to best actualize course learning goals. Changes will be announced to individual classes and conveyed in writing in advance of the change.

Accessibility and Disability Accommodations: Students with disabilities requesting accommodations and services need to complete an Accessibility Form, along with documentation from a licensed medical professional with a diagnosis of disability (defined as an impairment and/or condition that substantially

limits a major life activity for 6+ months). Temporary adjustments are available for individuals with short-term impairments, i.e., those due to accident or injury. Please see the String Theory School of Design IDeATE Program course catalog for more details.

Course Drops and Withdrawals: Enrolled students may drop a course through the end of Week 1, and may withdraw from a course through Week 7. Please be aware of the potential financial and academic implications of course drops and withdrawals. Please see the String Theory School of Design course catalog for more details. Once registered, it is your obligation to attend, drop, or withdraw. Dropping will remove the course from your transcript. Withdrawing will result in a “W” on a student’s transcript.

Commitment to Inclusive Practices: The String Theory School of Design welcomes individuals from diverse backgrounds and perspectives, and promotes an inclusive and respectful environment that enriches the school community and the educational and employment experience of its members. To report an incident, sexual misconduct, discrimination or harassment based on race, color, national origin, religion, sex, sexual orientation, disability, gender identity or expression, age, veteran status, or any other protected category or identity, please follow current guidance in the String Theory School of Design IDeATE Program course catalog.

Professor’s Welcome:

[add a note of welcome that creates a sense of belonging]

Course Specific Expectations:

[add a narrative paragraph or bulleted expectations no more than a half page in length]