University of Pittsburgh.

Kenneth P. Dietrich School of Arts and Sciences

College in High School

2023-2024

Theories of Leadership

LDRSHP 1100--3 Credits

Description: This course is designed to acquaint students with multiple theories and practices associated with effective leadership. In answering the question, "What is leadership?" it examines such theories as situational, participative, transformational, and servant leadership. Consideration is given to issues of followership and the many roles we play in life. The class also addresses those leadership and administrative skills and practices usually associated with effective professional management.

One of the strengths for this class is that it is very personal and applicable to a student's development and everyday life, not to mention their future. This class is meant to be active and engaging, if not exciting, and this can be accomplished through the use of guest speakers, group exercises and projects, movies and video presentations, current events, community service, job shadowing, field trips, and more.

Most importantly though, it is the teacher's passion for this class and their ability to be a role model for the leadership traits and lessons that are being taught that will captivate the students and make it meaningful. Few other classes provide the opportunities to nurture rewarding relationships, mentor, and cultivate life skills for the future.

Prerequisite: None.

Grading: The grading for this course is based entirely on in-class assignments, homework assignments, and/or projects that demonstrate the student's understanding and application of the leadership lessons and principles learned.

Textbook: The recommended textbooks are helpful, but not required: *The Leader's Companion*, by J. Thomas Wren (1995), New York: The Free Press; and *Developing the Leader Within You*, workbook, by John C. Maxwell (2001), Nashville: Nelson Impact.

Course Objectives

The goals of this course are for the student to:

- Summarize diverse perspectives on leadership through the ages and throughout the world
- Define leadership within the context of self, organization, and community
- Assess historical and modern-day views of leadership
- Describe relationships which exist between leaders and followers
- Analyze leadership within the context of today's changing environment
- Give examples about the practice of moral and ethical leadership
- Discuss and practice critical leadership skills needed by those who function as professional managers and administrators

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The following course topics will be covered:

1. Defining Leadership
- Discover if leadership can be learned
- Emotional intelligence
- Where to start to become a better leader

2. Developing the Leader Within You
- Value of self-reflection
- Personal mission statements

3. Servant Leadership
- Identify the 10 characteristics of servant leadership
- Sacrificial leadership

4. Historical Views of Leadership

5. Modern Views of Leadership

6. What Separates Leaders from Other People
- Gender and leadership

7. Exemplary Followers

8. Leadership Lessons Learned from the U.S. Civil War Gettysburg Battle

9. The Relationship Between Leaders and Followers
- Situational Leadership

10. The Leadership Environment

11. Leading Individuals
- Extrinsic and intrinsic motivation

12. Leading Groups

13. The Skills of a Leader
- Critical thinking and decision making
- Change
- Vision

14. Inclusive Leadership

15. Leadership in Practice – Practicing Moral Leadership

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Web Site Design and Development

CS 0134--3 Credits

Description: The objective of this course is to provide a basic understanding of the methods and techniques of developing a simple to moderately complex Web site. Using the standard web page language XHTML and HTML5, students will be instructed on creating and maintaining a simple web site. After the foundation language of XHTML as well as HTML5 has been established, the aid of an Internet editor – Dreamweaver or Aptana – will be introduced. To further enhance the web sites, a second language, Java Script, will be included. Finally, Web site design and layout techniques as well as basic search engine analysis will be added to enhance the students practical design skills.

Prerequisites: None.

Grading: Grading will be based on in class labs, homework, a final project, and exams.

Textbook: Recommended: *Murach's HTML5 and CSS3*, Zak Ruvalcaba and Anne Boehm; Murach, Publisher. ISBN 978-1-890774-66-0. Or any textbook that covers the topics below.

The course will be divided into 4 primary topics: XHTML; Web site maintenance with Dreamweaver; Java Script; Web site layout and design techniques & Internet search engine analysis.

The WWW (World Wide Web) is the section of the Internet that displays text and graphics on a specific site. These sites are stored and maintained on a server that allows for distribution throughout the Internet. Each Web site stores information that has been organized into individual hypermedia documents that we refer to as web pages.

1. Introduction to Web Development

- How Web applications work
- What are the components of a Web application?
- What is a static Web page and how are they processed?
- What is a dynamic Web page and how are they processed?
- Web browsers and operating systems
- What can JavaScript add to our pages?
- An initial introduction to the languages of HTML and CSS

2. Code, test, and validate

- XHTML syntax
- Basic HTML5 structure elements, tags, attributes
- CSS syntax
- CSS rule sets and comments CSS basic selectors
- How to use a Web editor like Dreamweaver or Aptana
- How are projects or "sites" defined?
- Creating and editing new HTML files
- How to create and edit CSS files
- Previewing sites in a Web editor

- How to test, debug, and validate your Web pages
- How are Web pages tested and debugged?
- What are options for validating sites?

3. Using HTML5 to structure a Web page

- Coding the head section
- How to code the title element, how to link a favicon (and what is a favicon) and how to include metadata
- Formatting text elements
- Coding text heading and paragraphs
- How and when to code in line elements for formatting and identifying text
- Structuring the content of the page
- Coding div and span elements
- How to structure a page with HTML5 semantic elements
- Adding links, lists, and images
- Including both relative and absolute URL links
- How to code both ordered and unordered lists
- Including images
- Putting the structured Web page all together
- Incorporating it all into a Web page

4. Using CSS to format the elements of a Web page

- Introduction to CSS
- Three ways to provide CSS styles for a Web page
- Using CSS with HTML5 semantic elements in older browsers
- Specifying measurements and colors in CSS
- How specify relative and absolute measurements in CSS. Using hex and RGB colors in CSS
- Coding selectors
- How to code selectors for all elements, element types, ids, and classes
- How to code relational, attribute and combinations of selectors
- CSS and formatting text
- How to use CSS to include some of the standard text formatting such as font family, font size, font styles, font alignments, and decorative text
- Using external style sheets
- How to incorporate the HTML and CSS files

5. Using the CSS box model for spacing, borders, and background

- Using external style sheets
- Floating elements. in 2 and 3 column layouts
- Using CSS to create text columns
- Positioning CSS elements

6. Working with tables

- Basic skills for using tables
- Creating, formatting and editing a table
- How to use CSS to format the table
- How to use HTML5 figure and figcaption elements with a table
- How to merge rows and columns of a table

7. Working with images

- Basic skills for working with images
- Types of images for the Web
- How to include and image on a page
- How to resize, align, and float and image on a page
- Advanced image skills
- Using HTML5 figure and figcaption elements
- Working with thumbnails
- Creating image map

8. Working with forms

- Using forms and controls
  - How to create a form
  - Using buttons, text fields, drop-down lists, radio buttons, check boxes, labels, and text areas
  - How to use a file upload control
  - Using HTML5 features for data validation

9. Using JavaScript to enhance your Web pages

- How JavaScript and the Document Object Model works
- Using JavaScript to enhance your web pages
  - Intro to JavaScript and DOM scripting
  - Basic JavaScript
  - JavaScript for data validation
  - How to use JavaScript for data validation
  - Using JavaScript for opening a popup window, image rollovers, image swaps, slide shows, and tabbed data
  - What if the JavaScript doesn't work on your page?

Chapters 11, 16, & 17 may be included as part of a course taught for an entire academic year.

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Preparation for Biology

BIOSC 0100--3 Credits

Description: The goal of this course is to provide students with a foundation in biology. This course focuses on a subset of major topics covered in the University of Pittsburgh courses Foundations of Biology I and II (BIOSCI 0150, 0160), including a review of chemistry as it applies to biology, the structure and function of macromolecules, the basic structure of cells, energy and cellular respiration, introduction to genetics and molecular biology, and development. While these topics are covered in high school biology courses, Preparation for Biology delves deeper and applies chemistry concepts to achieve a more complete understanding of biology. This, combined with practicing critical thinking skills, and primary literature and data analyses, prepares students for the rigors of the Foundations of Biology series.

Prerequisite: High School biology is the required prerequisite for the course.

Grading: The final grade will be determined on the basis of total points earned during the course. There will be two exams, each 50 points. There will be a cumulative (comprehensive) final exam (75 points). Additionally, there are 75 points that the teacher may assign at their discretion (for example, 3 10-point quizzes and 45 points in homework are recommended, but not required) for a total of 250 points for the course.

Textbook: The recommended text for the course is Sadava, *Life: The Science of Biology, 11th Edition*; published by McMillian (do not need to activate Launchpad). Other textbooks will be considered by the faculty liaison on a case-by-case basis.

Laboratory: Laboratory exercises are incorporated as part of the course to practice experimental design and critical thinking skills. One lab will be conducted as a day-long experience at the University of Pittsburgh. All other labs can be conducted at the school. No lab setup is needed by the school: equipment and reagents are all provided by the University.

The following topics are covered in the University of Pittsburgh BIOSC 0100 course:

1. The Chemistry of Life
- Chemical Bonds
- Water
- Carbon/Functional Groups

2. Macromolecules
- Proteins
- Enzymes
- Carbohydrates
- Lipids
- Nucleic Acids

3. The Cell
- Organelles
- Cytoskeleton
- Membranes
- Cell/Cell Interactions
- Signal Transduction

EXAM 1 (1 hour)

4. Energy
- Glycolysis
- Cellular Respiration

5. The Cell Cycle
- Mitosis
- The biology of cancer
- Meiosis
- Non-Disjunction-Human Genetic Disease

EXAM 2 (1 hour)

6. Genetics
- Mendelian Genetics
- Chromosome Theory of Inheritance

7. The Central Dogma of Molecular Biology
- DNA Replication
- Anatomy of a Gene
- Transcription/Post-transcriptional modifications
- Translation

8. Development
- Control of Eukaryotic Gene Expression
- Differential Gene expression during development

Final EXAM (2 hours)

Additional course credit information for BIOSC 0100:

At the University of Pittsburgh, course credits can count in three ways: toward the requirements for a major, toward elective requirements, and/or toward the total number of credits needed to graduate. For this course:

- Majors: As BIOSC 0010 is a preparatory course, it does not fulfill major requirements, although it provides preparation for the courses needed for life science majors related to biology
- Electives: Individual Schools and Colleges of the University (such as Engineering, Arts & Sciences, Business, Information Sciences, and so on) have different policies about elective credits and may count this course as an elective. Students interested in studying at the University of Pittsburgh should contact their School/College of interest to see if this course would be counted
- Graduation: This course's credits count toward the number of credits needed for graduation

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Intro. to Human Nutrition

NUTR 1006--3 Credits

Description: This course will cover an overview of the scientific principles of nutrition and their applications to humans throughout the lifecycle. Topics include classification and function of the six major nutrients, review of current nutrition standards, safety of the food supply, and nutrition misinformation.

Prerequisites: None.

Grading: Formative student assessment of learning will be based on completion of readings and performance on quizzes, online discussions, and assignments. Summative student assessment of learning will be based on performance of the Midterm (chapters 1-7) and Final (chapters 8-13).

Textbook: *Human Nutrition: Science for Healthy Living*, Stephenson, T. 3rd ed. 2021. McGraw-Hill.

Learning Outcomes:

Upon completion of this course, the student will have knowledge of:

1. The role of nutrition in promotion of a healthy lifestyle.
2. Health promotion and disease prevention theories and guidelines.
3. The various nutrition standards and how they can be utilized to evaluate the adequacy of nutrient intake in individuals in various populations.
4. The six categories of nutrients with respect to function, recommended amounts, major food sources, guidelines for intake, and digestive pathways.
5. MyPlate, by analyzing their own dietary intake or the dietary intake of a friend or family member.
6. Changes in dietary requirements that occur as a result of changes in an individual's health, age, and activity level.
7. Malnutrition: over- and under- nutrition causes, cures & associated health effects.
8. Current issues related to the safety of the food supply, both nationally and globally.
9. How to critically evaluate nutrition information in the popular media.
10. Nutrition recommendations for optimal performance.

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Course Expectations:
Any information must be accurate and validated with credible references using Academy of Nutrition and Dietetics citation format.

Quizzes:
You will complete short quizzes to assess your knowledge of the material.

Fad Diet Case Study:
Case Study: Access the Case Study: *Fad Diets – Christian Johnson* and follow the directions provided on the assignment – you will use NutritionCalc Plus (NutriCalc) to generate a "MyPlate Report"

Dietary Analysis:
Utilize NutriCalc to complete a 3-day food log for your own dietary practices. Log all food and beverages, *including water*, for two weekdays and one weekend day—they do not need to be consecutive. Follow the directions provided on each of the three assignments. You will use the same 3-day food log analysis for your food log assignment as well as your Personal Dietary Analysis assignments on macronutrients and micronutrients. NOTE: if you are uncomfortable completing a log of **your** usual intake, please ask a friend or family member to record their food intake for you to reference and complete the assignments using their information.

Course Grading Scale: [standard rounding rules will be followed]

97.0-100 A+	94.0-96 A	90.0-93 A-
87.0-89 B+	84.0-86 B	80.0-83 B-
77.0-79 C+	74.0-76 C	70.0-73 C-
67.0-69 D+	64.0-66 D	60.0-63 D-
< 60 F		

EVALUATION STRATEGIES:

Exams (2 @75 pts each)	150
Weekly Quizzes (13 @5pts each)	65
LearnSmart Readings & Practice (13 @5pts each)	65
Weekly Group Discussions (12) Leader (1)	50
Fad Diet Case Study (1)	25
Personal Dietary Analysis Assignments (3 @25pts each) 3-day food log, macronutrient, micronutrient	75
TOTAL POINTS	**430**

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Schedule:

Chapter	Topic / Assignment
1	Intro to Nutrition
2	Evaluating Nutrition Information
3	Basis of a Healthy Diet
4	Human Digestion, Absorption, and Transport ***Fad Diet Case Study Due***
5	Carbohydrates ***Personal Dietary Analysis: Food Log Due***
6	Fats and Other Lipids
7	Proteins: Amino acids
	Midterm
8	Metabolism ***Personal Dietary Analysis Due: Macronutrients***
9	Vitamins
10	Water and Minerals
11	Obesity, Energy Balance, and Weight Management
12	Special Topics
13	Nutrition for a Lifetime
	Final

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Basic Physics for Science and Engineering 1

PHYS 0174--4 Credits

Description: This is the first term of a two-term introductory sequence in physics for science and engineering students.

Prerequisite: Calculus is needed and should be taken at least concurrently. The laboratory course associated with this sequence is taken after Physics 0174.

Grading: The grade is determined primarily by three exams during the term and a cumulative final exam. Other work, such as quizzes and homework, may make some contribution to the grade. Approximately half of the class time each week is spent in covering new material. The remaining time is devoted to activities such as problem solving, demonstrating experiments, questions, and discussion.

Textbook: At the University of Pittsburgh, the latest edition of *Fundamentals of Physics* by Halliday, Resnick, and Walker is used. Any comparable, calculus-based text that covers all the material in this course outline is acceptable as an alternative.

The following topics should be covered. The order of topics may be altered if all the material listed before each exam is covered before that exam is given.

1. Measurement
- Units of length, time, mass; specifically, the SI system
- Unit checking
- Changing units
- Systems of coordinates

2. Vectors
- Vectors vs. scalars
- Magnitude, direction, Cartesian components
- Unit vectors **i**, j, k
- Addition and subtraction by geometric and algebraic methods
- Multiplication by a scalar
- Scalar (dot) product
- Vector (cross) product

3. Motion along a straight line
- Position and displacement
- Average velocity and average speed
- Instantaneous velocity and instantaneous speed
- Average acceleration and instantaneous acceleration
- Kinematics of constant acceleration
- Freely falling bodies

4. Motion in two and three dimensions
- Position and displacement
- Average velocity and average speed
- Instantaneous velocity and instantaneous speed
- Average acceleration and instantaneous acceleration
- Projectile motion
- Uniform circular motion
- Relative velocity and acceleration (it is sufficient to do only the one-dimensional case)

5. Newton's laws of motion
- Newton's First Law and inertial frames of reference
- Newton's Second Law and concepts of force and mass
- Newton's Third Law

6. Applications of Newton's laws
- Free-body diagrams
- Tension and pulleys
- Static and kinetic friction
- Inclined planes
- Uniform circular motion and centripetal force

EXAM I

7. Work and Kinetic Energy
- Work as a scalar product
- Work done by weight
- Work done by a variable force
- Hooke's law and work done by a spring
- Kinetic energy and the work-energy theorem
- Power

8. Potential energy & conservation of energy
- Conservative forces and potential energy
- Examples: mgh and $(1/2)kx^2$
- Conservation of mechanical energy
- Work done by nonconservative forces and Wnoncon = ΔE
- Conservation of energy (including internal energy)

9. Systems of particles
- Center of mass
- Newton's second law for a system of particles
- Linear momentum of a particle and of a system
- Conservation of momentum

10. Collisions
- Impulse and the impulse-momentum theorem
- Elastic and inelastic collisions in one dimension
- Collisions in two dimensions

EXAM II

11. Rotation
- Kinematics of fixed-axis rotation
- Linear and angular variables
- Moment of inertia and rotational kinetic energy
- Torque (including definition as a cross product) and rotational dynamics
- Rolling; translational and rotational kinetic energy; conservation of energy
- Angular momentum of a particle, a system of particles, and a rigid body
- Conservation of angular momentum

12. Oscillations
- Simple harmonic motion resulting from Newton's second law and Hooke's law
- Position, velocity, and acceleration in simple harmonic motion
- Energy considerations in simple harmonic motion
- Simple pendulum

EXAM III

13. Gravitation
- Newton's law of universal gravitation
- Gravitational potential energy and escape speed
- Planets and satellites
- Kepler's laws and their relation to conservation laws

14. Mechanical Waves
- Transverse and longitudinal waves
- Wavelength and frequency

- Speed of a traveling wave
- Waves on a stretched string
- Speed, energy, and power of a traveling wave on a stretched string
- Principle of superposition; interference
- Standing waves
- Sound waves
- Speed of sound
- Interference of sound waves

15. Doppler effect

FINAL EXAM (Cumulative)

PHYS 0174 Learning Objectives

1. Make a graph of the instantaneous displacement, velocity, and/or acceleration of a system based on a description of the motion or using another graph.
2. Apply the equations of 1-D kinematics to one or more objects with constant acceleration. Examples include free-fall, two objects that meet one another, and an object that has different constant acceleration at different times.
3. Add or subtract two or more vectors. (Relative velocity problems are an application of this category.)
4. Find the dot product or cross product of two vectors.
5. Describe the behavior of an object undergoing projectile motion based on the equations of 2-D kinematics.
6. Apply a conceptual understanding of Newton's first and third law.
7. Draw a free-body diagram and solve for an unknown force or acceleration of a system under the influence of two or more forces.
8. Calculate the force of static/kinetic friction or the coefficient of friction.
9. Calculate the drag force or terminal speed of an object.
10. Identify the centripetal force that acts on a system undergoing circular motion.
11. Find the work done by a force in cases were integration is not required (perhaps by inspecting a graph of force versus displacement). Alternately, find the force given work and displacement.
12. Calculate the average power provided by a force.
13. Apply conservation of mechanical energy to describe the motion of a system.
14. Use the work-energy theorem to identify the amount of mechanical energy that has been lost.
15. Calculate the average force or impulse during a collision or series of collisions.
16. Apply conservation of momentum to an explosion or collision. Be able to identify whether a collision is elastic, inelastic, or completely inelastic.
17. Answer a conceptual question about momentum, rockets, and/or the motion of the center of mass.

18. Apply kinematics to a rotating system. Be able to convert between the tangential values of s, v, a and θ, ω, using the radius r.
19. Distinguish between angular, tangential, and centripetal acceleration.
20. Determine the net torque acting on a body about a given axis and/or the angular acceleration of that body. Doing so may require the use of one or more moments of inertia.
21. Use the definition of static equilibrium to solve for one or more unknown forces or torques acting on a system.
22. Calculate the motion of a rolling object using torques and/or energy conservation. "Rolling" could be caused by a cord wrapped around the object, like in a yo-yo.
23. Find the rotational kinetic energy of an object.
24. Identify whether angular momentum is or is not conserved, and if appropriate, apply conservation of angular momentum to a rotating system.
25. Calculate the gravitation acceleration for an object inside or outside of a planet, given some combination of mass, radius, and density.
26. Apply energy conservation to a system with gravity to describe the motion of an object in a case where $U = mg$ is *not* an appropriate assumption.
27. Use Kepler's laws of planetary motion to describe the motion of a planet, moon, or satellite about its parent body.
28. Apply the concepts of stress, strain, and ultimate strength to a deformed object.
29. Calculate a spring constant given the elastic properties of a material.
30. Identify when a system (spring, simple pendulum, or physical pendulum) is undergoing simple harmonic motion, and find the amplitude, period, frequency, angular frequency, phase angle, displacement, velocity, and/or acceleration.
31. Apply conservation of mechanical energy to a simple harmonic oscillator (spring, simple pendulum, or physical pendulum). Damping may be involved.
32. Determine the amplitude, period, frequency, angular frequency, wave number, wave length, and/or propagation speed of a transverse traveling wave. If the wave is on a string, be able to calculate the propagation speed using the tension and linear density.
33. Predict the result of interference between two waves with identical amplitude and frequency. Specifically, be able to identify constructive, destructive, and intermediate interference—determining the amplitude and/or phase difference in the later case.
34. Identify the resonant frequencies and/or harmonics of a string or open/closed pipe.
35. Apply the equation for the Doppler effect to determine the shift in frequency caused by motion.

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Options for Implementing
College in High School Physics

Basic Physics for Science and Engineering 1
PHYS 0174

This is the first term of a two-term introductory lecture-demonstration sequence in physics for science and engineering students. Calculus is needed and should be taken at least concurrently. The grade is determined primarily by three exams during the term and a cumulative final exam. Approximately half of the class time each week is spent in covering new material. The remaining time is devoted to activities such as problem solving, demonstrating experiments, questions, and discussion. At the University of Pittsburgh, the latest edition of *Fundamentals of Physics* by Halliday, Resnick, and Walker is used. Any comparable, calculus-based text that covers all of the material in this course outline is acceptable as an alternative.

Department of Physics Course Policies

1. Students will need a scientific calculator for this course.
2. This course uses examinations created by the University of Pittsburgh CHS Faculty Liaison.

Possible paths to CHS Physics 0174

College in High School Physics 0174 is a flexible course that has been implemented in several different ways. Below are some of the ways that high schools have successfully offered the course.

1. General Physics ⟶ **CHS Physics 0174**

2. General Physics ⟶ **CHS Physics 0174** & AP Physics 1

3. General Physics ⟶ **CHS Physics 0174** & AP Physics 1 & 2 *(To implement this option, a school must have enough time to meet the goals of both CHS and AP classes. For example, one high school combining these courses has 100 minutes of instruction every day.)*

4. General Physics ⟶ **CHS Physics 0174** & AP Physics C: Mechanics

University of Pittsburgh

Kenneth P. Dietrich School of Arts and Sciences

College in High School

CHS Physics and AP Physics

The following information may be valuable in considering whether to offer CHS Physics with AP Physics.

CHS Physics and AP Physics 1

Most topics in CHS Physics 0174 coincide with curriculum of AP Physics 1. However, the following topics do not overlap:

CHS Physics 0174	AP Physics 1
- None *Required Math level: Calculus*	- Introduction to electrostatics and electric circuits (simple DC circuits) *Required Math level: Algebra*

*The kinetic theory of gases and thermodynamics are included in AP Physics 2.

CHS Physics and AP Physics C

Most topics in CHS Physics 0174 coincide with curriculum of AP Physics C. However, the following topics do not overlap:

CHS Physics 0174	AP Physics C: Mechanics
- Mechanical waves (including sound) *Required Math level: Calculus*	- None *Required Math level: Calculus*