PHYS399V: PHYS371—Classical Mechanics

Spring 2020: January 13–May 15
MR 10:00 AM–11:15 AM (unless otherwise noted), Room: STB210

Version 6: February 27, 2020 (subject to change)

Professor:	Dr. Kathy Cooksey, STB220 kcooksey@hawaii.edu; 808-932-7195
Office Hours:	M 11:30 AM–12:30 PM, W 10–11 AM, R 12:30–1:30 PM, F 1–2 PM, and by appointment
Website:	Laulima PHYS-399V-001 (HIL.12831.202030)
Textbook:	*Analytical Mechanics*, 6th ed., by Fowler & Cassidy (ISBN 978-0030223174)

Course Description:
Intermediate-level kinematics and dynamics. Central force motion; rotations, noninertial frames, normal modes of vibrations; introduction to Lagrangian and Hamiltonian formalism.
Pre-requisite: PHYS170, PHYS272, and MATH300 (may be currently enrolled)

Learning Objectives:

- Broad course goals:
  1. Deepen understanding of mechanics, as learned in introductory physics.
  2. Increase complexity of physics included in mechanics problems.
  3. Be able to derive many other useful equations from a set of fundamental equations.
  4. Improve problem-solving skills, especially in how: (i) an approach is motivated; (ii) a solution is formatted; and (iii) the answer is verified to be reasonable, but also: dimensional analysis is a way of solving problems and "reverse engineering" equations and clear diagrams (e.g., extended free-body diagrams) are a significant step in solving a problem efficiently.
- Specific content goals:
  1. Presenting a solution and thinking on one's feet is a highly transferrable skill.
  2. Manipulating equations algebraically/symbolically makes the resulting equation applicable to all situations with the same boundary conditions.
  3. Physical quantities have units that are used to understand the physical quantities, solve problems, and support intuition about the relative scales of physical quantities.

Email, Textbook, and Website:

- UHH considers email and Laulima an official form of communication; the student is responsible for receiving and returning information in a timely manner.
- The professor will email the student at his `hawaii.edu` account only.
- The required textbook is *Analytical Mechanics*, 6th ed., by Fowler & Cassidy (ISBN 978-0030223174).
- The Laulima course website PHYS-399V-001 (HIL.12831.202030) will be the hub for all course information.

Course Rules:

- The student is responsible for his own learning, which includes preparing for meetings, submitting work, asking questions, and seeking additional help.
- Students need to convey (either in person, by email, through an intermediary, or somehow) to the professor questions, comments, and concerns about the course.
- The professor will be receptive to and respectful of the student's needs and interests and must generally follow the course rules as detailed for the student (also see next section).
- Group work is encouraged for problem sets. However, all submitted work must be the original work of the student with reference to any homework partners.
- All references (e.g., websites, books other than the official course textbook, etc.) used to complete assignments must be cited, including numbers, techniques, facts, etc.
- The student may cancel two meetings during the semester, at no penalty other than having to learn more material on his own.
- The student and professor may reschedule three meetings each during the semester.
- A non-smart-phone calculator is required for every meeting. The student should practice with the calculator he will use for the tests and final exam.
- Solutions to problems must show sufficient supporting work to receive full points.

Good-to-Know about the Professor:

- She enjoys teaching and wants to be better at it, and she really cares about helping students be better. These aspects combined mean she is on the students' side; trust in that and knowledge that she is receptive to feedback will smooth over rough patches.
- She chooses teaching techniques based on physics-education research to support student learning as best as possible. This means she has one or more reasons for nearly every component of and action in a course. She'll gladly motivate these choices whenever necessary or asked.
- Her primary goal is to help students improve *how* they learn with the logic that if students learn how to learn, they can master any content. The related goal is to focus on transferrable skills so that time and effort spent for the class yield benefits beyond the course and semester.
- Generally, she does not answer questions directly. A student making connections and constructing a solution her- or himself will ingrain the answer more effectively, and the professor facilitates the process by asking leading questions. Since the motivation is to help the students, they should embrace and engage with this process. (It is also a transferrable skill to discuss ideas and answer questions on the fly.)
- She designs quizzes, tests, and exams so that no one gets 100% and no one gets 0% because either score would not be useful in assessing what the students understand and how to help. The rule-of-thumb is to score above the median (see Grading below). She has no interest in failing students who make good-faith effort in the class (e.g., good attendance, submit completed work, ask questions in and out of class).
- She thinks no single resource is comprehensive, so the expectation is that the student will have to work with the professor, her materials, the textbook, and the wealth of material available on the internet.
- The expectation is that a course requires 2–3 hr outside-of-class time per credit per week. Hence a 15-cr semester equals 30–45 hr per week (i.e., a full-time job).
- She generally responds to email 24-to-48 hours after receipt. If the matter is urgent, the student should call (office voicemail is automatically emailed) or stop by her office (her general weekly schedule is on her homepage: http://www2.hawaii.edu/~kcooksey).

General Course Outline (subject to change)

Reading assignments are to be read for the *following week* (which is why the schedule below starts in Week 0). The chapter intro should be read whenever the first section is assigned. The student are expected to come to class with questions about the assigned reading.

Problem sets (PS) are assigned every week and "due" the following; the student will be asked to solve some subset of the problems for the participation grade. The student may use his notes.

There are two tests; all content from a cutoff and earlier are fair game. The cutoff is determined by what content has been covered with the chance for feedback (hence the tests' titles). This pattern is designed so that the student has a chance to: (i) learn the material via reading, discussion, and problem sets; (ii) practice the content via problem sets; and (iii) receive feedback via discussion and/or posted solutions. Thus, there is a lag between material being the focus of the meetings and when the material will be on a test.

Detailed schedule: (subject to change)

Date	**Topic**	**Activity**
Week 0: Before semester begins		Read: §§1.1–1.6, §§1.9–1.10, §§2.1–2.3, §§3.1–3.3, §4.3, §4.5 Complete PS#1: Vectors Review
Week 1: M Jan 13, R Jan 16	Fundamental Concepts I	Read: §§1.7–1.8, §§1.11–1.12, §2.4, §§4.1–4.2 Pre-quiz Complete PS#2: Fundamental Concepts I
Week 2: **T Jan 21**, R Jan 24	Fundamental Concepts II *(Mon: MLK Day)*	Read: §§5.1–5.3 Complete PS#3: Fundamental Concepts II
Week 3: M Jan 27, R Jan 30	Noninertial Frames I	Read: §§5.4–5.6 Complete PS#4: Noninertial Frames I
Week 4: M Feb 3, R Feb 6	Noninertial Frames II	Read: §§6.1–6.6 Complete PS#5: Noninertial Frames II
Week 5: M Feb 10, R Feb 13	Central-Force Motion I	Read: §§6.7–6.14 Complete PS#6: Central-Force Motion I
Week 6: **T Feb 18**, R Feb 20	Central-Force Motion II *(Mon: President's Day)*	Read: §§1.11–1.12 (again), §§5.2–5.6 (again), §§8.1–8.6 Complete PS#7: Central-Force Motion II
Week 7: M Feb 24, R Feb 27	Rotational Motion I	Read: §§9.1–9.5 Complete PS#8: Rotational Motion I
Week 8: M Mar 2,	Rotational Motion II	Read: §§9.6–9.10 Complete PS#9: Rotational Motion II
R Mar 5	Test #1: Fundamentals, Noninertial Frames, & Central-Force Motion	
Week 9: M Mar 9, R Mar 12	Rotational Motion III	Read: §§10.1–10.5 Complete PS#10: Rotational Motion III
Mar 16–20	*Spring Break*	
Week 10: **T Mar 24**, **F Mar 27**	Lagrangian & Hamiltonian I *(Thu: Prince Kuhio Day)*	Read: §§10.5–10.7 Complete PS#11: Lagrangian & Hamiltonian I
Week 11: M Mar 30, R Apr 2	Lagrangian & Hamiltonian II	Read: §§10.8–10.9 Complete PS#12: Lagrangian & Hamiltonian II
Week 12: M Apr 6, R Apr 9	Lagrangian & Hamiltonian III *(Fri: Good Friday)*	Read: None Complete PS#13: Lagrangian & Hamiltonian III
Week 13: M Apr 13,	Lagrangian & Hamiltonian IV	Read: §§3.1–3.3 (again), §3.4, §3.6, §4.4, §5.6 (again), §8.4 (again) Complete PS#14: Oscillations Review
R Apr 16	Test #2: Rotational Motion, Lagrangian, & Hamiltonian	
Week 14: M Apr 20, R Apr 23	Oscillations I	Read: §§11.1–11.2 Complete PS#15: Oscillations I
Week 15: M Apr 27, R Apr 30	Oscillations II	Read: §§11.3–11.5 Complete PS#16: Oscillations II
Week 16: M May 4, R May 7	Oscillations III	Post-quiz
Week 17: W May 13	Final Exam (9:40–11:40 AM)	

Reading Assignments: as mentioned previously, reading assignments are to be read for the *following week*. The section titles per week are given below; it's like a more detailed schedule.

Week 0 on Fundamental Concepts I for Week 1

- **§1.1** Introduction
- **§1.2** Measure of Space and Time. Units
- **§1.3** Notation, Formal Definitions and Rules of Vector Algebra
- **§1.4** The Scalar Product
- **§1.5** The Vector Product
- **§1.6** An Example of the Cross Product. Moment of Force
- **§1.9** Derivative of a Vector
- **§1.10** Position Vector of a Particle. Velocity and Acceleration in Rectangular Coordinates
- **§2.1** Newton's Laws of Motion. Historical Introduction
- **§2.2** Rectilinear Motion. Uniform Acceleration Under a Constant Force
- **§2.3** Forces That Depend on Position: The Concepts of Kinetics and Potential Energy
- **§3.1** Introduction [to Oscillations]
- **§3.2** Linear Restoring Force: Harmonic Motion
- **§3.3** Energy Considerations in Harmonic Motion
- **§4.3** Forces of the Separable Type: Projectile Motion
- **§4.5** Motion of Charged Particles in Electric and Magnetic Fields

Week 1 on Fundamental Concepts II for Week 2

- **§1.7** Triple Products
- **§1.8** Change of Coordinate System. The Transformation Matrix
- **§1.11** Velocity and Acceleration in Plane Polar Coordinates
- **§1.12** Velocity and Acceleration in Cylindrical and Spherical Coordinates
- **§2.4** Velocity-Dependent Forces. Fluid Resistance and Terminal Velocity
- **§4.1** Introduction [to General Motion of a Particle in Three Dimensions]: General Principles
- **§4.2** The Potential Energy Function in Three-Dimensional Motion: The Del Operator

Week 2 on Noninertial Frames I for Week 3

- **§5.1** Accelerated Coordinate Systems and Inertial Forces
- **§5.2** Rotating Coordinate Systems: Angular Velocity as a Vector Quantity
- **§5.3** Dynamics of a Particle in a Rotating Coordinate System

Week 3 on Noninertial Frames II for Week 4

- **§5.4** Effect of Earth's Rotation
- **§5.5** Motion of a Projectile in a Rotating Cylinder
- **§5.6** The Foucault Pendulum

Week 4 on Central-Force Motion I for Week 5

- **§6.1** Introduction [to Gravitation and Central Forces]
- **§6.2** Gravitational Force Between a Uniform Sphere and a Particle
- **§6.3** Kepler's Law of Planetary Motion
- **§6.4** Kepler's Second Law. Equal Areas: Conservation of Angular Momentum
- **§6.5** Kepler's First Law: The Law of Ellipses
- **§6.6** Kepler's Third Law: The Harmonic Law

Week 5 on Central-Force Motion II for Week 6

- **§6.7** Potential Energy in a Gravitational Field: Gravitational Potential
- **§6.8** Potential Energy in a General Central Field
- **§6.9** Energy Equation of an Orbit in a Central Field
- **§6.10** Orbital Energies in an Inverse-Square Field
- **§6.11** Limits of the Radial Motion: Effective Potential
- **§6.12** Motion in an Inverse-Square Repulsive Field: Scattering of Alpha Particles
- **§6.13** Nearly Circular Orbits in Central Fields: Stability
- **§6.14** Apsides and Apsidal Angles for Nearly Circular Orbits

Week 6 on Rotational Motion I for Week 7

- **§§1.11–1.12** again, from Week 1
- **§5.2–5.6** again, from Weeks 2–3
- **§8.1** Center of Mass of a Rigid Body
- **§8.2** Rotation of a Rigid Body About a Fixed Axis: Moment of Inertia
- **§8.3** Calculation of the Moment of Inertia
- **§8.4** The Physical Pendulum
- **§8.5** A General Theorem Concerning Angular Momentum
- **§8.6** Laminar Motion of a Rigid Body

Week 7 on Rotational Motion II for Week 8

- **§9.1** Rotation of a Rigid Body About an Arbitrary Axis: Moments and Products of Inertia—Angular Momentum and Kinetic Energy
- **§9.2** Principal Axes of a Rigid Body: Dynamics Balancing
- **§9.3** Euler's Equations of Motion of a Rigid Body
- **§9.4** Free Rotation of a Rigid Body: Geometric Description of the Motion
- **§9.5** Free Rotation of a Rigid Body with an Axis of Symmetry: Analytical Treatment

Week 8 on Rotational Motion III for Week 9

- **§9.6** Description of the Rotation of a Rigid Body Relative to a Fixed Coordinate System: The Eulerian Angles
- **§9.7** Gyroscopic Precession: Motion of a Top
- **§9.8** The Energy Equation and Nutation
- **§9.9** The Gyrocompass
- **§9.10** General Motion of a Rigid Body: Rolling Wheel

Week 9 on Lagrangian & Hamiltonian I for Week 10

- **§10.1** Hamilton's Variational Principle. An Example
- **§10.2** Generalized Coordinates
- **§10.3** Calculating Kinetic and Potential Energies in Terms of Generalized Coordinates. An Example
- **§10.4** Lagrange's Equations of Motion for Conservative Systems
- **§10.5** Some Applications of Lagrange's Equations

Week 10 on Lagrangian & Hamiltonian II for Week 11

- **§10.6** Generalized Momenta. Ignorable Coordinates
- **§10.7** Forces of Constraint. Lagrange Multipliers

Week 11 on Lagrangian & Hamiltonian III for Week 12

- **§10.8** D'Alembert's Principle. Generalized Forces
- **§10.9** The Hamiltonian Function. Hamilton's Equation

Week 12 on Lagrangian & Hamiltonian IV for Week 13

None

Week 13 on Oscillations I for Week 14

- **§§3.1–3.4** again, from Week 0
- **§3.6** Forced Harmonic Motion: Resonance
- **§4.4** The Harmonic Oscillator in Two and Three Dimensions
- **§5.6** again, from Week 3
- **§8.4** again, from Week 6

Week 14 on Oscillations II for Week 15

- **§11.1** Potential Energy and Equilibrium. Stability
- **§11.2** Oscillation of a System with One Degree of Freedom About a Position of Stable Equilibrium

Week 15 on Oscillations III for Week 16

- **§11.3** Coupled Harmonic Oscillators. Normal Coordinates
- **§11.4** General Theory of Vibrating Systems
- **§11.5** Vibration of a Loaded String or Linear Array of Coupled Harmonic Oscillators

Grading:

- The grade depends on the following categories: participation (25%), tests (50%), and final exam (25%).
  - Participation is based on the student coming to meetings prepared, including having read the assigned sections; having questions from the reading and previous and/or current problems; and solving assigned problems.
  - The tests focus on the content listed in the schedule above but all prior content is fair gain.
  - The final exam is cumulative.
- Cheating is not tolerated. Any question of cheating will be tested with an oral exam, to see whether the student understands the material. Cheating will result in a zero for the item in question and a report to the University. It may result in immediate failure of the course.
- The final letter grade will be based on mastery/understanding (as determined by the percentage grade) and on improvement/effort. The professor will give projected final letter grades after each test so the student knows where he stand.

Problem-Solving Strategy (AKA "The Format"): This is the explicit format expected for solutions to all quantitative problems. It is not required for conceptual problems (though may be useful).

Student's Name
Collaborator(s):

PHYS399V Problem Set #*X*

1. Problem title or very brief description

   Physics Category

   - Identify the broad category under which the problem falls because this reduces the set of concepts and equations that will be useful.
   - The broadest categories reflect the course modules (e.g., "kinematics" or "linear momentum") but being more specific can be useful (e.g., "kinematics (2D)", "force (equilibrium)", "energy (conservation)").

   Definitions

   - Define the variables to represent the known/given quantities (with units) and the unknown/target quantities.
   - Use informative symbols for the variables; subscripts are useful.
   - Often a diagram is a useful way to define the known and unknown variables.

   Algebraic Derivation

   - Write the basic equations on which the solution is based, in terms of the defined variables. There should be as many equations as unknowns.
   - Algebraically manipulate the equations to reduce and simplify.

   Numeric Substitution

   - If the problem requires a numeric answer, substitute into the reduced equation (while tracking units explicitly) and compute the result.

   Assessment

   - Check the units come out correctly (even if it's a non-numeric answer).
   - If it's a numeric answer, check the order-of-magnitude,
     else justify the derived equation scales reasonably with each variable.
   - Clearly justify that the final answer is reasonable.
     Units and order-of-magnitude/scaling are two "sanity checks" but
     also demonstrate understanding of expectation based on physics.
     - If result is not expected, discuss whether this is the point (e.g., learning, new intuition) or if it seems incorrect.
     - If the latter, then attempt to explain what is wrong (and earn back points).

2. Problem title or very brief description

   Physics Category
   Definitions
   Algebraic Derivation
   Numeric Substitution
   Assessment

3. *...wash, rinse, repeat*

Content Not on Equation Sheet: Below are a combination of fundamental concepts in physics that must be learned (which is more than memorized) and relationships that can be derived from fundamental concepts and given equations. This is not a comprehensive list.

- This section (Content Not on Equation Sheet) of the PHYS170 Syllabus; see the latest version of PHYS170 Syllabus at: http://guavanator.uhh.hawaii.edu/~kcooksey/teaching/UHH/UHH.html. Some just may not be relevant (and maybe never was).
- The following content that was on the PHYS170 Equation Sheet (see link above) but not on PHYS371 Equation Sheet:
  - Gravitational acceleration at Earth's surface: $g = 9.806\,\mathrm{m\,s^{-2}}$
  - Quadratic solution for $ax^2 + bx + c = 0$: $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
  - Density: $\rho = \dfrac{M}{V}$
  - Kinematic equations (constant $\vec{\mathbf{a}}$):[1]
    $\vec{\mathbf{v}}(t) = \vec{\mathbf{v}}_0 + \vec{\mathbf{a}}t$
    $\vec{\mathbf{r}}(t) = \vec{\mathbf{r}}_0 + \vec{\mathbf{v}}_0 t + \dfrac{1}{2}\vec{\mathbf{a}}t^2$
    $v^2 = v_0^2 + 2a(r - r_0)$ (by component)
  - Magnitude of static friction: $f_\mathrm{s} \leq \mu_\mathrm{s} N$
  - Magnitude of kinetic friction: $f_\mathrm{k} = \mu_\mathrm{k} N$
  - Gravitational force: $\vec{\mathbf{F}}_{12}(r) = \dfrac{GM_1M_2}{r^2}\,\hat{\mathbf{r}}_{12}$
  - Pressure: $P = \dfrac{F}{A}$, where F is force and A is area.
  - Ideal gas law (gas pressure): $PV = \mathcal{N}\, k_\mathrm{B}\, T$, where $\mathcal{N}$ is number of particles.
  - Temperature: $T_{(^\circ\mathrm{C})} = T_{(\mathrm{K})} - 273$ and $T_{(^\circ\mathrm{C})} = \dfrac{5}{9}\left(T_{(^\circ\mathrm{F})} - 32\right)$
  - Center of mass for particles: $\vec{\mathbf{r}}_\mathrm{CM} = \dfrac{1}{M_\mathrm{sys}} \displaystyle\sum_{n=1}^{\mathcal{N}} M_n \vec{\mathbf{r}}_n$
  - Moment of inertia for particles: $I = \displaystyle\sum_{n=1}^{\mathcal{N}} M_n r_n^2$.
  - Work-Energy Theorem:[1] $W_\mathrm{AB,net} = K_\mathrm{sys,B} - K_\mathrm{sys,A}$
  - Mass-energy equivalence: $E = Mc^2$
  - Kinetic energy of particle:[1] $K = \dfrac{1}{2}Mv^2$
  - Average KE of hot particles: $K_\mathrm{ave} \approx k_\mathrm{B}\, T$
  - Gravitational potential energy: $U(r) = -\dfrac{GM_1M_2}{r}$
  - Potential energy of particle near Earth's surface: $U(y) = Mgy + \mathrm{constant}$
  - Spring potential energy: $U(r) = \dfrac{1}{2}kr^2 + \mathrm{constant}$
  - Period (T)-frequency (f) relation: $T = f^{-1}$
  - Wavelength (λ)-frequency relation: $v = \lambda f$

[1] Also applicable to fixed-axis rotating systems with appropriate substituions of $\vec{\boldsymbol{\theta}}$, $\vec{\boldsymbol{\omega}}$, $\vec{\boldsymbol{\alpha}}$, I, $\vec{\boldsymbol{\tau}}$, and/or $\vec{\mathbf{L}}$.

- Direction convention: $\vec{\mathbf{r}}_{12}$ points from 1 to 2
- Unit vector $\hat{\mathbf{r}} = \frac{\vec{\mathbf{r}}}{r}$
- Radian: $2\pi\,\text{rad} = 360°$
- Circumference of a circle: $s = 2\pi r$
- Area of a circle: $A = \pi r^2$
- Area of a triangle: $A = \frac{1}{2}bh$
- Area of a trapezoid: $A = \frac{1}{2}(a+b)h$
- Surface area of a cylinder: $A = 2\pi r h + 2\pi r^2$
- Volume of a cylinder: $V = \pi r^2 h$
- Pythagorean theorem: $a^2 + b^2 = c^2$
- $\angle A + \angle B + \angle C = 180° = \pi\,\text{rad}$
- $\frac{d}{dx}f(x) \equiv \lim_{\Delta x \to 0}\left(\frac{f(x+\Delta x) - f(x)}{\Delta x}\right)$
- Chain rule: $\frac{d}{dx}f(y) = \frac{df(y)}{dy}\frac{dy}{dx}$
- Product rule: $\frac{d}{dx}\big(f(x)g(x)\big) = f(x)\frac{dg(x)}{dx} + g(x)\frac{df(x)}{dx}$
- $\frac{d}{dx}\left(x^n\right) = nx^{n-1}$
- $\int\limits_{x_0}^{x+\mathcal{N}\Delta x} f(x)dx \equiv \lim_{\Delta x \to 0}\left(\sum_{n=1}^{\mathcal{N}} f(x_0 + n\Delta x)\Delta x\right)$
- $\int\limits_{x_\mathrm{A}}^{x_\mathrm{B}} \frac{d}{dx}f(x) = f(x_\mathrm{B}) - f(x_\mathrm{A})$
- **Common prefixes**
  * Giga = 10^9 or billion; denoted as G.
  * Mega = 10^6 or million; denoted as M.
  * Kilo = 10^3 or thousand; denoted as k.
  * Centi = 10^{-2} or one-hundredth; denoted as c.
  * Milli = 10^{-3} or one-thousandth; denoted as m.
  * Micro = 10^{-6} or one-millionth; denoted as μ and sometimes called "micron" when applied to meters.
  * Nano = 10^{-9} or one-billionth; denoted as n.
  * Femto = 10^{-15} or one-quadrillionth; denoted as f.

– **Greek letters** (lower,upper case):

α, A	alpha	ν	nu
β, B	beta	ξ, Ξ	xi
γ, Γ	gamma	o, O	omicron
δ, Δ	delta	ϕ, Π	pi
$(\epsilon, \varepsilon), E$	epsilon	$(\rho, \varrho), P$	rho
$z\eta, Z$	zeta	σ, Σ	sigma
η, H	eta	τ, T	tau
$(\theta, \vartheta), \Theta$	theta	υ, Υ	upsilon
ι, I	iota	$(\phi, \varphi), \Phi$	phi
κ, K	kappa	χ, X	chi
λ, Λ	lambda	ψ, Ψ	psi
μ, M	mu	ω, Ω	omega

Campus-wide Information

Disability Support: Any student with a documented disability who would like to request accommodation should contact the Disability Services Office—Student Services Center, E230; 932-7623 (V), 932-7002 (TTY), uds@hawaii.edu—as early in the semester as possible.
Advising: Advising is a very important resource designed to help students complete the requirements of the University and their individual majors. Students should consult with their advisor at least once a semester to decide on courses, check progress towards graduation, and discuss career options and other educational opportunities provided by UH Hilo. Advising is a shared responsibility, but students have final responsibility for meeting degree requirements.
Kilohana Academic Success Center: The KASC provides academic support opportunities for all UH Hilo students that foster their development into independent, self-motivated learners. Students who visit Kilohana have access to subject-specific and academic skills tutoring from UHH students selected for their academic achievement and dedication to helping others succeed. Kilohana is located on the lower level of the Mookini Library and on the web at http://hilo.hawaii.edu/kilohana/.
Human Rights: The University of Hawaiʻi at Hilo prohibits discrimination in its education programs based on race, national origin, color, creed, religion, sex, age, disability, veteran status, sexual orientation, gender identity or associational preference. If at any time during class you feel uncomfortable about what is being talked about, or feel that your human rights have been violated, please feel free to leave the room. However, the professor asks that you confer with her as soon as possible about what happened so that appropriate action can be taken if necessary to avoid future problems. If you are uncomfortable speaking with the professor about your concern, please contact Kalei Rapoza (kaleihii@hawaii.edu), Interim EEO/AA Director, at 932-7626.
UH Hilo Title IX Policy: The University of Hawaii is committed to providing a learning, working and living environment that promotes personal integrity, civility, and mutual respect and is free of all forms of sex discrimination and gender-based violence, including sexual assault, sexual harassment, gender-based harassment, domestic violence, dating violence, and stalking. If you or someone you know is experiencing any of these, the University has staff and resources on your campus to support and assist you. Staff can also direct you to resources that are in the community. Here are some of your options:

> If you wish to remain anonymous, speak with someone confidentially, or would like to receive information and support in a confidential setting, contact: • UH Hilo Counseling Services: SSC, room E-203, 932-7465; • UH Hilo Medical Services: Campus Center, room 212, 932-7369; and/or • Hawaiʻi Island YWCA, 935-0677.
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> If you wish to report an incident of sex discrimination or gender-based violence including sexual assault, sexual harassment, gender-based harassment, domestic violence, dating violence, or stalking as well as receive information and support,† contact: • Libby Bailey, Title IX Coordinator, 932-7818, libby.bailey@hawaii.edu; • Jennifer Stotter, Director of the Office of Equal Opportunity & Deputy Title IX Coordinator, 932-7641, jstotter@hawaii.edu; and/or • Kalei Rapoza, Interim Director of Human Resources, 932-7626, kaleihii@hawaii.edu.
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> †Please note that you do not have to file a report with the University to receive institutional support or assistance.

As a member of the University faculty, the professor is required to immediately report any incidence of sex discrimination or gender-based violence to the campus Title IX Coordinator. Although the Title IX Coordinator and professor cannot guarantee confidentiality, the student will still have options about how the case will be handled. The goal is to make sure the student is aware of the range of options available and has access to the necessary resources and support. For more information regarding sex discrimination and gender-based violence, the University's Title IX resources and the University's Policy, Interim EP 1.204, go to: http://www.hawaii.edu/titleix.
Student Conduct: Students are expected to follow the University of Hawaiʻi at Hilo Student Code of Conduct available at the following URL: http://www.uhh.hawaii.edu/catalog/student-conduct-code.html.