egr 557

Ira A. Fulton Schools of Engineering
Arizona State University

Syllabus for Foldable Robotics

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Overview

Foldable Robotics is a course organized around new types of robots being developed in research labs and industry across the country. These devices are designed and built using layered, flat sheets of a wide variety of materials, and folded up to create both form and motion. This class studies these devices from initial prototype and design through implementation and optimization, with a focus on application-specific projects which seek to solve problems of cost, parallelism, complexity, and time with a relatively fast and easy prototyping method.

This class allows students to delve deeper into the analytical problems associated with these devices, in topics such as design, manufacturing, dynamics & simulation, optimization, kinematics & motion, and stiffness analysis.

Class Basics

Section Info and Meeting Times

Class: EGR557 – Foldable Robotics
Class Schedule: Monday/Wednesday, 3:00pm-4:15pm
Meeting Location: Polytechnic Campus, Tech 162
Course Number: 26449

Instructor Contact Info

Instructor: Daniel M. Aukes
E-mail: danaukes@asu.edu
Instructor Office: Tech 152, Polytechnic Campus
Office Phone: 480-727-5851

Office Hours

Office Hours will held weekly starting week 2 or may be made by appointment. I will run a survey to identify the best time to hold office hours within my own constraints. This document will be updated to reflect the official office hours that start week 2. This document will be updated to reflect up-to-date office hours as needed.

Prerequisites

There are no formal prerequisites, but students taking *Foldable Robotics* should be familiar with:

- Programming fundamentals, ideally in a scripted language like Python or Matlab.
- Linear algebra, differential equations, calculus, trigonometry, vectors, etc.
- Working around rapid prototyping machines, and if not, willing to learn.

Course Objectives

At the end of this course, students will demonstrate proficiency in synthesizing concepts from across a number of engineering domains including robotics, modeling and analysis, optimization, data collection and experimental validation, CAD/CAM design, and manufacturing & rapid prototyping. This includes:

- Using bio-inspired approaches in the development and design of mechanisms
- Understanding the kinematic relationships between forces and motion for rigid mechanical systems
- Understanding the relationships between force and deflection in compliant systems
- Being able to build and use physics-based models for understanding the dynamic motion of robotic systems
- Understanding how the limitations of fabrication processes translate to design constraints and guidelines for laminate systems.
- The basics of data collection and experiment design
- How to use optimization approaches in solving an engineering design problem.

Expected Learning Outcomes

Foldable Robotics

- You will be able to identify key innovations in the foldable robotics timeline and their impact.
- You wil be able to identify persistent, recurring, or key mechanisms as well as why they are useful in the context of mechanisms and robotics.
- You will be able to contrast the key differences between origami in the context of art vs how folded systems are used in the development of robotic mechanisms.

Python

- You will be able to identify and utilize the key differences between data types in writing Python code.
- You will be able to create and use functions for the purposes of modularizing Python code
- You will be able to plot multidimensional tabular data as figures using the matplotlib library.
- You will be able to demonstrate how to perform array and matrix-based operations using the Numpy and Scipy packages
- You will be able to compose and work with symbolic expressions using the Sympy package.
- You will be able to write and compile Jupyter Notebooks for the purposes of documenting your works.

Biomechanics and Bio-inspiration

- You will be able to search for and critically read through research papers to identify key metrics related to animal locomotion

- You will be able to the biomechanics of a selected organism to a set of initial design goals or specifications.

Kinematics, Jacobians, Forces, and Power

- Ideate a kinematic mechanism – prototype it, draw it and demonstrate its motion
- Translate the kinematic rules of a mechanism to a computer program and visualise / plot its motion.
- Interpret the motion of a kinematic end-effector in robotics terms, such as:
  - The input/output speed relationship
  - The output/input force relationship
  - The power transferred during motion
- Utilize numerical or symbolic approaches to obtain the kinematics.

Dynamics

- Create and populate a rigid body dynamical system composed of
  - Rigid Frames
  - Masses and Inertias
  - Joints
  - Forces
- Model the f=ma relationship of a dynamic system over time.
- Integrate the motion of a dynamic system over time

Actuator Selection, Characterization, and Integration

- Select an actuator or power-storage mechanism
- Size an actuator or power-storage mechanism based on project specifications
- Model an actuator or power-storage mechanism
- Test an actuator or power-storage mechanism.
- Collect performance / model data on a selected actuator or power-storage mechanism.
- Integrate an actuator or power-storage mechanism into your kinematic mechanism

Compliance and System Stiffness

- Describe the deflection of a beam using Euler-Bernoulli beam equations
- Model a beam in Solidworks and calculate its deflection under load using FEA.
- Experimentally measure the deflection of a beam and obtain its Young's modulus.
- Create an approximate model for beam compliance and add it to your system dynamics

Optimization for model fitting and design improvement

- Understand basic approaches for minimizing or optimizing a function
- Use coding-based tools to optimize simple functions and perform a regression.
- Use a data-driven approach to fit unknown model parameters to a real system.
- Use a model-based approach for selecting ideal design parameters using optimization.

Prototyping, manufacturing, and computation

- Design an origami-inspired mechanism using analog techniques

- Be able to enumerate the various manufacturing considerations of cutting and lamination
- Be able to compute a manufacturing-aware digital design file.
- Make a laminate device using digital techniques (optional)
- Make robots and mechanisms
  - Learn layer-based fabrication steps
  - Make mechanisms using rapid prototyping tools

Experimental Validation

- Understand best practices for developing an experiment
- Understand ways to reduce noise and variation
- Develop a small experiment and collect data
- Interpret sources of error and corrective actions

Team-based project management, communication, etc.

- Develop a computation-focused project website for communicating progress in written form.
- Present work orally to the class

Textbook, Materials, Equipment, and Personal Laptops

Textbook

There is no textbook. Selected readings from will be provided on Canvas and/or linked to online.

Software

You will be expected to install and use either the Anaconda distribution of Python, or google colab, for completing all assignments and following along in class.

This class is friendly to all operating systems. Students have used Window, Ubuntu or OS/X on their own in the past with no problems.

Please see the software list posted on the course site for more information about required and recommended software. The software listed is either open-source and freely available to download, available through ASU, or free for student use.

Computers

It is expected that you can bring a laptop to class to complete in-class programming tasks.

Materials

Students will be responsible for selecting and obtaining the consumable materials used in their project, such as cardboard, adhesive, plastic, etc. I may be able to supply a limited number of motors, sensors, and controllers which can be used for development, but if students wish to keep their robots they will need to purchase their own components.

Equipment

Special equipment for making laminate robots is available for use on the Poly Campus at your discretion. If you wish to use the tools and equipment you will need to pass all safety training required by the Innovation Hub and follow all campus public health protocols. See https://poly.engineering.asu.edu/innovation-hub/ for more information.

Checkout

Checkout of equipment or reusable parts may be possible through Dr. Aukes, the Innovation Hub, or Peralta Labs. Any checked-out tools or parts must be returned in order to receive a grade in the class.

Zoom Policy

If attending class in-person, please bring earbuds and be prepared to use them in team breakout sessions; this is essential to reduce interference and cross-talk.

If attending remotely, you will need the following:

- Reliable home internet for accessing Zoom, Canvas, and other course content.
- A webcam or smartphone with camera for participating in class as well as for data collection.

If you are not able to personally finance the equipment needed to attend class remotely, please inform the course instructor.

Other recommended resources

- Adobe Creative Cloud, available to all ASU students for free: https://uto.asu.edu/adobe-creative-cloud.
- Microsoft Office (Microsoft 365 is free for all currently-enrolled ASU students)
- Solidwoks, available via https://myapps.asu.edu

Project

The final project will involve designing a foldable robot using the methods introduced in this class. The project will span the entire semester. Teams of ~4 students will propose a research question they would like to focus on in the realm of foldable robotics. They will survey the state of research on this topic, and craft a project of appropriate scope (with the guidance of the professor) and depth that can be accomplished in the time frame. They will then develop a design workflow, analysis, manufacturing plan, a robot, and validating data that supports the design decisions made.

Class Schedule

The class schedule can be found on Canvas. It is subject to change, and will be updated regularly. It is your responsibility to keep track of all due dates and times, which will all be found on canvas.

Tentative Schedule[1]

[1] The Schedule is subject to change.

Week	Monday	Wednesday
1	*Class 1:* Welcome	*Class 2:* Foldable Background
2	*Class 3:* Biomechanics I	*Class 4:* Laser Training
3	*Class 5:* Biomechanics II / Kinematics I	*Class 6:* Developing a Research Question, etc.
4	*Class 7:* Project Pitches	*Class 8:* Kinematics II
5	*Class 9:* Kinematics III	*Class 10:* Kinematics IV
6	*Class 11:* Dynamics I	*Class 12:* Dynamics II
7	*Class 13:* Dynamics III	*Class 14:* Presentation I
8	*Class 15:* Mechanics and Compliance	*Class 16:* Optimization I
9	*Class 17:* ***No Class: Spring Break***	*Class 18:* ***No Class: Spring Break***
10	*Class 19:* Laminate Fabrication Tutorial	*Class 20:* Manufacturing I
11	*Class 21:* In Class Cutting I	*Class 22:* Presentation II
12	*Class 23:* Manufacturing II	*Class 24:* In Class Cutting II
13	*Class 25:* Manufacturing III	*Class 26:* Consulting / Flex Day
14	*Class 27:* Optimization II	*Class 28:* In Class Cutting III
15	*Class 29:* Experimental Validation	*Class 30:* Consulting / Flex Day
16	*Class 31:* TBD Seminar	*Class 32:* Presentation III
16	***Finals Week***	***Finals Week***

Assignments

Assignment Breakdown[2]

Item	Points	Percentage
Individual Subtotal	1940	44
Team Subtotal	2450	56
Total	**4390**	**100**

Tentative List of Assignments[3]

Individual Assignments

Week	Name	Type	Points
1	Python for Loops. Arrays. and Plotting	Individual Assignment	100
1	Make a Pop-up Book	Individual Assignment	200
1	Install Python	Ungraded Individual Task	
1	Incoming Survey	Individual Survey	
2	Install CAD	Ungraded Individual Task	
2	Python Functions	Individual Assignment	100

[2]Assignments, totals, relative weighting, and due dates are subject to change with appropriate warning.
[3]Assignments, totals, relative weighting, and due dates are subject to change with appropriate warning.

Week	Name	Type	Points
3	Project Pitch	Individual Assignment	100
3	Project Selection Survey	Individual Survey	
4	Kinematics Via Prototyping & CAD	Individual Assignment	200
5	Intro to Kinematics	Individual Assignment	200
7	Intro to Dynamics	Individual Assignment	200
8	Course Feedback I	Individual Survey	20
10	Parameter Identification	Individual Assignment	200
11	Course Feedback II	Individual Survey	20
12	Intro to Manufacturing Computation	Individual Assignment	200
14	Prototyping	Individual Assignment	200
15	Design Optimization, Experiment Design, Data Collection, and Analysis	Individual Assignment	200
	Individual Subtotal		**1940**

Team Assignments

Week	Name	Type	Points
3	Develop a Research Question	Team Assignment	200
4	Biomechanics Background and Initial Specifications	Team Assignment	200
6	Make a Website	Ungraded Team Task	
6	System Kinematics	Team Assignment	200
7	Website Update I	Team Assignment	100
7	Presentation I	Team Assignment	200
8	System Dynamics I	Team Assignment	200
8	Parameter Identification Plan	In-Class Team Activity	25
10	System Dynamics II	Team Assignment	200
11	Presentation II	Team Assignment	200
11	Website Update II	Team Assignment	200
13	Design and Manufacturing Workflow	Team Assignment	200
13	Design Optimization, Experiment Design, Data Collection, and Analysis Plan	In-Class Team Activity	25
16	Presentation III	Team Assignment	200
16	Website Update III	Team Assignment	300
	Team Subtotal		**2450**

How to Succeed in this Course

- Attend all class sessions
- Complete all pre-class preparation assignments and reading
- Complete all post-class follow up assignments and reading
- Participate in office hours
- Check your ASU email regularly
- Log in to the Canvas at least once each week
- Communicate proactively with your instructor
- Create a study schedule so that you don't fall behind on assignments

Grading Policies

The goal of assignments is to develop a fundamental understanding of the topics required to create foldable robots, using coding to design, manufacture, and analyze.

Assignments are on Canvas

Assignments will be posted to Canvas throughout the semester. It is the student's responsibility to check canvas periodically for announcements and posted material. Assignments will cover many of the topics presented in class.

Type of Assignments

Assigned work may be in the form of a longer-form, weekly assignment intended to teach a new fundamental skill, or it may be a short, small-point-value assignment consisting of tasks that must be completed in order for you to complete other milestones. Some surveys also have a small number of points assigned to them, to ensure student participation. In-class work generally serves as a starting point for assigned homework and is typically ungraded, though it may be graded occasionally.

Please see the *"Rubric"* section of each assignment for assignment-specific expectations.

Team vs. Individual Assignments

Assigned work may be individual in nature or team-based project assignments. Individual assignments will be graded on an individual basis, and are intended to reflect your own work. Please use the discussion board feature on Canvas when you have a question. Copying others' work is not permitted.

The grade for team-based assignments will be shared by all participating members.

Grading Scale

Final points will receive a letter grade according to the following table:

Grade	Range
A+	97-100.0
A	93-96.9
A-	90-92.9
B+	87-89.9

Grade	Range
B	83-86.9
B-	80-82.9
C+	77-79.9
C	70-76.9
D	60-69.9
E	0-59.9

Grading Rubric

Some assignments will be graded according to rubric with number values corresponding to a sliding qualitative scale . The following is a general description of what each percentage means in this course:

Description	%
Exceeds Expectations. Shows superior effort, quality, mastering of the concepts. Innovation in the execution of submitted work. Documentation is publication-ready.	100
Above expectations. Demonstrates full understanding of the problem, and solution is well executed, documented, and presented.	85
Meets expectations. Minor mistakes are present, but student demonstrates a general understanding of the concepts. Documentation present but perhaps not comprehensive.	70
Below expectations. Some effort shown, though there may be serios flaws in analysis or execution. Documentation lacking in certain areas.	55
Fails to meet minimum expections. Minimal effort shown. Does not show understanding and may not have thought through their methods. Documentation is lacking substance, clarity, completeness, evidence of effort.	40
Not submitted, illegible, not readable, not properly linked	0

Late Penalities

Due to the nature of this class, failing to turn in an assignment on time affects you and your classmates, as each concept builds on the last. It is your responsibility to get in touch with the instructor regarding any questions before assignments are due. Late submissions will lose one letter grade(10%) for every day they are late[4]. **Any sumbission more than four days late will receive a zero.** Additionally, due to the nature of the submission process, **late CATME assignments will not be accepted.**

All assignments must be submitted to Canvas by the date and time noted in Canvas.

Submitting and Presenting work

Assignment submissions must follow the “Submission Best Practices” document shared on Canvas. It outlines the expectations for well written assignments, reports, and presentations.

Assigned homework will be submitted for grading several different ways. This is always indicated in the *“Submission”* section of each assignment.

- It may be submitted for grading via Canvas.

[4] meaning 10% of the total possible number of points

- Other work involving external tools (Google Surveys, CATME, etc) will be graded based on submitting to that external tool.
- Some work will be presented in front of the class, and the grade derived from the presentation.
- Other work will be compiled into the design notebook (in the form of a website or report) and graded priodically.

It is the student's responsibility to pay close attention to each assignment's submission instructions, as each assignment indicates the method by which the work must be submitted for grading. Failure to submit work in the manner asked for in each assignment will result in a zero.

Course Policies

Attendance & Participation

Summary

- Attendance is **required**. More than two absences result in -2% grade reduction per missed class.
- Absences and Tardies are treated the same
- Coordinate with fellow students to take notes if you are gone.
- Email me at once of technical difficulties over Zoom, but try to reconnect ASAP using other technology (Hotspot, cell-phone, call-in, etc.)

Details

This class is structured so that it can only be successful with your attendance. Classes will be interactive, and will require you to come with questions, answers, and ideas to discuss. Students should notify me if they will miss class, although this does not excuse them from learning the concepts or turning in their assignments on time.

Missing more than **two** classes will result in noticeable penalties to students' grade, in the form of -2% off the student's final grade per missed class over two.[5]

Please coordinate with your fellow students to make sure someone takes notes during class if you will be unavoidably gone.

If you are attending remotely, attendance *over Zoom* will be required to count your participation. Attendance will be taken each class by taking a snapshot of the Zoom participant list; this may occur more than once per class. Students are expected to sign in to Zoom on time, as important issues are often introduced within the first few minutes of class. Tardies are thus treated as absences. If a student is found to be either absent or inactive on Zoom, they will be counted absent.

In the case of technical difficulty preventing your from attending via Zoom, please contact the instructor right away over email and explain the situation. Please try another means of reconnecting to zoom, such as over your cell-phone (by calling in or by using the Zoom app).

Accommodations

Attendance and participation in class activities is an essential part of the learning process, and students are expected to attend class regularly. Some absences are, however, unavoidable.

[5] counted as 2% of total points.

Excused absences for classes will be given without penalty to the grade in the case of (1) a university-sanctioned event [ACD 304-02]; (2) religious holidays [ACD 304-04; a list can be found here https://eoss.asu.edu/cora/holidays]; (3) work performed in the line-of-duty according [SSM 201-18]; and (4) illness, quarantine or self-isolation related to illness as documented by a health professional.

Anticipated absences for university-sanctioned events, religious holidays, or line-of-duty activity should be communicated to the instructor by email at danaukes@asu.edu, at least 2 days before the expected absence.

Absences for illness, quarantine or self-isolation related to illness should be documented by a health professional and communicated to the instructor as soon as possible by email at danaukes@asu.edu.

Excused absences do not relieve students from responsibility for any part of the course work required during the period of absence. Faculty will provide accommodations that may include participation in classes remotely, access to recordings of class activities, and make-up work.

If there is a disagreement as to whether an absence should be accommodated, the instructor and student should contact the academic unit chair immediately for resolution.

Classroom Behavior

Novel Coronavirus

ASU returned to on-campus instruction in Fall 2021. The ASU Face Cover Policy requires the wearing of face covers in the majority of classrooms, teaching laboratories, studios and workshop settings.

The space for this class has been designated as a space requiring face covers. Please wear a face covering over your nose and mouth at all times during class for the health and safety of yourself and others.

For the most up-to-date information, please visit the ASU Novel Coronavirus website.

Summary

- Keep all communication professional
- Turn off all cell phones, pagers, and other personal devices when participating in class
- Use your laptops for classroom activities, not email, chats, web browsing, or other non-class related activities.

Details

Professional Communication Professional Communication in all forms is required. This includes proper dress when attending class remotely and in-person. Please refrain from using any background images in your zoom video feed, though you should consider blacking out your background for privacy and professionalism.

Cell phones, pagers, and other personal devices Cell phones, pagers, and other personal devices must be turned off during class to avoid causing distractions. The use of recording devices is not permitted during class. Any violent or threatening conduct by an ASU student in this class will be reported to the ASU Police Department and the Office of the Dean of Students.

Use of laptops in class Laptops are strongly suggested for this course. You may use your laptop to take notes, during tutorial sessions, or when giving presentations. Please do not use class time for emails, chats, web browsing, or other non-class related activities.

Reorganizing a Team

Summary

- Please try to work out any team-based issues.
- Please see me if the team is not working. I may choose to split the team

Details

Reorganizing teams is not a desired outcome of a group project but is sometimes necessary if dysfunction rises to a level that it cannot complete the project. One or more teammates or the instructor may initiate the process to split or reorganize a team. Splitting teams does not necessarily work in any members' best interests, as team-based Team Assignments, which each team member must contribute to, are afterwards spread across fewer people.

However, if the need arises, members must work with the professor to outline the issues which are creating the need to reorganize and the measures which remaining teammates may take to rectify the situation. This can take the form of changes made to communication, workload reallocation, new meeting times, etc. The professor will have the final say in establishing a set of expectations for the team, which must be met within a week. If members fail to live up to these expectations, the team may be split and reorganized, as deemed necessary by the instructor.

When reorganiztion occurs, each new team will set up their own folders starting with the former team's work, but new material will be created by the new team, and old material adapted based on the new direction of each new team. Any changes to the project definition due to the split (such as project scope, performance specifications, timeline, etc) will need to be coordinated with the instructor for all future submissions or presentations.

The instructor has the final say in the establishment and reoganization of teams.

Academic Integrity

This class is meant to teach you how to create and use your own design tools for creating folding robots using a variety of published resources, online resources, and classroom content. I encourage you to plumb the depths of what's available; through this synthesis you might be able to create something unique. However, I expect to be able to tell what is your work and what is someone else's. For this reason, specific rules for this class are:

Specific Rules

- Do your own work for individual assignments and tests.
- Include the your sources of inspiration within assignments and projects. This will help grow the list of cool references, but more importantly, help distinguish inspiration from wholesale plagarism.

- Keep code/text/information you use from outside sources separate from your own original content (through the use of separate folders, for example). Make it explicit what is yours and what is not.
- Include all the licenses or copyright statements as required by the things you reuse. This will make your own code more reuseable for yourself and potentially others in the future.
- See https://provost.asu.edu/academic-integrity/policy for more info.

Students in this class must adhere to ASU's academic integrity policy, which can be found at https://provost.asu.edu/academic-integrity/policy. Students are responsible for reviewing this policy and understanding each of the areas in which academic dishonesty can occur. In addition, all engineering students are expected to adhere to both the ASU Academic Integrity Honor Code and the Fulton Schools of Engineering Honor Code. All academic integrity violations will be reported to the Fulton Schools of Engineering Academic Integrity Office (AIO). The AIO maintains record of all violations and has access to academic integrity violations committed in all other ASU college/schools.

Recordings

Note that class sessions may be recorded, and recordings provided to enrolled students, instructors or instructional support personnel as deemed necessary by the course instructor. If you have concerns about being recorded, please contact the course instructor.

Copyright

All course content and materials, including lectures (Zoom recorded lectures included), are copyrighted materials and students may not share outside the class, upload to online websites not approved by the instructor, sell, or distribute course content or notes taken during the conduct of the course (see ACD 304–06, "Commercial Note Taking Services" and ABOR Policy 5-308 F.14 for more information).

You must refrain from uploading to any course shell, discussion board, or website used by the course instructor or other course forum, material that is not the student's original work, unless the students first comply with all applicable copyright laws; faculty members reserve the right to delete materials on the grounds of suspected copyright infringement.

Policy against threatening behavior, per the Student Services Manual, SSM 104–02

Students, faculty, staff, and other individuals do not have an unqualified right of access to university grounds, property, or services. Interfering with the peaceful conduct of university-related business or activities or remaining on campus grounds after a request to leave may be considered a crime. All incidents and allegations of violent or threatening conduct by an ASU student (whether on- or off-campus) must be reported to the ASU Police Department (ASU PD) and the Office of the Dean of Students.

Disability Accommodations

Suitable accommodations will be made for students having disabilities. Students needing accommodations must register with the ASU Disabilities Resource Center and provide documentation of that registration to the instructor. Students should communicate the need for an accommodation in sufficient time for it to be properly arranged. See ACD 304-08 Classroom and Testing Accommodations for Students with Disabilities.

The Americans with Disabilities Act (ADA) is a federal antidiscrimination statute that provides comprehensive civil rights protection for persons with disabilities. One element of this legislation requires that all qualified students with documented disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation please contact the Disability Resource Center at ASU Polytechnic located in Student Affairs Quad # 4 or call 480-727-1039 / TTY: 480-727-1009. Eligibility and documentation policies are online at: http://www.asu.edu/studentaffairs/ed/drc/

Harassment and Sexual Discrimination

Arizona State University is committed to providing an environment free of discrimination, harassment, or retaliation for the entire university community, including all students, faculty members, staff employees, and guests. ASU expressly prohibits discrimination, harassment, and retaliation by employees, students, contractors, or agents of the university based on any protected status: race, color, religion, sex, national origin, age, disability, veteran status, sexual orientation, gender identity, and genetic information.

Title IX is a federal law that provides that no person be excluded on the basis of sex from participation in, be denied benefits of, or be subjected to discrimination under any education program or activity. Both Title IX and university policy make clear that sexual violence and harassment based on sex is prohibited. An individual who believes they have been subjected to sexual violence or harassed on the basis of sex can seek support, including counseling and academic support, from the university. If you or someone you know has been harassed on the basis of sex or sexually assaulted, you can find information and resources at https://sexualviolenceprevention.asu.edu/faqs.

As a mandated reporter, I am obligated to report any information I become aware of regarding alleged acts of sexual discrimination, including sexual violence and dating violence. ASU Counseling Services, https://eoss.asu.edu/counseling is available if you wish to discuss any concerns confidentially and privately. ASU online students may access 360 Life Services, https://goto.asuonline.asu.edu/success/online-resources.html.

Student Support Services

- ASU Libraries - offers 24/7 access to librarians through “Ask a Librarian” online chat and help by librarians in person at the Reference Desk during most hours the libraries are open. http://www.asu.edu/lib/
- Counseling and Consultation – provides confidential mental health and career counseling services for all ASU students. http://www.asu.edu/studentaffairs/counseling/
- Learning Resource Center – provides students with academic support services such as tutoring, peer advising, computer assisted instruction, and supplemental instruction. Offers both free and fee-based services. http://www.asu.edu/vpsa/lrc/
- Writing Center – provides on-site tutors to help students increase their confidence as writers and improve writing skills free of charge. http://www.asu.edu/duas/wcenter/
- Career Services – offers assistance to students in choosing a major, setting career goals, interviewing and job hunting strategies. http://career.asu.edu/
- Student Financial Aid Office – offers information and applications for student funding such as grants, loans, scholarships and student employment. http://www.asu.edu/fa/
- Student Health and Wellness Center – provides non-emergency medical health care to all ASU students regardless of insurance status. Most visits with a physician or nurse practitioner are free of charge, but fees will be incurred for x-rays, lab results, etc., http://www.asu.edu/health/

- Student Recreational Center – offers individual and group fitness opportunities, as well as information on nutrition and wellness, and massages. Use of the general facilities (weights, circuit training and cardio machines) are free, other services (yoga classes, massages) are fee-based. http://www.asu.edu/src/
- Student Legal Assistance – provides legal advice and counsel free of charge to all ASU students in areas such as landlord-tenant law, credit reports and collection issues, taxability of scholarships and grants, etc. Notary service is also available at no charge. http://www.asu.edu/mu/legal/
- Help Wiki – provides a frequently asked questions resource for technology users at ASU. http://wiki.asu.edu/help/
- EMPACT Crisis Hotline – offers free 24-hour support for mental health crises. Call (480) 784-1500 in the Phoenix area, (866) 205-5229 for the toll-free number outside of Phoenix, and (480) 736-4949 for the sexual assault hotline. All services are free and confidential. http://www.empact-spc.com/

Notice

Any information in this syllabus (other than grading and absence policies) may be subject to change with reasonable advance notice.