TO: The Engineering Faculty

FROM: The Faculty of the Agricultural and Biological Engineering Department

RE: New graduate course – ABE 53500 – Design and Modeling of Fluid Power Systems; crosslist with current course ME 53500 - Design and Modeling of Fluid Power Systems

The Faculty of the Agricultural and Biological Engineering Department has approved the following new graduate course. This action is now submitted to the Engineering Faculty with a recommendation for approval.

FROM (IF ALREADY OFFERED WITH TEMPORARY NUMBER)**: ABE 59100**

Spring; 3 total credits; Lecture

Pre-requisites: ME 30900, or CE 34000 and CE 34300, or equivalent class passed with a minimum grade of D-

Attendance for last Spring 2022 was 12 students. Each spring semester for 10 years with enrollment from 6 to 15 students per offering.

TO: ABE 53500/ME 53500 - DESIGN AND MODELING OF FLUID POWER SYSTEMS

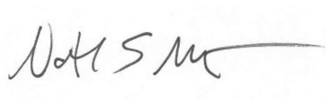
Spring; 3 total credits; LEC/75/2/16

Pre-requisites: ME 30800 and ME 30801, or CE 34000 and CE 34300, or equivalent class passed with a minimum grade of D-

Introduction to fluid power technology. Design of hydraulic systems for mobile and industrial application for functionality, cost and energy efficiency. Modeling strategies for fluid power systems. Demo labs and class projects are given to reinforce the design and modeling learning projects.

RATIONALE:

ABE 53500/ME 53500 (previously ABE 59100/ME 59700) has been offered every year for more than ten years (currently by Dr. Andrea Vacca), and it has been a pillar class supporting the ongoing research at the Maha Fluid Power Research Center. The class is also taken by several engineering students outside the Maha Fluid Power Research Center, from departments outside ME, such as AAE and ABE. Students in ABE have been taking the course using a temporary course number (ABE 59100), an issue we hope to resolve by obtaining a permanent number and cross listing the course number with ME. This course provides knowledge of fluid power drive technology, which is a fundamental technology for applications in industrial, mobile, aerospace, and marine fields. United States industry is particularly strong in these fields and constantly demanding for R&D experts. Purdue has been leading the fluid power academic research in the US for more than a decade and this class will consolidate this tradition for cutting-edge education and research in fluid power. The class also provides modeling techniques that a graduate student can use in other research fields.



Nathan Mosier, Head of the Agricultural and Biological Engineering Department
Link to Curriculog entry: **https://purdue.curriculog.com/proposal:22078/form**

1. Course Information

ME 53500 / ABE 53500 - Design and Modeling of Fluid Power Systems

CRN: TBD

Meeting time: Lectures: Tue 10:30 – 11:45pm (Room BHEE 226)

Thu 10:30-11:45pm (Room BHEE 226)

https://purdue.webex.com/join/avacca

version for synchronous online attendance offered to students required to quarantine or with other demonstrated issues. Please require Andrea Vacca's permission to access the online session 24hr prior the lecture, providing the reason and accompanying documentation for the request.

Course credit hours: 3

Course web page: Brightspace

Prerequisites: Undergraduate class in Fluid Mechanics, like ME 30800 and ME 30801, or CE 34000 and CE 34300 or equivalent class passed with a minimum grade of D-

2. Information About the Instructor(s)

Name of the instructor: Andrea Vacca

Office Location: Maha Fluid Power Research Center, Kepner Laboratories, KPNR125

Phone number: 765 496 2127

Email Address: avacca@purdue.edu

Office hours: Monday 4pm – 5pm

Office hours are via online meeting through WebeEx. Use following link to connect: https://purdue.webex.com/join/avacca

Please send an email to Andrea Vacca in advance to confirm the meeting.

Other meeting times can be arranged in case of need.

Andrea Vacca will also reply class-related inquiries via emails (usual response time < 24 hr)

3. Course Description

This class provides the student with the fundamental knowledge of fluid power (FP) technology.

Fluid power refers to a discipline that involves the use of fluids to perform mechanical actuations. It is a well-established and independent discipline that has defined research and scholarly activities for more than seven decades. FP serves a large and diverse industry reaching agriculture, construction, transportation, aerospace, marine, manufacturing and entertainment industries. Advancements in control and efficiency of FP systems is enabling new robotic systems and biomedical devices. According to the US Dept. of Energy, approximately 5% of the nation's total energy consumption is transmitted by FP actuation and drive systems. Compared with the other technologies for transmitting mechanical energy (i.e. electric or pure mechanical systems), FP has a clear power to weight ratio advantage. It also allows easy integration with electric control technology (Electro-Hydraulic Systems).

The class first describes basic fluid power components such as pumps, motors, cylinder, hydraulic control valves, and accumulators. The main architectures of such components are illustrated, and the basic equations that allow formulating analytical or numerical models are presented.

After describing the basic components of a fluid power system, the second part of the class covers the analysis, the modeling and the design of complete hydraulic control systems. The basic control concepts are described first, for the case of circuits controlling a single actuator; the case of multiple actuators is covered afterwards, as an extension of the single actuator control concepts. Emphasis is given to the challenge of meeting functional requirements of a given application, while minimizing cost of ownership as well as energy consumption. Starting from the basic circuits, the lectures and labs will also cover current state of art systems for industrial and mobile applications.

The course includes class lectures but also some labs/demo experiences, which will be given during the hours scheduled for the lectures. During the lab experiences, the students will learn how to recognize the different hydraulic components, and how to perform basic tests on components and systems. Every student will also have to work on two independent project assignments aimed at modeling a hydraulic pump as well as an entire hydraulic system in MatLab / Simulink. The class evaluation is based on these two project assignments and a final exam.

4. Learning Outcomes

After completion of the course, the student will be capable of (<u>course learning objectives</u>):

CL 1. Interpret and design hydraulic systems according to ISO standard of representation

CL 2. Describe the principle of operation of basic hydraulic components such as pumps, motors, hydraulic control valves, pipes, linear actuators (cylinders) and recognize the technologies available for each component

CL 3. Model the operation of hydraulic components through lumped or distributed numerical approaches.

CL 4. Discuss the features of the hydraulic control technologies commonly available for mobile machinery and industrial applications, particularly in terms of cost, functionality and energy consumption.

CL 5. Formulate, design, simulate and present the most energy efficient solution for the hydraulic control system of a fluid power application, given the functional requirements.

With these objectives, the class will also meet the following ABET Student Outcomes:

(1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. (CL2, CL3, CL5)

(2) an ability to apply engineering design to produce solutions that meet specified need with consideration of public health, safety, and welfare, as well as global, social, environmental and economic factors. (CL4, CL5)

(6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions. (CL1, CL3)

5. Teaching Philosophy

Hydraulic control technology is an applied engineering discipline with a high multidisciplinary content. It involves elements of fluid mechanics, machine design, electric and computer engineering. For this reason, hydraulic control technology is a constantly evolving discipline, with most of the up to date information reported in technical publications, in the web, only in a partial form.

Hydraulic control technology is a discipline particularly suitable for graduate level classes. The learning of this discipline exposes the students to many of the challenges they might encounter in their future professional career in industry or in academia. These challenges include: i) "to develop an engineering mind", which means properly use the basic engineering knowledge gained in the previous college years, to "connect all the dots" while studying a fluid power system; ii) "to develop an analytical approach for studying fluid power systems" ii) to not rely on "easy to find" and reliable study resources alternative to the class material that allows for quickly catching up with the class contents; iii) "to solve engineering problems" involving many possible solution alternatives.

The class instructor is aware of these challenges, having experienced them as a student first, and in his professional career later. For these reasons, he made effort to design this class in such a way that students can get stimulated as much as possible towards a passionate learning of the class material.

Most of the class contents are presented through slides. Several slides are purposely left incomplete so that important details can be covered in a flexible way during the lectures. The lectures also contain several instances of discussion. These discussion intervals are designed to promote in-class active learning, and to share to the students the practical implication of the theoretical contents.

The class lectures and the supporting slides are organized by topic. The instructor provides extra study material or references to the students. Some of this extra material is often from different sources, and therefore not smoothly organized for an easy independent study. For this reason, regular attendance is strongly encouraged. However, the instructor's book "Hydraulic Fluid Power" recently published could be a great help for the students in need to better understand the class material.

Some class lectures will be dedicated to practical demos and labs, which are designed to expose the students to some practical aspects related to the assembling, the operation, and the measurements of fluid power circuits and components.

During the class, the students will be challenged with two individual class projects that, in a compressed form, reproduces the challenges related to the design and particularly the modeling of a fluid power system. One project is dedicated to the detailed modeling of a hydraulic pump (which is the heart of a hydraulic system), while one project focuses on the modeling of the hydraulic actuation system of an off-road vehicle.

The class design as illustrated above has received mostly very positive feedback from the students. However, the instructor is still committed to constantly improve the class material and the lecture style. For this reason, constructive class feedbacks, given to the instructor verbally, or via email, or anonymous form (end of class survey) are always appreciated and considered when designing the future versions of the class.

6. How to Succeed in this Course

As described in the section "teaching philosophy", this class can present to the students challenges different from other engineering classes typical of the graduate level. Differently from basic engineering disciplines, where several sources (textbooks, websites) are available to describe the core concepts, the hydraulic control technology is a multidisciplinary discipline that lacks basic educational material. This is mainly due to the constant progress of this engineering technology.

For this reason, the successful students need to be prepared for being constantly engaged with the class material and the related assignments. In summary, a successful student:

- Commits an average of 8 hrs per week to the course
- Dedicates time on a weekly base to the class project, and discusses with the instructor possible doubts or the main project assumptions
- Engages the class mates / asks the instructor to discuss the class topics and the class projects.

In contrast, there are some common behaviors that has caused poor grade / failing the course:

- Work on the class project only one weeks before the final deadline. The project is conceived for several weeks of constant commitments. The development of a properly functioning simulation model usually requires several steps as well as consultations with class mates or the instructors. This cannot be done as a last minute effort.
- Assume that a low grade is not an option for a graduate level class. Only the students that meets the class objectives will receive a high grade (see grading policy in a later section)

7. Learning Resources, Technology, & Texts

- Lecture slides, lab handouts and supplementary material will be provided by the instructors through Purdue Brightspace prior the lectures.
- Purdue Hotseat. This platform will be used for the in-class discussion. The answer to each question will be provided during the class lecture. To get familiar with Purdue Hotseat, please follow this link: www.openhoatseat.org.
- Textbook: Vacca A., Franzoni F., 2021, Hydraulic Fluid Power: Fundamentals, Applications, and Circuit Design, John Wiley & Sons Inc (ISBN 978-1119569114).

The above book covers most of the class material.

- Additional textbooks that can complement lecture materials are:
    - Assofluid, 2007. Hydraulics in Industrial and Mobile Applications.

      The students can refer to this book for the description of basic hydraulic components and fluid properties. Some description on complete hydraulic control systems is provided, but not much in line with the material presented in class.

    - Philip J. Pritchard, Fox and McDonald's Introduction to Fluid Mechanics, 8th Edition

      This book is excellent for reviewing the required basics of fluid mechanics

    - The handbook of Hydraulic Filtration, Parker Hannifin, available online

      This document is excellent for describing filters and oil requirements

    - Blackburn J. F., Reethof G., Shearer J.L., 1959, Fluid Power Control. The M.I.T. Press.
    - Merrit, Herbert E. 1967. Hydraulic Control System. John Wiley & Sons, Inc.
    - McCloy D., H. R. Martin, Control of Fluid Power, 1980. Ellis Horwood Limited.

      These books are excellent in presenting core concepts of hydraulics such as orifice equation, hydraulic control valves, as well as some system concepts. Unfortunately, they are out-dated for the more *modern systems used in mobile hydraulics which are presented in class*

- Manring, Noah D. 2013. Fluid Power Pumps and Motors: Analysis, Design, and Control. McGraw Hill.
- Ivantysyn J., Ivantysynova M., 2003, Hydrostatic Pumps and Motors: Principles, Design, Performance, Modelling, Analysis, Control and Testing, Tech Books International

  These books are excellent sources for the understanding of the positive displacement machines used in hydraulic control systems

8. Course Logistics

Reading Assignments: The students are encouraged to read the textbook pages indicated next to each lecture (see table below) to maximize the understanding of the class material. Some lectures might have additional reading assignments indicated in the same table or that will be announced either at the end of the previous lecture. The student is expected to read these assignments before the class period. Some additional reading assignment might be suggested during the lectures, to further details the information provided on the class topics.

Class attendance and honest policy: Spring 2022's class will occur through regular lectures. Online attendance through webex platform is granted to students requiring special accommodation as detailed in the first page of the syllabus. A tentative class schedule is provided in a following section of the syllabus. The schedule will be constantly updated on Purdue Brightspace. Each student is expected to attend all lectures (attendance may be taken and considered towards the final grade) and participate during the active learning phases of the class. If the instructor is late, please wait 15 minutes before leaving. Multiple absences might result in a decreased grade (see grading policy). You will be held responsible for all information from the reading assignments, lectures, e-mail, etc., regardless of attendance. You should check your e-mail daily for class information. If you have some extenuating circumstance, please inform the instructor as soon as possible prior to the absence.

Cheating, plagiarism, and other forms of academic dishonesty will be prosecuted according to Purdue University policy.

Homework: the class does not have weekly homework. However, two reports related to the lab/demos will be requested according to the tentative schedule shown in a later section of the document. Additionally, the instructor will post on Brightspace some problems and related solutions that will help the students to practice the theoretical concepts learned in class, and prepare to the final exam.

Demo Labs: Some (<4) lectures will be replaced by some demos and lab experiences, to expose the students to some practical aspects of fluid power components and systems. Typical examples include (but are not limited to): disassemble hydraulic components, characterize a positive displacement machine, build and troubleshoot an entire hydraulic control system. In case of restrictions due to pandemic, these experiences might be offered online using a virtual simulator. As alternative, videos will be posted on Brightspace.

Final exam: The final exam provides the students with the opportunity to demonstrate their ability to analyze and design fluid power systems. The exam will be a two-hour in-class exam, following the open-book and open-notes formula.

Cheating, plagiarism, and other forms of academic dishonesty during the exams will be prosecuted according to Purdue University policy.

Class projects: The class has two project assignments. The first project relates to the modelling of a positive displacement machine for fluid power application, and it is due after the first part of the lectures (see class schedule below). The second project aims at modeling the hydraulic system of an entire machine, and it is due during the last week of the class period. The detailed description of the project will be provided during the lecture period, and it will be posted on Blackboard.

Each student must work individually on each project. The main goal of the projects is to tests the students' ability to simulate hydraulic components and systems by finding the proper modeling equations and assumptions. Each student must present a project report describing the model implementation and the main results that can illustrate the correct functioning of the system.

9. Assignments and Points

This section provides the grading policy that will be followed for ME 535

Grades will be earned based on a weighted average as follows:

Class reports (n. 2) 10%

Independent project (n. 2) 70 % (35% project 1 - pumps; 35% project 2 - systems);

Final Exam – 20 %;

Every assignment will have a maximum grade of 100. Grades might also be curved according to the instructor's discretion; in this case, criteria used for the curving will be shared to the students.

Grades and final score may be adjusted (up to ±5%) based on class/lab attendance, attitude, and class participation and overall performance. Class participation includes: reports, answers to Hotseat quizzes during lectures (also for online students), Q/A participation during the lectures (also for online students), Q/A during office hours or outside the class.

The final grades will be determined using the following tentative table:

Grade	GPA value	Numerical Range
A+	4.0	96.0-100
A	4.0	93.0-95.9
A-	3.7	90.0-92.9
B+	3.3	87.0-89.9
B	3.0	83.0-86.9
B-	2.7	80.0-82.9
C+	2.3	77.0-79.9
C	2.0	73.0-76.9
C-	1.7	70.0-72.9
D+	1.3	67.0-69.9
D	1.0	63.0-66.9
D-	0.7	60.0-62.9
F	0.0	<60.0

Plagiarism and/or cheating are sufficient for an F. Please refer to the Purdue Honors Pledge (https://www.purdue.edu/provost/teachinglearning/honor-pledge.html) and the student handbook for University rules about plagiarism and cheating.

The following requirements must be met to receive a passing grade:

- Two class projects submitted
- Final exam submitted

In order to meet the above requirement, the instructor will be available to arrange a make-up exam, or accept late submission for the students with reasonable and properly documented needs (self-declaration might not be accepted). Also, it is the student's responsibility to notify instructor about scheduling a make-up exam or a late submission. These requests should occur ahead of time, unless not possible for documented reasons.

10. Course Schedule

The tentative class schedule is provided below. Please note that the schedule might be subject to changes. An updated schedule will be maintained in Purdue Brightspace.

Date		Topic	Comments
Tue	Jan 11	Introduction to the course, Syllabus, Hydraulic symbols. Basic equations for hydraulic components	Textbook pages: 53-76
Thu	Jan 13	Basic equations for hydraulic components – cont.	Textbook pages: 99-103

Tue	Jan 18	Orifice equation and orifice functions	Textbook pages: 81-96
Thu	Jan 20	Hydraulic fluids	Textbook pages: 26-47
Tue	Jan 25	Hydraulic line modeling	Textbook pages: 109-119
Thu	Jan 27	Pumps and motors - 1	Textbook pages: 123-131
Tue	Feb 1	Pumps and motors - 2	Textbook pages: 132-159
Thu	Feb 3	1st project assignment explanation	Zubin Mistry
Tue	Feb 8	Axial piston pumps – deep dive	Dr. Lizhi Shang
Thu	Feb 10	LAB 1 - Pumps and Motors *at Maha Lab 1500 Kepner Dr, Lafayette, IN*	Pump disassembly Pump characterization
Tue	Feb 15	Hydraulic control valves – 1	Textbook pages: 179-232
Thu	Feb 17	Hydraulic control valves – 2	Textbook pages: 179-232 (LAB 1 report due)
Tue	Feb 22	Hydraulic control valves – 3	Textbook pages: 179-232
Thu	Feb 24	Accumulators	Textbook pages: 239-254
Tue	Mar 1	Controlling loads – Basic system architectures	Textbook pages: 261-277
Thu	Mar 3	Basic metering architectures – 1	Textbook pages: 293-298
Tue	Mar 8	Basic metering architectures – 2 Counterbalance valves	Textbook pages: 319-327 Textbook pages: 333-354
Thu	Mar 10	Bleed Off and Open center systems Advanced Open Center architectures	Textbook pages: 357-376 (1st project due date)
		SPRING BREAK	
Tue	Mar 22	Load Sensing Systems	Textbook pages: 379-411
Thu	Mar 24	Constant Pressure systems	Textbook pages: 379-411
Tue	Mar 29	Hydrostatic transmissions – 1	Textbook pages: 551-577
Thu	Mar 31	Hydrostatic transmissions – 2	Textbook pages: 619-629

Tue	Apr 5	LAB 2 – Metering control architectures *At Parker motion control lab, ABE building*	
Thu	Apr 7	2nd project assignment	Mateus Bertolin (LAB 2 report due)
Tue	Apr 12	Hydrostatic actuators	Textbook pages: 631-642
Thu	Apr 14	Extension to multiple actuators – 1 Series and parallel	Textbook pages: 427-445
Tue	Apr 19	Extension to multiple actuators – 2 Constant Pressure Open center systems	Textbook pages: 449-474
Thu	Apr 21	Extension to multiple actuators – 3 LS systems	Textbook pages: 475-507
Tue	Apr 26	Extension to multiple actuators – 4 LS systems (cont.)	Textbook pages: 475-507
Thu	Apr 28	Final exam review	
TBD		Hydromechanical transmissions and hybrids	Textbook pages: 593-617
Sun	May 1		(2nd project due date)
TBD		Final exam	

11. Academic Integrity

As previously stated, cheating and plagiarisms and other forms of academic dishonesty will be pursued following University policy. Students might expect the class instructors to cross check the student work and use commercial websites or tools such as iThenticate, Course Hero or Quizlet to verify the student assignments.

Academic integrity is one of the highest values that Purdue University holds. Individuals are encouraged to alert university officials to potential breaches of this value by either emailing or by calling 765-494-8778. While information may be submitted anonymously, the more information that is submitted provides the greatest opportunity for the university to investigate the concern.

The Purdue Honor Pledge “As a boilermaker pursuing academic excellence, I pledge to be honest and true in all that I do. Accountable together - we are Purdue"

For more information the student is encouraged to consult Purdue's student guide for academic integrity.

12. Nondiscrimination Statement

Purdue University is committed to maintaining a community which recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her own potential. In pursuit of its goal of academic excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life. Link to Purdue's nondiscrimination policy statement.

13. Students with Disabilities

Purdue University strives to make learning experiences as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, you are welcome to let me know so that we can discuss options. You are also encouraged to contact the Disability Resource Center at: **drc@purdue.edu** or by phone: 765-494-1247.

As stated in previous sections, the instructor will accommodate the special needs of a student, as detailed in a "Letter of Accommodation" provided to the student by the Disability Resource Center (DRC). "Letter of Accommodation" will be accepted at any point during the semester.

Purdue has assistance available to help you make learning materials accessible. Some examples include:

- Information on Universal Design for Learning
- Guidance on creating accessible documents

14. Emergency Preparation and Safety Considerations

In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor's control. Relevant changes to this course will be posted onto the course website or can be obtained by contacting the instructors or TAs via email or phone. You are expected to read your @purdue.edu email on a frequent basis.

Guidelines regarding ensuring access to emergency information:

- Keep your cell phone on to receive a Purdue ALERT text message.
- Log into a Purdue computer connected to the network to receive any Desktop Popup Alerts.
- If you have a "no cell phone" in class policy allow one or two students who have signed up for Purdue ALERT to keep their phones on to receive any alerts

Safety Considerations:

To be updated according to the class location.

EMERGENCY PREPAREDNESS

Emergency preparedness is your personal responsibility. Purdue University is actively preparing for natural disasters or human-caused incidents with the ultimate goal of maintaining a safe and secure campus. Let's review the following procedures:

- For any emergency call 911.
- There are nearly 300 Emergency Telephone Systems throughout campus that connect directly to the Purdue Police Department (PUPD). If you feel threatened or need help, push the button and you will be connected to the PUPD.
- If we hear a fire alarm we will immediately evacuate the building and proceed to the mall in front of the Food Science buidling.
    - **Do not use the elevator.**
    - Go over evacuation route…see specific Building Emergency Plan.
- If we are notified of a Shelter in Place requirement for a tornado warning we will shelter in the lowest level of this building away from windows and doors.
- If we are notified of a Shelter in Place requirement for a hazardous materials release we will shelter in our classroom shutting any open doors and windows.
- If we are notified of a Shelter in Place requirement for a civil disturbance such as a shooting we will shelter in a room that is securable preferably without windows.

EMERGENCY NOTIFICATION PROCEDURES are based on a simple concept – if you hear a fire alarm inside, proceed outside. If you hear a siren outside, proceed inside.

- **Indoor Fire Alarms** mean to stop class or research and immediately **evacuate** the building.
    - Proceed to your Emergency Assembly Area away from building doors. **Remain outside** until police, fire, or other emergency response personnel provide additional guidance or tell you it is safe to leave.
- **All Hazards Outdoor Emergency Warning Sirens** mean to immediately seek shelter (**Shelter in Place**) in a safe location within the closest building.
    - "Shelter in place" means seeking immediate shelter inside a building or University residence. This course of action may need to be taken during a tornado, a civil disturbance including a shooting or release of hazardous materials in the outside air. Once safely inside, find out more details about the emergency*. **Remain in place** until police, fire, or other emergency response personnel provide additional guidance or tell you it is safe to leave.

**In both cases, you should seek additional clarifying information by all means possible…Purdue Emergency Status page, text message, Twitter, Desktop Alert, Albertus Beacon, digital signs, email alert, TV, radio, etc.…review the Purdue Emergency Warning Notification System multi-communication layers at http://www.purdue.edu/ehps/emergency_preparedness/warning-system.html*

EMERGENCY RESPONSE PROCEDURES:

- Review the **Emergency Procedures Guidelines** https://www.purdue.edu/emergency_preparedness/flipchart/index.html
- Review the **Building Emergency Plan** (available on the Emergency Preparedness website or from the building deputy) for:
    - evacuation routes, exit points, and emergency assembly area

- when and how to evacuate the building.
- shelter in place procedures and locations
- additional building specific procedures and requirements.

EMERGENCY PREPAREDNESS AWARENESS VIDEOS

- **"The Coming Storm"** The Coming Storm is a movie that dramatizes the aftermath of a campus shooting, weaving within the story the best practices and lessons learned from active shooter incidents that have occurred throughout the United States. View FBI Short Movie [here].
- **"Run. Hide. Fight.®"** YouTube Video Produced by the City of Houston Mayor's Office of Public Safety and Homeland Security through a grant provided by a Department of Homeland Security Grant Funded Project of the Regional Catastrophic Planning Initiative, provides critical options for consideration to survive an active shooter event.
- **"Run. Hide. Fight.®"** Text Version.
- Department of Homeland Security Active Shooter web site...resources and tips on how to prepare for this type of horrific incident...learn more
- **Ready: Whenever, Wherever**—A public service campaign, from the Indiana Department of Homeland Security, which encourages Hoosiers to practice reasonable awareness and develop a plan for action in the event of an emergency

MORE INFORMATION

Reference the Emergency Preparedness web site for additional information:
https://www.purdue.edu/ehps/emergency_preparedness/

15. Mental Health Statement

- **If you find yourself beginning to feel some stress, anxiety and/or feeling slightly overwhelmed, try WellTrack.** Sign in and find information and tools at your fingertips, available to you at any time.
- **If you need support and information about options and resources**, please see the Office of the Dean of Students for drop-in hours (M-F, 8 am- 5 pm).
- **If you're struggling and need mental health services**: Purdue University is committed to advancing the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of mental health support, services are available. For help, such individuals should contact Counseling and Psychological Services (CAPS) at 765-494-6995 during and after hours, on weekends and holidays, or by going to the CAPS office of the second floor of the Purdue University Student Health Center (PUSH) during business hours.

16. Netiquette

Your instructor and fellow students wish to foster a safe online learning environment. All opinions and experiences, no matter how different or controversial they may be perceived, must be respected in the tolerant spirit of academic discourse. You are encouraged to comment, question, or critique an idea, but you are not to attack an individual. Our differences, some of which are outlined in the University's nondiscrimination statement below, will add richness to this learning experience. Please consider that sarcasm and humor can be misconstrued in online interactions and generate unintended disruptions. Working as a community of learners, we can build a polite and respectful course ambience. Please read the Netiquette rules for this course:

- Do not dominate any discussion. Give other students the opportunity to join in the discussion.
- Do not use offensive language. Present ideas appropriately.
- Be cautious in using Internet language. For example, do not capitalize all letters since this suggests shouting.
- Avoid using vernacular and/or slang language. This could possibly lead to misinterpretation.
- Keep an "open-mind" and be willing to express even your minority opinion.
- Think and edit before you push the "Send" button.
- Do not hesitate to ask for feedback.

17. Violent Behavior Policy

Purdue University is committed to providing a safe and secure campus environment for members of the university community. Purdue strives to create an educational environment for students and a work environment for employees that promote educational and career goals. Violent Behavior impedes such goals. Therefore, Violent Behavior is prohibited in or on any University Facility or while participating in any university activity.

See the University's full violent behavior policy for more detail.

18. Diversity and Inclusion Statement

In our discussions, structured and unstructured, we will explore a variety of challenging issues, which can help us enhance our understanding of different experiences and perspectives. This can be challenging, but in overcoming these challenges we find the greatest rewards. While we will design guidelines as a group, everyone should remember the following points:

- We are all in the process of learning about others and their experiences. Please speak with me, anonymously if needed, if something has made you uncomfortable.
- Intention and impact are not always aligned, and we should respect the impact something may have on someone even if it was not the speaker's intention.
- We all come to the class with a variety of experiences and a range of expertise, we should respect these in others while critically examining them in ourselves.

19. Course Evaluation

During the last two weeks of the course, you will be provided with an opportunity to evaluate this course and your instructor. Purdue uses an online course evaluation system. You will receive an official email from evaluation administrators with a link to the online evaluation site. You will have up to two weeks to complete this evaluation. Your participation is an integral part of this course, and your feedback is vital to improving education at Purdue University. I strongly urge you to participate in the evaluation system.

20. Disclaimer

This syllabus is subject to change.

Changes might involve all elements of the class logistics, class schedule and project deadlines.

All the important information will be announced during the lectures and via email. Also, an updated version of the syllabus will be maintained on Purdue Brightspace.