**THE UNIVERSITY OF ARIZONA**
**BE/ENGR 221 – Introduction to Computer Aided Design Fall 2021**
**23 August – 8 December**

## Description of Course

ABE 221 introduces engineering students to computer aided design (CAD) concepts and techniques that include two- and three-dimensional drawing presentation, methods of graphic communication, data analysis, and parts mating and assemblies. This course is primarily designed to train engineering students in the proper and efficient use of Computer Aided Design (CAD) tools focusing on SolidWorks and 3D printing.

## Contact Information and Instructions

**Instructor:** Prof. Muluneh Yitayew
Contact the Instructor with Administrative questions and Final Grades. Copy the Teaching Assistant on all correspondence with the Instructor.
Email: myitayew@email.arizona.edu
Office: Shantz 531/533
Office Hours: By appointment

**Teaching Assistant:** Kate Stalkfleet
Any email to the TA should also be carbon copied to the Instructor. The teaching assistant will monitor all the technical questions/answers from students and coordinate the lab monitors.
Email: kstalkfleet@email.arizona.edu
Office: N/A
Office Hours: TBA.

**Graders/Lab Monitor:**
Contact the Graders/Lab Monitor to ask specific technical questions about homework; always carbon copy the Teaching Assistant. Two open labs will be held in Shantz 338. The time for these labs will be announced on the first week. There will be two 2-hours help session will be held on Zoom per week with time to be announced the first week.

**Grader Assignement**

| **Grader** | **Last Name Start** |
|---|---|
| **Kate Stalkfleet** | **All** |

You must use your university email account in all communications with the course team. We will be checking and replying to emails on weekdays between 9 AM and 5 PM only.

## Outcomes

Upon completion of the course students will be able to:

1. Employ Computer Aided Design/SolidWorks in all their design work Example: Capstone Design
2. Create, visualize and model their design using SolidWorks
3. Apply SolidWorks and 3D printing to produce rapid prototype
4. Communicate effectively using SolidWorks drawings

## Course Objectives

At the end of this semester students would be able to

1. Use SolidWorks interface
2. Use sketch, features and assemblies tools to model parts and assemblies
3. Understand dimensioning and tolerancing
4. Create 3D parts, assemblies and 2D drawings
5. Understand parametric feature based modeling
6. Understand design intent
7. Understand parametric model controls, i.e., parameters, dimensions and relationships
8. Use geometric relations
9. Apply sleeves and fits to bearings and shafts with appropriate tolerances
10. Use 3D printing to get a rapid prototype

## Help Sessions Locations and Times

- **Meeting times for remote and in-person help sessions:** This is a hybrid online course and as such there is no required meeting times. We will have two, 2-hours help sessions on Zoom and an additional two 2-hours help session per week in **Shantz 338**. Attendance to these sessions is not required but encouraged for those who need help. Lab sessions are at the following times:

| **Day** | **Place** | **Meeting URL** | **Time** | **Session Monitor** |
|---|---|---|---|---|
| Tuesdays | Zoom | https://arizona.zoom.us/j/88632931562 | 9-11am | Kate |
| Wednesdays | Zoom | https://arizona.zoom.us/j/88632931562 | 9-11am | Kate |
| Thursdays | Shantz 338 | | 9-11am | Kate |
| Fridays | Shantz 338 | | 9-11am | Kate |

Computer stations will be available in Shantz 338 for registered students during the lab hours. Due to COVID-19 only limited number of students will be allowed per session. Help sessions are not mandatory, but you are encouraged to come to ask questions if you need help. The lab monitor and/ or teaching assistant will be in charge of each session. The lab monitor may go over homework sets to clarify any issues that you may have on homework.

- **Face coverings are required in Shantz 338:** Per UArizona's **Administrative Directive**, face coverings that cover the nose, mouth, and chin are required to be worn in all learning spaces at the University of Arizona (e.g., in classrooms, laboratories and studios). Any student who violates this directive will be asked to immediately leave the learning space and will be allowed to return only

when they are wearing a face covering. Subsequent episodes of noncompliance will result in a Student Code of Conduct complaint being filed with the Dean of Students Office, which may result in sanctions being applied. The student will not be able to return to the learning space until the matter is resolved.

    - The Disability Resource Center is available to explore face coverings and accessibility considerations if you believe that your disability or medical condition precludes you from utilizing any face covering or mask option. DRC will explore the range of potential options as well as remote course offerings. Should DRC determine an accommodation to this directive is reasonable, DRC will communicate this accommodation with your instructor.

- **Attendance in Shantz 338:**
    - If you feel sick or may have been in contact with someone who is infectious, stay home. Except for seeking medical care, avoid contact with others and do not travel.
    - Notify your instructors if you will be missing an in person or online course.
    - Campus Health is testing for COVID-19. Please call (520) 621-9202 before you visit in person.
    - Visit the UArizona COVID-19 page for regular updates.

**Assignments:** Assignments will be posted via D2L. You are free to work at your own pace as long as the assignment deadlines are met. However, you should complete each homework assignment in advance of its deadline as no late work after 24 hours will be accepted and homework submitted after the deadline but within 24 hours will be penalized by a loss of 50% of achieved score.

# Textbook:

**Engineering Design and GRAPHICS with SolidWorks 2019 by James D. Bethune, ISBN: 978-0135401750**

Course materials are being delivered digitally via D2L through the Inclusive Access program.

Please access the material through D2L the first day of classes to make sure there are no issues in the delivery, and if you are having a problem or question it can be addressed quickly.

You automatically have access to the course materials FREE through September 5, 2021.
You must take action (even if you haven't accessed the materials) to opt-out if you do not wish to pay for the material, and choose to source the content independently. The deadline to opt-out for courses is 9:00pm MST, September 5, 2021.

If you do not opt-out and choose to retain your access, the cost of the digital course materials will appear on your Bursar account during the October billing cycle.

Please refer to the Inclusive Access FAQs at https://shop.arizona.edu/textbooks/Inclusive.asp for additional information.

**Required Equipment and software requirements:** For this class you will need daily access to the following hardware: laptop or web-enabled device with webcam and microphone, regular access to reliable internet signal; ability to download and run the following software: SolidWorks, web browser, Adobe Acrobat, etc.].

You must download and use SolidWorks 2019. **DO NOT any previous or the 2020 versions of Solidworks. This is because the textbook is compatible with 2019 version.**

Note: If you are on campus, you can use computers in various OSCR labs that have Solidworks 2019 installed. http://uits.arizona.edu/departments/oscr/locations/hours

Note: SolidWorks should be operational on 64-bit Windows machines, but not on Mac OS. Mac users must run Windows OS (i.e., use bootcamp or parallels to run Window Operating System on Mac). For downloading and installation of Software and for Hardware questions: UA 24/7 at http://uits.arizona.edu/departments/the247 or (520)626-TECH (8324).

SolidWorks UA Site License: http://softwarelicense.arizona.edu/solidworks-download-0

See the software developer's site for system requirements.

http://www.solidworks.com/sw/support/SystemRequirements.html

## Teaching Method

The course will be managed via D2L learning management system. A textbook containing follow-along tutorials will be used as the main resource for the class, along with some additional materials and problems that will be posted on D2L. It is recommended that you refrain from simply following each instruction in the tutorials and instead try to understand the principle upon which each step depends. This will help you in the scheduled quizzes for each chapter.

## Examination Policy

There will be no exam for this course instead there will be six quizzes to be completed in d2l according to the schedule. There will also be three individual projects to be completed before the end of the semester. The homework and the projects should be regarded as learning experiences, during which CAD skills can be both demonstrated and improved. Note: We consider projects as replacements to exams and as such we expect you to do projects by yourself without anybody's help even a paid tutor. There will not be help session on the weeks the projects are assigned. Failure to abide by this rule will result a serious consequence.

Both homework and projects should be completed on time and submitted to d2l drop boxes on or before the deadline. Assignments turned in late will be severely penalized. Any homework or project turned in late within 24 hours of the deadline will receive 50% of the score; any assignment submitted beyond that time period will receive no credit. The D2L dropbox timestamp will be used to determine when an assignment was submitted.

## Grading Policy

| | |
|---|---|
| Quizzes | 15% |
| Homework | 40% |
| Projects | 45% |
| **Total** | **100 %** |

Based on previous records, the approximate final grade distribution is as follows:

| | |
|---|---|
| 90%-100% | A |
| 80%-89.9% | B |
| 70%-79.9% | C |
| 60%-69.9% | D |
| <59.9% | E |

The final grade distribution will be scaled in order to reflect the overall class performance each semester.

Note: Our goal as a team is for everyone in the class to get an "A" in the course. We will do our best to help you achieve this goal but it all depends on your own personal work ethic. If you work diligently, use the resources available for you, and meet the deadlines, there is no reason for you not to get a good grade in the course.

## Assignment Format

All homework assignments will be released when the student returns this signed syllabus to the 'Syllabus' dropbox.

You will turn in your computer files via the D2L dropbox. You are required to read instructions carefully and ensure that all required files are turned in. You can easily forget to press the submit button when using D2L, so please remember to verify that your file is in the drop box after you submit it. It is your responsibility to make sure that your files are properly submitted. You will receive no credit for any assignment you fail to submit on time, regardless of the reason. An exception will be made for documented medical emergencies.

**All files for each assignment must be submitted in a single .zip archive folder** along with any previously created files that are reused in the assignment. When you use SolidWorks, you will find that many files are dependent (referencing other files). If you fail to include all of the referenced files you will receive only partial credit for the assignment. One problem per assignment randomly selected will be graded. The score on that one problem will be worth 50% of the assignment. The remaining problems combined will be worth the up to other 50%, depending on how well they have been completed. It behooves the student to complete the entire assignment accurately and punctually.

**BE/ENGR 221 Homework General Grading Rubric**

*Note: This is only a general rubric. The actual rubric used for each individual assignment may have variations since not all assignments are the same and thus will require slight changes to homework requirements and point values.*

**Detailed Grading Rubric (Out of 20 points)**

- Minus 20 points if the problem being graded in detail wasn't submitted.
- Minus 1 points if the document isn't in the correct units (in or mm).
- Minus 2 points for each incorrect or missing dimension or relation (underdefined), including extrusion thickness (up to -10).
- Minus 4 points for each missing/incorrect feature or mate (up to -20). Examples would be if the problem is missing a chamfered edge, or a hole, or an extrusion, or a loft, etc.
- Minus 3 points for each Solidworks error, like being overdefined, no solutions found, missing part in an assembly, or some other error. (Up to -6)
- Minus 1 for each fixed relation.
- Minus 1 point for incorrect part orientation. (Needs correct Isometric view).
- Minus 4 points for each missing part (For assemblies only) or view (For drawings only) (Up to -12).

**Problem Completion Grading Rubric (Out of 20 points)**

- Minus 20/n points for each additional problem that is missing where n = # of other problems in the assignment.
- Minus (up to 20/n points) for each additional problem that was turned in depending on the level of completion for each problem.

**Late Penalties**

***Missed or Late Exams***

Missed or late exams cannot be made up without a good cause and adequate proof (See Class Rules) for further details.

- Minus 100% of achieved score if the assignment was submitted more than 24 hours late.
- Minus 50% of achieved score if the assignment was submitted late but within 24 hours from the deadline.

## *Course Policies*

***About Policies***

Policies are a set of guiding principles for how you (the student), we (the instructors), and the university should act in a given situation. Read these policies carefully so you know what is expected of you as well as what you can expect from the course.

## Attendance Policy

For general policy regarding attendance please visit https://deanofstudents.arizona.edu/policies/attendance-policies-and-practices

In accord with CDC guidance, it is required that UArizona students, faculty and staff who are sick with COVID-19, or who have recently had a **close contact** with a person with COVID-19, must stay home or in their living quarters (e.g., dorm room).

Please read these guidelines carefully and adhere to these processes to avoid being penalized

- You are encouraged to stay at home if you feel sick or have any of the **symptoms of COVID-19**.

- If you need to miss a class, or series of classes, due to illness or the need to quarantine/isolate you are responsible for emailing the course instructor at myitayew@arizona.edu , with copy to the Dean of Students at **DOS-deanofstudents@email.arizona.edu**, to let us know of the need, as soon as possible. There is no need for a medical excuse to be provided for absence of up to a week (see more below).
- You are responsible for completing any work that you might miss due to illness or the need to quarantine/isolate, including assignments, quizzes, tests and exams.
- You are responsible for communicating with instructor(s) via email
- If you miss more than one week of classes in any one semester you will be required to provide a doctor's note of explanation to **DOS-deanofstudents@email.arizona.edu**. The Dean of Students Office will communicate the receipt of the note (with expected end date) out to the relevant faculty.

## Student Code of Academic Integrity

Because CAD has become an essential tool in modern engineering design and analysis, we expect everyone to be proficient in its application by the end of the semester. To accurately assess each student's proficiency, we insist every student does his/her work without collaborating with any other student or other person in doing the homework, quizzes and projects. Graded homework and projects must be the product of independent effort. **No file sharing** is permitted and will be viewed as an integrity violation (cheating) when detected. Downloading work from the internet and submitting as one's work is also considered cheating. **You have to work on your own file from start to end of any assignment.** Graders are able to check your files and ascertain that it is your work. Failure to abide by this rule constitutes a violation of the Code of Academic Integrity and will result your name being reported to the Dean of Students Office for cheating and disciplinary action taken as determined by the University's rules concerning dishonest scholarship: http://deanofstudents.arizona.edu/codeofacademicintegrity. The instructor reserves the right to lower your semester grade by one letter grade or fail you in the course if you are found guilty of cheating. We have a zero tolerance policy on cheating.

As a first homework assignment, each student pledges to abide by these rules by signing the "signature" line (at the end of this syllabus) and submitting the syllabus to the D2L dropbox. Students who do not submit a signed form will be administratively dropped from the class after 24 hours

### *Incomplete Policy*

Students will not be given an incomplete grade in the course without sound reason and documented evidence as described in the university's catalog. In any case, for a student to receive an incomplete, he or she must be passing and must have completed a significant portion of the course.

### ***Withdrawals***:

It is the responsibility of the student to become familiar with the University course withdrawl policy at: http://catalog.arizona.edu/policy/class-attendance-participation-and-administrative-drop Please note, there are different policies based upon whether you are an undergraduate or graduate student and whether you are a main campus or on-line student.

### ***Communication Policy***

This course uses D2L for all course communications including for the repository for assignments, communicating weekly updates, email communications, and the calendar tool. Since I will be using the email tool in D2L, if you don't use the D2L email system as your primary email system, then you should forward your D2L email to the email system of your choice. You can also subscribe to instant

email or text notifications through D2L to remind you about assignment due dates. To activate or change the notification feature, click on the @ symbol at the top of the news feed on the course home page in D2L.

***Discrimination & Bullying***

Discrimination and bullying will not be tolerated. Students and instructors have a shared responsibility to foster a positive learning environment. We all want a safe, welcoming, and inclusive environment where all of us feel comfortable with each other and where we can challenge ourselves to succeed.

***Disruptive Behavior***

Students are expected to be familiar withthe UA Policy on Disruptive Behavior in an Instructional Setting found at http://policy.arizona.edu/printpdf/92.

***Elective Name and Pronoun Usage***

This course supports elective gender pronoun use and self-identification; rosters indicating such choices will be updated throughout the semester, upon student request. As the course includes group work and in-class discussion, it is vitally important for us to create an educational environment of inclusion and mutual respect.

***Classroom and Threatening Behavior Policy***

Sure it's an online class, but to foster a positive learning environment, students and instructors have a shared responsibility. We want a safe, welcoming, and inclusive environment where all of us feel comfortable with each other and where we can challenge ourselves to succeed. To that end, our focus is on the tasks at hand –treat each other with respect. The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to oneself. Click to read the Threatening Behavior by Students Policy.

***Nondiscrimination and Anti-harassment Policy***

The University is committed to creating and maintaining an environment free of discrimination. Please refer to UA site to read the university's Nondiscrimination and Anti-harassment policy.

## Accommodations DRC Students: Need for Assistance

If you have any condition, such as a physical or learning disability, which will make it difficult for you to carry out the work as outlined, or which will require academic accommodations, please notify us as soon as possible.

## Confidentiality of Student Records

Please read by going to
http://www.registrar.arizona.edu/ferpa/default.htm

**Tentative Schedule**

| Week | Activity | Start Date | Deadline |
|---|---|---|---|
| 1 | Install Solidworks and Sign Syllabus | August 23 | August 29 |
| 2 | Ch 1: Basics of Solidworks | August 30 | September 5 |
| 3 | Ch 2: Sketch Entities and Tools | September 6 | September 12 |
| 4 | Ch 3: Features Part 1 | September 13 | September 19 |
| 5 | Ch 3: Features Part 2 | September 20 | September 26 |
| 6 | Ch 4: Orthographic Views | September 27 | October 3 |
| 7 | Ch 7: Dimensioning | October 4 | October 10 |
| 8 | Project 1: 3D Printing | October 4 | October 17 |
| 11 | Ch 5: Assemblies, Advanced and Mechanical Mates | October 18 | October 24 |
| 12 | Ch 6: Threads and Fasteners | October 25 | November 7 |
| 13 | Ch 9: Bearings | November 8 | November 14 |
| 14 | CH 10: Gears | November 15 | November 21 |
| 15 | Ch 8: Tolerancing | November 22 | November 28 |
| 15 | Project 2 | November 22 | December 8 |

# COVID-19 Guidelines and Requirements

https://health.arizona.edu/sites/default/files/CHS-Coronavirus-Self-Isolation-Guide.pdf

Please follow UA's Covid-19 Guidelines as updated