

EML4501 Mechanical Engineering Design 2

2021 Spring Syllabus

Mon, Wed, Fri: 8:30-9:20am, 10:40-11:30am, & 12:50-1:40pm

Updated 1/11/2021

*Modifications to this syllabus may be required during the semester.
Any changes to the syllabus will be posted on the course website and announced in class.*

Teaching Team

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Catalog Description

Integrated design and presentation of a mechanical system. Credits: 3

Prerequisites: EGN 3353C, EML 2322L, and EML 3005 & EGM 3401 with minimum grade of C

Corequisites: EML 4321 and EML 4507 [Corequisites Are Not Enforced]

Course Materials and Fees

Course Fee: \$49

Course Objectives & Relation to Program Outcomes (ABET)

Students who successfully complete this course demonstrate the following in the context of mechanical engineering design theory and application:



Outcome	Coverage*
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.	High
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.	High
3. An ability to communicate effectively with a range of audiences.	High
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.	High
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.	High
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.	Low
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.	Low

*Coverage is given as high, medium, or low. An empty box indicates that this outcome is not covered or assessed in the course.

Required Textbooks and Software

1. Engineering Capstone Design, M. J. Traum, S. N. Niemi, et al., University of Florida, 2020
Free OER Download: <https://merge.mae.ufl.edu/outreach/textbook/>
2. Multimedia Engineering Fluid Mechanics, C. C. Ngo and K. C. Gramol, University of Oklahoma Engineering Media Lab, 2019
Free OER Access: <http://www.ecourses.ou.edu/cgi-bin/ebook.cgi?doc=&topic=fl>
3. Multimedia Engineering Mechanics of Materials, Kurt Gramoll, University of Oklahoma Engineering Media Lab, 2019
Free OER Access: <http://www.ecourses.ou.edu/cgi-bin/ebook.cgi?doc=&topic=me>
4. Multimedia Engineering Dynamics, Kurt Gramoll, University of Oklahoma Engineering Media Lab, 2019
Free OER Access: <http://www.ecourses.ou.edu/cgi-bin/ebook.cgi?topic=dy>
5. Multimedia Engineering Thermodynamics, Kurt Gramoll and Meirong Huang, University of Oklahoma Engineering Media Lab, 2019
Free OER Access: <http://www.ecourses.ou.edu/cgi-bin/ebook.cgi?doc=&topic=th>
6. A Heat Transfer Textbook, 5th ed, J. H. Lienhard IV & J. H. Lienhard V, Phlogiston Press, Cambridge, MA, 2020. ISBN: 9780486837352
Free OER Access: <https://ahtt.mit.edu/>
7. SolidWorks 2020 and SolidWorks PDM
Available through UF
8. Ansys and Granta EduPack Free Student Software
Available through UF or Ansys: <https://www.ansys.com/academic/free-student-products>

Recommended Materials

1. Introduction to Mechanics of Materials, 2nd Ed, Madhukar Vable, Expanding Educational Horizons, 2009
Free OER Download: <http://madhuvable.org/wp-content/uploads/2016/04/Entire%20Book%202018.pdf>

2. Shigley's Mechanical Engineering Design, 10th Ed., R. G. Budynas and K. J. Nisbett, McGraw-Hill, 2015
ISBN: 9780073398204
3. Materials Selection in Mechanical Design, 5th Ed., Michael F. Ashby, Butterworth-Heinemann, 2016
ISBN: 0081005997
4. Dimensioning for Interchangeable Manufacture, Earlwood T. Fortini, Industrial Press, 1967
ASIN: B0006BQNRC

Evaluation of Grades

This course is graded. Grades are earned based on the following individual and group deliverables. Further descriptions will be given when assignments and assessments are announced in class. Additional resources supporting these assignments will be posted on the course Learning Management System as needed.

Assignment/Assessment	Type	Points	%
Participation	Individual	20	4.0
Entry Resume	Individual	1	0.2
Entry Resume Worded Score	Individual	1	0.2
Skill Set Inventory Survey	Individual	2	0.4
Reverse Engineering Report	Individual	100	20.0
Teaching Team Quiz (Honorlock Practice)	Individual	1	0.2
Fluids Review Quiz	Individual	15	3.0
Thermodynamics Review Quiz	Individual	15	3.0
Dynamics Review Quiz	Individual	15	3.0
Mechanical Design Review Quiz	Individual	15	3.0
Concept Design Report	Group	40	8.0
Concept Design Report Peer Review	Individual	0	var.
IP Disclosure	Group	10	2.0
Preliminary Design Report	Group	60	12.0
Preliminary Design Report Peer Review	Individual	0	var.
90-Second Final Presentation Pitch Video	Group	9	1.8
Final Design Poster Abstract	Group	4	0.8
Exit Resume	Individual	1	0.2
Exit Resume Worded Score	Individual	1	0.2
Final Design Poster	Group	20	4.0
Final Design Poster Presentation	Group	20	4.0
Poster Session Synchronous Interaction	Individual	10	2.0
Final Oral Presentation Slides	Group	10	2.0
Final Oral Presentation	Group	50	10.0
Design Review Feedback Resolution	Group	10	2.0
Final Design Report	Group	70	14.0
Final Design Report Peer Evaluation	Individual	0	var.
	TOTAL	500	100.0

Any changes will be posted on the CANVAS page and announced in class

Explanation of Peer Evaluation:

All group members will submit feedback reflecting on their own contributions and the contributions their group members to major team deliverables. Evaluations submitted with every group member having perfect scores will be discarded as attempted grade inflation (see honor code section of the syllabus). Peer reviews resulting in a team member's score being above the class average add 10% to that individual's score on the group deliverable. Peer reviews resulting in a team member's score being within one standard deviation of the class average add 5% to that individual's score on the group deliverable. Peer reviews resulting in a team member's score being within two standard deviations of the class average have no impact on that individual's score on the group deliverable. Peer reviews resulting in a team member's score being more than two standard deviations below the class average subtract 10% from that individual's score on the group deliverable.

Grading Policy

A:	93-100	A-:	90-92.99
B+:	87-89.99	B:	83-87.99
B-:	80-82.99	C+:	77-79.99
C:	73-76.99	C-:	70-72.99
D+:	67-69.99	D:	63-66.99
D-:	60-62.99	E:	0-59.99

More information on UF grading policy may be found at:

<https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/>

Grade Definitions

- A : Student demonstrated course mastery in all regards and with distinction.
- A- : Student performed outstandingly in all regards and is exceptional.
- B+ : Student performed with excellence in the course.
- B : Student showed high command of course content.
- B- : Student has done a commendable job with course content.
- C+ : Student demonstrated ample grasp of course content.
- C : Student demonstrated adequate grasp of course content.
- C- : Student demonstrated fair grasp of course content.
- D+ : Student met fair course expectations.
- D : Student attained below average expectations.
- D- : Student met minimal expectations to pass.
- E : Student failed to meet minimal expectations to pass.

Attendance

While attendance is not strictly monitored, it is extremely important to attend class regularly. If you miss a class, you are responsible for acquiring notes or other resources covered. The teaching team will endeavor to make all course materials available through the Learning Management System. However, some experiences cannot be replicated asynchronously. Students are held responsible for knowledge of all scheduling and policy announcements made in class. Excused absences must be consistent with university policies in the undergraduate catalog (<https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>) and require appropriate documentation and advance communication with the instructor.

Online Course Recording & Copyright Policy

Class sessions may be audio-visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-

mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the “chat” feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited. Unless stated otherwise, Dr. Matthew J. Traum holds copyright to all course material.

Policies on Clear Communication, “Ghosting”, Sources of Truth, and Assignment Grade Disputes

1. Once students are assigned into groups, all Emails to the EML4501 Teaching Team related to group business must clearly identify the group’s number. Each time any member of a group fails to identify the group by number in a communication to the Teaching Team, the group loses 1 point.
2. Individuals who fail to support their group or “ghost” the course, as demonstrated by peer evaluation scores two standard deviations below the class average and/or low participation tracked in Canvas/PDM, earn a failing grade in EML4501 regardless of points accumulated in the class.
3. Online platforms, notably GroupMe, provide venues for course discussion that exclude the instructor and EML4501 Teaching Team. Discussion platforms beyond UF-sanctioned Learning Management Systems will not be monitored or curated by the instructor. Thus, information propagated through these platforms can be incorrect. It is each student’s responsibility to verify information obtained from these external discussion services with reputable reference sources or UF-affiliated subject matter experts. Erroneous information obtained from external discussion platforms used in EML4501 will be marked incorrect on graded assignments and assessments.
4. If an individual or group has an assignment grading dispute, the issue must first be addressed with the TA, “Grader”, or Grader who did the grading. If individuals/groups can show where grading errors occurred, Teaching Team members are happy to correct grades accordingly. Only after communication with a TA/“Grader”/Grader fails to resolve a grading dispute may the individual/group bring the dispute to the instructor.

Students Requiring Accommodations

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352) 392-8565, <https://disability.ufl.edu/students/get-started/>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Course Evaluation

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <http://gatorevals.aa.ufl.edu/students/> . Students will be notified when the evaluation period opens, and they can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <http://ufl.bluera.com/ufl/> . Summaries of course evaluation results are available to students at <http://gatorevals.aa.ufl.edu/public-results/> .

University Honesty Policy

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code.” On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this

assignment.” The Honor Code (<http://sccr.dso.ufl.edu/process/student-conduct-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor.

Commitment to a Safe and Inclusive Learning Environment

The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:

- Your academic advisor or Graduate Program Coordinator
- Robin Bielling, Director of Human Resources, 352-392-0903, rbielling@eng.ufl.edu
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@eng.ufl.edu

Software Use

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: <https://registrar.ufl.edu/ferpa.html>

Campus Health, Wellness, and Academic Resources

See appended page.

Schedule of Topics, Assignments, & Assessments

See appended schedule.

“Treat a person as they should be, and they will become what they could be.”

--R. W. Emerson

Campus Resources:

Health and Wellness

U Matter, We Care:

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

Counseling and Wellness Center: <http://www.counseling.ufl.edu/cwc>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Discrimination, Harassment, Assault, or Violence

If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the [Office of Title IX Compliance](#), located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, title-ix@ufl.edu

Sexual Assault Recovery Services (SARS)

Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or

<http://www.police.ufl.edu/>.

Academic Resources

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. <https://lss.at.ufl.edu/help.shtml>.

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling.

<https://www.crc.ufl.edu/>.

Library Support, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring.

<https://teachingcenter.ufl.edu/>.

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers.

<https://writing.ufl.edu/writing-studio/>.

Student Complaints Campus: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.

On-Line Students Complaints: <http://www.distance.ufl.edu/student-complaint-process>.

Module	Meeting #	Week #	Date	Day	Location	Synchronous Content	Asynchronous Content	Suggested Reading	Deliverable Assigned	Assessment / Assignment Due
#1: Course Intro	1	1	1/11/2021	Mon	Virtual Classroom	Course Introduction The Design Process	1. Review of Syllabus & Expectations 2. R. Dam & T. Siang, "Design Thinking: A Quick Overview," Interaction Design Foundation, 2018 3. Hummer Commercial: "The Big Race"	M. J. Traum, et al., "Implementing an Effective Large-Enrollment Engineering Capstone Design-and-Build Program," Proc. ASEE SE Section Conf., Auburn, AL, USA, March 8-10, 2020.	1. Entry Resume 2. Entry Resume/Worlded Score 3. Skill Set Inventory for Group Generation	
#2: Prerequisite Review	2	1	1/13/2021	Wed	Virtual Classroom	Fluid Mechanics [EGN 3353C] Review	1. LaTeX Communication Tutorial 2. Fluid Mechanics [EGN 3353C] Review	C. C. Nye & K. C. Gramoll, <i>Multimedia Engineering Fluid Mechanics</i> , U. Oklahoma Eng. Media Lab, 2019 http://www.ecourses.ou.edu/cgi-bin/ebook.cgi?doc=&topic=fl		
#2: Prerequisite Review	3	1	1/15/2021	Fri	Virtual Classroom	Introducing the Reverse Engineering Report (RER) Thermodynamics [EML3100] Review	1. Adam Grant TED Talk - Secret Weapon for Best Teams 2. Thermodynamics [EML3100] Review	K. Gramoll & M. Huang, <i>Multimedia Engineering Thermodynamics</i> , U. Oklahoma Eng. Media Lab, 2019 http://www.ecourses.ou.edu/cgi-bin/ebook.cgi?doc=&topic=h	4. Reverse Engineering Report (RER) 5. Fluids Review Quiz 6. Thermodynamics Review Quiz	1. Entry Resume 2. Entry Resume/Worlded Score
#2: Prerequisite Review	4	2	1/20/2021	Wed	Virtual Classroom	Dynamics [EGM3401] Review	1. M. Clayton, "Project Management in Under 5: What is a Gantt Chart?" 2. Dynamics [EGM3401] Review	K. Gramoll, <i>Multimedia Engineering Dynamics</i> , U. Oklahoma Eng. Media Lab, 2019 http://www.ecourses.ou.edu/cgi-bin/ebook.cgi?topic=dy		
#2: Prerequisite Review	5	2	1/22/2021	Fri	Virtual Classroom	Design & Manufacturing [EML2322L] Review	1. SolidWorks & PDM Onboarding 2. DML [EML2322L] Review	K. Gramoll, <i>Multimedia Engineering Mechanics of Materials</i> , U. Oklahoma Eng. Media Lab, 2019 http://www.ecourses.ou.edu/cgi-bin/ebook.cgi?doc=&topic=me	7. Dynamics Review Quiz 8. Mechanical Design Review Quiz	3. Skill Set Inventory for Group Generation
#2: Prerequisite Review	6	3	1/25/2021	Mon	Virtual Classroom	Mechanical Design [EML3005] Review	1. Mech 1 [EML3005] Review 2. R. F. Dam & T. Y. Siang, "What is Design Thinking and Why Is It So Popular?," Interaction Design Foundation, 2020	S. R. Niemi, et al., "Industry Product Data Management (PDM) Tool Integration into Undergraduate Engineering Design Courses," Proc. ASEE SE Section Conf., Auburn, AL, USA, March 8-10, 2020.		
#3 Tolerance & Dimensioning	7	3	1/27/2021	Wed	Virtual Classroom	Tolerance Loops: Functional Surfaces	1. Vector Math Underpinning Tolerance Loops 2. Science of Small Distances	E. T. Fortin, <i>Dimensions for Interchangeable Manufacture</i> , Ch 8: Length Fits, Industrial Press, Inc. New York, NY, 1967		
#3 Tolerance & Dimensioning	8	3	1/29/2021	Fri	Virtual Laboratory	Open Lab Hours	Distributing Tolerances	Association for the Development of Computer-Aided Tolerancing Systems (ADCATS) Database - Publications http://adcats.ct.bvu.edu/reportsandpublications.php?publication		5. Fluids Review Quiz 6. Thermodynamics Review Quiz
#3 Tolerance & Dimensioning	9	4	2/1/2021	Mon	Virtual Classroom	Product Functionality Example	1. Literature Review & Patent Search 2. Pencil-Top Focus Toy Product Example	M. J. Traum, S. L. Karakam, "The Pencil-Top Fidget: Reinvigorating Shop (Metal Drilling and Tapping) in High School Science Classrooms," Proc. 126th ASEE Conf., Tampa, FL, USA, June 16-19, 2019		
#4 Insertion & Handling Time	10	4	2/3/2021	Wed	Virtual Classroom	Time Manual Assembly Activity	Standards	Amys Academic Support Resources https://www.amys.com/academic/free-student-products-support-resources		
#4 Insertion & Handling Time	11	4	2/5/2021	Fri	Virtual Laboratory	Open Lab Hours	1. Boothroyd & Dewhurst Estimation Technique 2. S. Meze, "Kano model, product design and startups: a powerful combination," 2017.	Boothroyd & Dewhurst, <i>Product Design for Manufacture & Assembly</i> , 3rd Ed., Ch 3: Product Design for Manual Assembly, CRC Press, 2011	9. Concept Design Report (CDR)	7. Dynamics Review Quiz 8. Mechanical Design Review Quiz
#5 Creative Ideation	12	5	2/8/2021	Mon	Virtual Classroom	Major Project Customer Guest Lecture [Amor Menendez- UF Biofoundry]	1. Kano Model for Analyzing Customer Needs 2. J. Robert - ASME FutureME, "Project Success Defining the Problem"	C. Olsen-Landis, "Kano Model - Ways to use it and NOT use it," IBM Design, Medium.com, 2017		
#5 Creative Ideation	13	5	2/10/2020	Wed	Virtual Classroom	How to Select Subsystems Gulford's Alternative Uses Test Activity	1. Adam Grant TED Talk - Original Thinkers 2. Function Analysis Method for Divergent Thinking	Traum et al (2020) Capstone Design Text, Ch1-Customer Needs		
#5 Creative Ideation	14	5	2/12/2021	Fri	Virtual Laboratory	Open Lab Hours	1. Tim Harford TED Talk: A Powerful Way to Unleash Your Natural Creativity 2. Eliminating Impossible Concepts	Traum et al (2020) Capstone Design Text, Ch2-Researching the Problem		4. Reverse Engineering Report (RER)
#5 Creative Ideation	15	6	2/15/2021	Mon	Virtual Classroom	Customer Needs to Quantitative Metrics	1. M. Oshin, "The Dick Fosbury Flap: How to Think Outside the Box & Innovate New Ideas," mayosohm.com, 2017 2. Right Sizing the Subsystem Number	Traum et al (2020) Capstone Design Text, Ch3a-Quantifying Customer Needs		
#5 Creative Ideation	16	6	2/17/2021	Wed	Recharge Day					
#5 Creative Ideation	17	6	2/19/2021	Fri	Virtual Laboratory	Open Lab Hours	Jim Collins, "Good to Great Ch5 - Hedgehog Concept"	M. F. Ashby, <i>Material Selection in Mechanical Design</i> , 4th Ed., Ch 3: Engineering Materials & Their Properties, Butterworth-Heinemann, 2011		
#5 Creative Ideation	18	7	2/22/2021	Mon	Virtual Classroom	Assumption Removal Activity	1. Hedgehog Concept 2. Subsystem Synergy and Discord	M. F. Ashby, <i>Material Selection in Mechanical Design</i> , 4th Ed., Ch 4: Material Property Charts, Butterworth-Heinemann, 2011		
#5 Creative Ideation	19	7	2/24/2021	Wed	Recharge Day					
#6 Down-Selection to Preliminary Design	20	7	2/26/2021	Fri	Virtual Laboratory	Open Lab Hours	1. Material Selection - Intro to Ashby Charts 2. Using Granta EduPack	M. F. Ashby, <i>Material Selection in Mechanical Design</i> , 4th Ed., Ch 5: Materials Selection - The Basics, Butterworth-Heinemann, 2011	10. Peer Evaluation for CDR 11. IP Disclosure	
#6 Down-Selection to Preliminary Design	21	8	3/1/2021	Mon	Virtual Classroom	Maskow's Hammer - Selecting OTS vs. Custom Parts	1. Performing a Trade Study	M. F. Ashby, <i>Material Selection in Mechanical Design</i> , 4th Ed., Ch 6: Case Studies: Materials Selection, Butterworth-Heinemann, 2011	12. Preliminary Design Report (PDR)	
#6 Down-Selection to Preliminary Design	22	8	3/3/2021	Wed	Recharge Day					
#7 Intellectual Property	23	8	3/5/2021	Fri	Virtual Laboratory	Open Lab Hours	Intellectual Property: Trademark	University of Florida Intellectual Property Policy		9. Concept Design Report (CDR)
#7 Intellectual Property	24	9	3/8/2021	Mon	Virtual Classroom	Intellectual Property: Patents	Normalizing Concept Valuations	L. Lessig, <i>Free Culture: How Big Media Uses Technology and the Law to Lock Down Culture and Control Creativity</i> , The Penguin Press, New York, NY, 2004		
#7 Intellectual Property	25	9	3/10/2021	Wed	Recharge Day					
#7 Intellectual Property	26	9	3/12/2021	Fri	Virtual Laboratory	Open Lab Hours	1. Intellectual Property: Copyright	Larry Lessig - TED Talk, Laws that Choke Creativity		10. Peer Evaluation for CDR
#7 Intellectual Property	27	10	3/15/2021	Mon	Virtual Classroom	Intellectual Property: Trade Secrets	Carrying out a Concept Down-Selection Matrix			
#7 Intellectual Property	28	10	3/17/2021	Wed	Recharge Day					
#8 Finalizing Design	29	10	3/19/2021	Fri	Virtual Laboratory	Open Lab Hours	Design for Manufacturing		18. Final Design Poster 19. Final Design Poster Presentation 20. Poster Session Synchronous Interaction	11. IP Disclosure
#8 Finalizing Design	30	11	3/22/2021	Mon	Virtual Classroom	TBA	Design for Manual Assembly			
#8 Finalizing Design	31	11	3/24/2021	Wed	Recharge Day					
#8 Finalizing Design	32	11	3/26/2021	Fri	Virtual Laboratory	Open Lab Hours	Bill Of Materials		21. Final Design Oral Presentation Slides 22. Final Design Oral Presentation 23. Design Review Feedback Resolution 24. Final Design Report (FDR)	
#9 Design Review	33	12	3/29/2021	Mon	Virtual Conference Room	Design Review 1A	Purchase Orders			
#9 Design Review	34	12	3/31/2021	Wed	Virtual Conference Room	Design Review 1B	Estimating Manufacturing Costs			
#9 Design Review	35	12	4/2/2021	Fri	Virtual Conference Room	Design Review 1C	Detail Design: Design, Analyze, Prototype Cycle		13. Peer Evaluation for PDR 14. 90-Second Pitch Video 15. Final Design Poster Abstract	12. Preliminary Design Report (PDR)
#9 Design Review	36	13	4/5/2021	Mon	Virtual Conference Room	Design Review 2A				
#9 Design Review	37	13	4/7/2021	Wed	Virtual Conference Room	Design Review 2B				
#9 Design Review	38	13	4/9/2021	Fri	Virtual Conference Room	Design Review 2C			16. Exit Resume 17. Exit Resume/Worlded Score	13. Peer Evaluation for PDR 14. 90-Second Pitch Video 15. Final Design Poster Abstract
#10 Product Evaluation	39	14	4/12/2021	Mon	N/A	Faculty & Course Evaluations		D. G. Ullman, "Improving Team Communication with Design Technology Readiness Levels," 2020		
#10 Product Evaluation	40	14	4/14/2021	Wed	Virtual Classroom	Technology Readiness Levels (Guest Speaker: Shawn Martin, US DoD)		D. G. Ullman, "7 Questions Companies Should Ask Before Using a New Technology," <i>Machine Design</i> , 2020		
#10 Product Evaluation	41	14	4/16/2021	Fri	Virtual Laboratory	Open Lab Hours		L. E. Rogers, et al., "Transitioning Oral Presentations Online in Large-Enrollment Capstone Design Courses Increases Panelist Participation," <i>Advances in Engineering Education</i> , 2020.		16. Exit Resume 17. Exit Resume/Worlded Score 21. Final Design Oral Presentation Slides
#11 Final Deliverables	42	15	4/19/2021	Mon	Virtual Symposium	Final Poster Design Presentations				18. Final Design Poster 19. Final Design Poster Presentation 20. Poster Session Synchronous Interaction
#11 Final Deliverables	43	15	4/21/2021	Wed	Recharge Day					
#11 Final Deliverables	44	15	4/22/2021	Thur	Virtual Conference Room	Final Oral Design Presentations				22. Final Design Oral Presentation
#11 Final Deliverables	45	15	4/23/2021	Fri	Virtual Conference Room	Final Oral Design Presentations				22. Final Design Oral Presentation
#11 Final Deliverables	N/A	Finals	4/26/2021	Mon	N/A	N/A			25. Peer Evaluation for FDR	23. Design Review Feedback Resolution 24. Final Design Report (FDR) 25. Peer Evaluation for FDR (by 4/30/2021)