EML4501 Mechanical Engineering Design 2

2020 Spring Syllabus M-W-F Period 2 (8:30 – 9:20am MAE-B 211) M-W-F Period 6 (12:50 – 1:40pm LAR 239) M-W-F Period 4 (10:50 – 11:30am LAR 239) OPEN LAB HOURS: Wednesdays (starting 1/22/2020), 8:30am – 2pm, MAE-C 010

> 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.

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Teaching Assistant	Kimberly J. Stubbs Office: MAE-B, 325-B Hours: Mondays, 2:30-3:30pm Email: <u>kimberlyjstubbs@ufl.edu</u>	Teachi Techni	ng ician	Noel Thomas Office: MAE-C, 010 Email: <u>noel.thomas@ufl.edu</u>	
"Graders"	Lauren E. Rogers Office Hours Location: NEB-109 Office Hours: Thursdays, 10:30-11:30am Email: <u>laurenrogers01@ufl.edu</u>			Kenneth K. Nguyen Office Hours Location: MAE-B, 211 Office Hours: Thursdays, 3-5pm Email: <u>kennethnguyen@ufl.edu</u>	
	Suyapa "Su" Peachy Office Hours Location: NEB-109 Office Hours: Mondays, 9:30-10:30a Email: <u>applecotton@ufl.edu</u>	ım	Otto A Office Office Email:	A. Ramirez, Jr. Hours Location: NSC-312 Hours: Thursdays, 12:40-1:40pm ramo1014ufl.edu	

Matthew "Benny" LaGoy Email: <u>bennylagoy@ufl.edu</u>

Catalog Description

Integrated design and presentation of a mechanical system. Credits: 3 *Prerequisites*: EGN 3353C, EML 2322L, and EML 3005 and EGM 3401 with minimum grade of C *Corequisites*: EML 4321 and EML 4507

Course Materials and Fees

Course Fee: \$46.21

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			
1.	An ability to identify, formulate, and solve complex engineering problems by applying principles	High	
	of engineering, science, and mathematics.		

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. <u>Introduction to Mechanics of Materials</u>, 2nd Ed, Madhukar Vable, Expanding Educational Horizons, 2009 Free OER Download: <u>http://madhuvable.org/wp-content/uploads/2016/04/Entire%20Book%202018.pdf</u>
- 2. <u>Basics of Fluid Mechanics</u> (version 0.3.4.0), Genick Bar-Meir, Potto Project NFP, 2013 Free OER Download: <u>https://mountainscholar.org/handle/20.500.11785/260</u>
- 3. <u>Multimedia Engineering Dynamics</u>, Kurt Gramoll, University of Oklahoma Engineering Media Lab, 2019 Free OER Access: <u>http://www.ecourses.ou.edu/cgi-bin/ebook.cgi?topic=dy</u>

Recommended Materials

- <u>Multimedia Engineering Fluid Mechanics</u>, 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
- <u>Multimedia Engineering Mechanics of Materials</u>, Kurt Gramoll, University of Oklahoma Engineering Media Lab, 2019 Free OER Access: <u>http://www.ecourses.ou.edu/cgi-bin/ebook.cgi?doc=&topic=me</u>
- 3. <u>Mechanics Map Digital Textbook</u>, Jacob Moore, Penn State Mont Alto Open Textbook Project, 2019 Free OER Access: <u>http://adaptivemap.ma.psu.edu/</u>
- 4. <u>Shigley's Mechanical Engineering Design, 10th Ed.</u>, R. G. Budynas and K. J. Nisbett, McGraw-Hill, 2015. ISBN: 9780073398204
- 5. <u>Machinery's Handbook, 29th Ed.</u>, Erik Oberg, Industrial Press, 2012 ISBN: 9780831129002
- 6. <u>Materials Selection in Mechanical Design, 5th Ed.</u>, Michael F. Ashby, Butterworth-Heinemann, 2016 ISBN: 0081005997
- 7. <u>Dimensioning for Interchangeable Manufacture</u>, Earlwood T. Fortini, Industrial Press, 1967 ASIN: B0006BQNRC

Attendance

While attendance is not strictly monitored, it is extremely important to attend class regularly. If you miss a lecture, 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 classroom experiences cannot be replicated asynchronously via the Web. 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 (<u>https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/</u>) and require appropriate documentation. If you have a documented and excusable absence, please contact your instructor as soon as possible.

Evaluation of Grades

This course is graded. Grades are earned based on the following individual and team 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 CANVAS site as needed.

Assignment/Assessment	Туре	%		
Classroom/Laboratory Participation	Individual	1%		
Pre/Post Resume Submission	Individual	1%		
Prerequisite Material Entry Quizzes	Individual	6%		
Online Pre/Post Content Quizzes	Individual	10%		
Reverse Engineering Report Gantt Chart	Individual	1%		
Reverse Engineering Report	Individual	13%		
Technical Paper Reviews	Individual	2%		
Reverse Engineering Report Peer Review	Individual	1%		
Homework	Individual	4%		
Midterm Exams (Two)	Individual	10%		
Concept Design Report	Team	6%		
Preliminary Design Report	Team	9%		
Final Design Report	Team	13%		
UF Stroke Conference Abstract	Team	1%		
UF Stroke Conference Poster	Team	2%		
Design Review Update Contracts	Team	4%		
Bill Of Materials Order Form	Team	1%		
Sub-System Artifact	Team	7%		
IP Disclosure Document	Team	var.		
Final Poster Presentation	Team	1%		
Final Design Presentation	Team	7%		
Group Feedback	Individual	var.		
Any changes will be posted on the CANVAS page and announced in class				

Explanation of Group Feedback:

All group members will submit feedback reflecting on their own contributions and the contributions their team members to major team deliverables. Most evaluations should align with the class average. Evaluations submitted with every group member having perfect scores will be discarded as attempted grade inflation (see honor code section of the syllabus). Positive reviews resulting in a team member's score being above the class average have potential to add up to 10% to individual scores on major team deliverables. Similarly, negative reviews resulting in a team member's score being below the class average can incur a penalty of up to 10% to individual scores on major team deliverables.

Grading Policy

	A: 92-100	A-: 89-91.99
B+: 86-88.99	B: 82-85.99	B-: 79-81.99

EML4501 Mechanical Engineering Design 2 Traum 2020 Spring C+: 76-78.99 C: 72-75.99 C-: 69-71.99 D+: 66-68.99 D: 62-65.99 D-: 59-61.99 E: 0-58.99

More information on UF grading policy may be found at: <u>https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/</u>

Students Requiring Accommodations

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <u>https://disability.ufl.edu/students/get-started/</u>) 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 <u>http://gatorevals.aa.ufl.edu/students/</u>. 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 <u>http://ufl.bluera.com/ufl/</u>. Summaries of course evaluation results are available to students at <u>http://gatorevals.aa.ufl.edu/public-results/</u>.

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 (<u>http://sccr.dso.ufl.edu/process/student-conduct-code/</u>) 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 or TAs in this class.

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, <u>taylor@eng.ufl.edu</u>
- 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: <u>https://registrar.ufl.edu/ferpa.html</u>

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 <u>umatter@ufl.edu</u> 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: <u>http://www.counseling.ufl.edu/cwc</u>, 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 <u>Office of Title IX Compliance</u>, located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, <u>title-ix@ufl.edu</u>

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. <u>https://lss.at.ufl.edu/help.shtml</u>.

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling. <u>https://www.crc.ufl.edu/</u>.

Library Support, <u>http://cms.uflib.ufl.edu/ask</u>. 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. <u>https://teachingcenter.ufl.edu/</u>.

Writing Studio, **302** Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers. <u>https://writing.ufl.edu/writing-studio/</u>.

Student Complaints Campus: <u>https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf</u>. *EML4501 Mechanical Engineering Design 2 Traum 2020 Spring* *Schedule of Topics and Assignments:* See attached schedule.

Module	Meeting #	Week #	Date	Day	Location	Face-To-Face	Online	Assignment Assigned	Assessment / Assignment Due
Course	1	Week 1	1/6/2020	м	Classroom	Course Introduction	Read: B. Chinn "Engineering vs. Design Thinking" View Teaching Team Introduction Videos	Pre-Intervention Resume Assigned	
Prerequisite							View Resume Submission Assignment Video	re-merennon result seere stangiete	Pre-Intervention Resume Date
Review	2		1/8/2020	w	Classroom	Fluid Mechanics [EGN 3353C] Review			Pre-Intervention Resume Score Due
Review	3		1/10/2020	F	Classroom	Hund Meenames [EGN 3555C] Review / Honorlock Practice "Quiz"			HonorLock Practice "Quiz" (Administered In Class [Online])
Prerequisite Review	4	Week 2	1/13/2020	М	Classroom	Fluids Quiz In Class (Administered Online)		Reverse Engineering Report Assigned	Fluids Entry Quiz In Class (Administered Online)
Prerequisite Review	5		1/15/2020	w	Classroom	Mechanical Design [EML3005] Review	View Engineering Design Process & Gantt Chart Videos	Engineering Design Process & Gantt Chart Pre-Test (Online) Assigned Engineering Design Process & Gantt Chart Post-Test (Online) Assigned Reverse Engineering Report Gantt Chart Assigned	
Prerequisite	6		1/17/2020	F	Classroom	Mechanical Design [EML3005] Review			Engineering Design Process & Gantt Chart Pre-Test (Online) Engineering Design Process & Gantt Chart Post-Test (Online)
Prerequisite	•	Week 3	1/20/2020	М	•	Martin Luther King, Jr. Day Holiday			Mechanical Design Entry Quiz (Administered Online)
Prerequisite	7		1/22/2020	w	Laboratory	Laboratory Safety	View Dynamics [EGM3401] Review Videos	Dynamics Review Pre-Test (Online) Assigned	Passare Engineering Report Coart Chart
Review Prerequisite			1/24/2020	r	Chamman	(Flipped Class) Work On Reverse Engineering Report	View How to Review Technical Papers Videos	Dynamics Review Post-Test (Online) Assigned	Dynamics Review Pre-Test (Online)
Review Tolerance &	•		1/2-#2020	r	Cabsroom	Talarance Loone (Eurotional Surfaces)		Review of Technical Paper 1 Assigned	Dynamics Review Post-Test (Online)
Dimensioning	9	Week 4	1/27/2020	м	Classroom	Tolerance Loop Technique		Tolerance Loop HW 1	Dynamics Entry Quiz (Administered Online)
Tolerance & Dimensioning	10		1/29/2020	W	Laboratory	(Flipped Class) Work On Reverse Engineering Report	View Standards Videos View Literature & Patent Search Videos	Standards & Lit Review Pre-Test (Online) Assigned Standards & Lit Review Post-Test (Online) Assigned	Review of Technical Paper 1 Due
Tolerance & Dimensioning	11		1/31/2020	F	Classroom	Tolerance Loop Technique Distributing Tolerances		Review of Technical Paper 2 Assigned	Standards & Lit Review Pre-Test (Online) Standards & Lit Review Post-Test (Online)
Tolerance & Dimensioning	12	Week 5	2/3/2020	М	Classroom	Tolerance Loop Examples		Tolerance Loop HW 2	Tolerance Loop HW 1
Tolerance &	13		2/5/2020	W	Laboratory	(Flipped Class) Work On Reverse Engineering Report	View Tolerance Loop Videos	Tolerance Loop Pre-Test (Online) Assigned	Review of Technical Paper 2 Due
Tolerance &								forearce Loop Post-Test (Onlane) Assigned	Tolerance Loop Pre-Test (Online)
Dimensioning	14		2/7/2020	F	N/A	No Class Meeting (Complete Reverse Engineering Report)	Form Major Project Teams	Peer Review of Reverse Engineering Report Assigned	Tolerance Loop Post-Test (Online) Reverse Engineering Report Due 10pm
Assembly & Handling Time	15	Week 6	2/10/2020	М	Classroom	Assembly & Handling Time		Conceptual Design Report Assigned	Tolerance Loop HW 2
Assembly &	16		2/12/2020	W	Laboratory	(Flipped Class) Work On Conceptual Design Report	View Assembly & Handling Time Videos	Assembly & Handling Time Pre-Test (Online) Assigned	
Assembly &	17		2/14/2020	F	Classroom	Midtem Review		Assembly & nandning Tame Post-Test (Onlane) Assigned	Assembly & Handling Time Pre-Test (Online)
Handling Time Assembly & Handling Time	18	Week 7	2/17/2020	м	Classroom	Midtem Review			Assembly & Handling Time Post-Test (Online) Maltern Exam (1 Kight Exam) 1. Laboratory Safety 2. Tolerance Loops 3. Assembly Time 4. Desian Problem
Creative	19		2/19/2020	W	Laboratory	(Flipped Class) Work On Conceptual Design Report	View Customer Needs to Quantitative Metrics Videos	Customer Needs to Quantitative Metrics Pre-Test (Online) Assigned	Peer Review of Reverse Engineering Report Due
Creative	20		2/21/2020	F	Classroom	Divergent Thinking		Customer receipto quantitative mentes rom-ren (onane) sesagirea	Customer Needs to Quantitative Metrics Pre-Test (Online)
Ideation Creative	21	Week 8	2/24/2020	м	Classroom	Customer Greet Lecture			Customer Needs to Quantitative Metrics Post-Test (Online)
Ideation Creative			2/26/2020	w	Laboratory	(Direct Char) Work On Concernated Desire Descrit	View Concern I denting Videou	Concept Ideation Pre-Test (Online) Assigned	
Ideation			2.202020		Laboratory	(rapped case) were on conceptual senge report	The Concept Includes Taxles	Concept Ideation Post-Test (Online) Assigned	Concernt Idention Pre-Test (Online)
Creative Ideation	23		2/28/2020	F	Classroom	No Class Meeting (Complete Conceptual Design Report)		Preliminary Design Report Assigned	Concept Ideation Time Post-Test (Online) Conceptual Design Report Duc (10:00pm) Conceptual Design Report Group Member Evaluation Duc (11:59pm)
	•	Spring Break	3/2/2020	M	:	Spring Break		None	
	•		3/6/2020	F	•	Spring Break		None	
Down-Selection to Preliminary Design	24	Week 9	3/9/2020	М	Classroom	Material Selection & Ashby Charts		Material Selection & Ashby Charts HW 1 Assigned	
Down-Selection to Preliminary Design	25		3/11/2020	w	Laboratory	(Flipped Class) PDM Onboarding Work On Preliminary Design Report	Trade Study to Weight Concepts Collapsing Subsystems to "Right Size" Subsystem Number PDM Onboarding	Trade Study to Weight Concepts Pre-Test (Online) Assigned Trade Study to Weight Concepts Post-Test (Online) Assigned	
Down-Selection to	26		3/13/2020	F	Classroom	Material Selection & Ashby Charts			Trade Study to Weight Concepts Pre-Test (Online)
Down-Selection to	27	Week 10	3/16/2020	м	Classroom	Manufacturing Costs		Material Selection & Ashby Charts HW 2 Assigned	Irade study to weight Concepts Post-Test (Online) Material Selection & Ashby Charts HW 1
Preliminary Design							Down-Selection Matrices		
Down-Selection to Preliminary Design	28		3/18/2020	w	Laboratory	(Flipped Class) Work On Preliminary Design Report	Preliminary Design: Configuration Design, Parametric Design Cycle Subsystem Synergy and Discord	Down-Selection & Preliminary Design Pre-Test (Online) Assigned Down-Selection & Preliminary Design Post-Test (Online) Assigned	
Down-Selection to Preliminary Design	29		3/20/2020	F	Classroom	Midtern Review			Down-Selection & Preliminary Design Pre-Test (Online) Down-Selection & Preliminary Design Post-Test (Online)
Down-Selection to Preliminary Design	30	Week 11	3/23/2020	м	Classroom	Midtern Review			Material Selection & Aduby Chans HW 2 Mildenne Exan 2 (Migh Exam) 1. Laboratory Safety 2. Material Selection & Aduby Charts 3. Manufacturing Costs 4. Design Problem
Down-Selection to Preliminary Design	31		3/25/2020	w	Laboratory	(Flipped Class) Work On Preliminary Design Report	Design for Manufacturing Design for Assembly Balancing Competing Design Aspects	Design for Manufacturing & Assembly Pre-Test (Online) Assigned Design for Manufacturing & Assembly Post-Test (Online) Assigned UF Stroke Conference Abstract Submission Assigned UF Stroke Conference Abstract Submission Assigned	
Down-Selection to Preliminary Design	32		3/27/2020	F	N/A	No Class Meeting (Complete Preliminary Design Report)		Bill of Materials for Subsystem Artifact Assigned Final Design Report Assigned	Design for Manufacturing & Assembly Pre-Test (Online) Design for Manufacturing & Assembly Post-Test (Online) Preliminary Design Report + IP Disclosure Due (1000pm) Preliminary Design Report Groun Member E-Mundaion Due (1159pm)
Design Reviews & Final Design	33	Week 12	3/30/2020	М	Classroom	Design Reviews IA		Design Reviews 1A Update Contract Assigned	UF Stroke Conference Poster Abstract Due
Design Reviews						Create Bill of Materials for Subsystem Artifact	Detail Design: Design, Analyze, Prototype Cycle		UF Stroke Conference Poster Abstract Submission Due
Design Reviews	35		4/3/2020	F	Classroom	Desim Reviews 1B		Desim Reviews 1B Update Contract Assigned	Bill of Materials for Subsystem Artifact Due (2:00pm)
& Final Design Design Reviews	26	Week 12	4/6/2020	м	Chermom	Darim Pavious 24		Daviewer 24 Hodata Contract Assigned	Devies Reviews 1A Hodate Contract Date
& Final Design Design Reviews			10,000			Build Subsystem Artifact			
& Final Design	37		4/8/2020	w	Laboratory	Work on Final Design Report		Poster Presentations Assigned Design Reviews 2R Undate Contract Assigned	
& Final Design	38		4/10/2020	F	Classroom	Design Reviews 2B		Notification of IP Disclosure Submission (If Required)	Design Reviews 1B Update Contract Due
Design Reviews & Final Design	39		4/13/2020	М	Classroom	Course & Instructor Evaluation Make-Up Design Reviews		Post-Intervention Resume Assigned Post-Intervention Resume Score Assigned	
Design Reviews & Final Design						Build Subsystem Artifact Work on Final Design Report			Poster Presentations Due
Final Deliverables									Design Reviews 2A Update Contract Due Design Reviews 2B Update Contract Due Final Design Report Dae (1000pm) IP Dieclosure: Submission (If Requested on 4/10/2019) Final Design Report George Member Evaluation Dae (11:59pm)
Final Deliverables					Harrell Medical Education Building				
Final Deliverables									Post-Intervention Resume Due Post-Intervention Resume Score Due
Final Deliverables					NRF Foyer 4-60m				Sub-System Artifact Due Deliver Poster Presentations 2
Final					MAE-A 221 (Time TBA)				Design Presentations Due
Final					MAE-A 221 (Time TRA)	Design Presentations			Final Design Presentations Group Member Evaluation Due (11:59pm)