

## **EML 4220 – Vibrations**

**Sections:** 2592 (5<sup>th</sup> period, #13423) and 3313 (8<sup>th</sup> period, #13424)  
Fall 2021 Syllabus

*Modifications to this syllabus may be required during the semester. Any changes to the syllabus will be posted on the course e-learning/Canvas site and/or announced in class.*

### **Meeting Times / Location:**

Section 2592 (#13423): MWF 5<sup>th</sup> period (11:45am – 12:35pm) / MCCC0100

Section 3313 (#13424): MWF 8<sup>th</sup> period (3:00pm – 3:50pm) / CHE0237

### **Instructor:**

Gloria J. Wiens, Department of Mechanical and Aerospace Engineering

E-mail address: [gwiens@ufl.edu](mailto:gwiens@ufl.edu) (Please contact through the Canvas website)

Office Location: Zoom Office / Breakout Rooms (held online via <https://ufl.zoom.us>)

Office hours: Monday and Wednesday (4:15pm – 5:15pm), other times via appointment.

### **Teaching Assistants (TA) and Graders:**

Office Hours (held online via <https://ufl.zoom.us>). Please contact TAs through the Canvas website.

- **Jerome David**, [jerome.david@ufl.edu](mailto:jerome.david@ufl.edu)  
Office hour: Tuesday (4:00pm – 5:00pm)
- **Riley Richards**, [rileyrichards@ufl.edu](mailto:rileyrichards@ufl.edu)  
Office hour: Thursday (11:00am – 12:00pm)

### **Catalog Course Description:**

Single and multiple degree of freedom systems, including application to mechanical systems with problems employing computer techniques. (3 credit hours)

### **Course Pre-requisites and Co-requisites:**

Prerequisites: EGM 3344, EGM 3401, EGM 3520 and MAP 2302 with minimum grades of C. Coreq: None

### **Course Objectives:**

The purpose of the course is to provide students with the fundamentals needed to perform vibration analysis for the design and use of various machines, systems, and structures. Upon completion of this course each student should have:

1. Basic understanding of vibration analysis and the ability to apply this understanding to analyze and solve a given problem.
2. Basic understanding of damped and forced vibration in single and multiple degree of freedom systems.
3. The ability to apply advanced science and engineering principles in the design and analysis of structures to suppress or enhance vibrations.

**Material and Supply Fees:** None

### **Professional Component (ABET):**

EML 4220 supports several program outcomes enumerated in the Department of Mechanical and Aerospace Engineering Assessment Plan and prepares students to attain the following outcomes. Specific Mechanical Engineering UF Student Learning Outcomes (SLO) supported by this course include: (SLO1) Apply knowledge of mathematics, science, and engineering principles to mechanical engineering problems; and (SLO3) Design a mechanical engineering system, component or process to meet desired needs within realistic economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability constraints.

**Relation of Course to Program Outcomes (ABET):**

Outcome	Coverage*
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	High [30%; method of assessment is in-class activities, quizzes, 3 exams and final]
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	Low [10%; method of assessment is in-class activities, quizzes, 3 exams and final]
3. An ability to communicate effectively with a range of audiences	
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	Medium [15%; method of assessment is in-class activities, quizzes, 3 exams and final]
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	
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	

\*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:** (electronic version)

Mechanical Vibrations, Pearson, 6<sup>th</sup> Edition (2017)

Singiresu S. Rao

ISBN-10: 013436130X

ISBN-13: 9780134361307

TA355.R37 2017

This course is participating in UF All Access program. Login at the following website and Opt-In to gain access to your required eBook. <https://www.bsd.ufl.edu/G1CO/IPay1f/start.aspx?TASK=INCLUDED> – UF All Access will provide you with your required materials digitally at a reduced price and the ability to pay using your student account. This option will be available starting 1 week prior to the semester starting and ending 3 weeks after the first day of class. For print purchasing options or study guides and additional course materials please visit <https://www.bkstr.com/floridastore/home> or the UF Bookstore located in the Reitz Union.

E-Learning/Canvas system (<https://elearning.ufl.edu>) – all documents, homework, grades, etc. will be posted on this system.

**Recommended Reading:**

Tutorials to mathematical software MATLAB/Simulink. Software is useful to analyze vibrations.

**Course Outline:**

Harmonic Motion and Free Vibration (with damping)

Resonance and Harmonic Excitation

General Forced Response

Multiple Degree of Freedom Systems

Design for Vibration Suppression or Enhancement

**Attendance Policy and Class Expectations:**

It is expected that this course will require at least 10 hours of effort per week when you consider time spent for lectures, reading assignments, quizzes/in-class activities, homework, and re-writing of your class notes. It is also expected that you will attend every lecture. If you cannot attend a lecture, please notify me prior to class. If you must miss lecture for any reason, you should obtain the lecture notes from another student. You will be held responsible for knowledge of all scheduling and policy announcements made in class and on course website.

You are expected to take a sincere interest in learning the classroom material. Keeping with this expectation, you are expected to show up on time for class. Please turn off all cell phones prior to the start of class. If you are a distraction in class, you will be asked to leave.

There will be in-class activities throughout the semester in which your participation level will be assessed for determining a portion of your final course grade. These activities may or may not be announced a priori and may include pre-read assignments and quizzes via Canvas. Homework problems will be assigned, but not graded. They are to serve as practice problems to help you master the material. Recitation/office hours are scheduled throughout each week should you need assistance in solving the problems or additional help in understanding the material.

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.

**Course via HyFlex with Zoom Recording**

Our 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 in class and/or 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.

**Evaluation of Grades:**

Students will be evaluated from their grades on the following, which are weighted as follows

- 16% Class Participation, Quizzes and other assignments with points assigned.
- 84% Exam 1, Exam 2, Exam 3 and Final Exam

*(Based on TOP 3 Exam Scores out of the 4 Exams, that is Lowest Exam Grade Dropped)*

ALL Exams MUST BE WRITTEN and SUBMITTED via Honorlock. Exams will be closed-book and closed-notes.

**RE-GRADING POLICY:** All ‘re-grade requests’ must be submitted electronically in writing to the instructor (Dr. G.J. Wiens) within one week from the date the graded assignment (exam) is first returned. The written request must explain in detail what you want the grader to do and where you believe he/she has made a mistake in grading. The request must have a date on the top of the page, your name, your telephone number(s), and e-mail address. NOTE: Failure to view your graded assignment upon its electronic return does not change the one-week deadline for a re-grade request.

**Grading Scale and Policy:**

93.4 – 100	A	86.7 – 89.9	B+	76.7 – 79.9	C+	66.7 – 69.9	D+	0 – 59.9	E
90.0 – 93.3	A-	83.4 – 86.6	B	73.4 – 76.6	C	63.4 – 66.6	D		
		80.0 – 83.3	B-	70.0 – 73.3	C-	60.0 – 63.3	D-		

More information on UF grading policy may be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

***Make-up Exam Policy:***

Make-up exams will not be given since students are allowed to drop one of their three ‘In-Class’ or Final exam. Only extreme extenuating circumstances will be considered otherwise and not without a documented excused absence (e.g., documented extreme medical emergency). A missed exam will count as your dropped exam.

All submitted documented reasons for missing an exam (e.g., due to religious holiday, official university business, serious family emergency, military obligation, jury duty) will be retained on file and referenced during final course grade determination. Documentation must be submitted to the instructor (Dr. G.J. Wiens) a priori or within one week following the date of the missed exam.

***Students Requiring Accommodations:***

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting <https://disability.ufl.edu/students/get-started/>. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester. NOTE: Any requests must be made 5 university working days prior to the date for which accommodation is being requested.

***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 <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

***In-Class Recording***

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

### ***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 Conduct Code (<https://sccr.dso.ufl.edu/process/student-conduct-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. 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
- Jennifer Nappo, Director of Human Resources, 352-392-0904, [jpennacc@ufl.edu](mailto:jpennacc@ufl.edu)
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, [taylor@eng.ufl.edu](mailto:taylor@eng.ufl.edu)
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, [nishida@eng.ufl.edu](mailto: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 Resources:***

#### *Academic Resources*

**E-learning technical support**, 352-392-4357 (select option 2) or e-mail to [Learning-support@ufl.edu](mailto: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://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>  
<https://care.dso.ufl.edu>.

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

### 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](mailto: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](mailto: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/>.

#### **COVID-19:**

- You are expected to wear approved face coverings at all times during class and within buildings even if you are vaccinated.
- If you are sick, stay home and self-quarantine. Please visit the UF Health Screen, Test & Protect website about next steps, retake the questionnaire and schedule your test for no sooner than 24 hours after your symptoms began. Please call your primary care provider if you are ill and need immediate care or the UF Student Health Care Center at 352-392-1161 (or email [covid@shcc.ufl.edu](mailto:covid@shcc.ufl.edu)) to be evaluated for testing and to receive further instructions about returning to campus.
- If you are withheld from campus by the Department of Health through Screen, Test & Protect, you are not permitted to use any on campus facilities. Students attempting to attend campus activities when withheld from campus will be referred to the Dean of Students Office.
- UF Health Screen, Test & Protect offers guidance when you are sick, have been exposed to someone who has tested positive or have tested positive yourself. Visit the [UF Health Screen, Test & Protect website](#) for more information.
- Please continue to follow healthy habits, including best practices like frequent hand washing. Following these practices is our responsibility as Gators.



***Important Dates: ... NOTE: Exam dates are fixed & administered using Honorlock.***

Combined semester exams, Sections 2592 (#13423) and 3313 (#13424):

Exam 1: Thursday, September 23, 2021, during Periods E2-E3, 8:20pm-10:10pm

Exam 2: Tuesday, November 2, 2021, during Periods E2-E3, 8:20pm-10:10pm

Exam 3: Thursday, December 2, 2021, during Periods E2-E3, 8:20pm-10:10pm

In-class Activity Class Periods:

(Attendance & Participation Required, held via HyFlex with <https://ufl.zoom.us>)

Dates: TBD

Exam Prep Activities: September 22 (Wed); November 1 (Mon); and December 1 (Wed)

Review Sessions: (held via <https://ufl.zoom.us>)

Tuesday, September 21, 2021 (Time: 5:00pm-6:30pm)

Wednesday, September 22, 2021 (Time: 5:00pm-6:30pm)

Thursday, October 28, 2021 (Time: 5:00pm-6:30pm)

Monday, November 1, 2021 (Time: 5:00pm-6:30pm)

Tuesday, November 30, 2021 (Time: 5:00pm-6:30pm)

Wednesday, December 1, 2021 (Time: 5:00pm-6:30pm)

Final Exam by Section:

Section 2592 (#13423) – Wednesday, December 15, 2021 (Time: 3:00pm – 5:00pm)

Section 3313 (#13424) – Tuesday, December 14, 2021 (Time: 12:30pm – 2:30pm)

Holidays and No Lectures Dates:

September 6, 2021 – Labor Day

October 8, 2021 – Homecoming

November 11, 2021 – Veterans Day

November 24-27, 2021 – Thanksgiving Break

Other Date noted:

Wednesday, December 8, 2021 – Last Day of Classes