

Thermodynamics of Materials

EMA 4314 | Section 8797

Fall 2023

Time and Location: Tuesdays, Period 7 (1:55 PM - 2:45 PM) in AND 0101
Thursdays, Periods 7 & 8 (1:55 PM - 3:50 PM) in AND 0101

Professor: Megan Butala (she/her)

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Office Hours: TBD

Teaching Assistant: Robert Clayton

Office Hours: TBD

Course Description

Foundations of thermodynamic variables and equations, as well as their applications to tools (e.g. phase diagrams) and processes in materials science (3 credits)

Course Pre-Requisite

EMA 3010

Course Objectives

During this course, students are expected to develop an understanding of the four laws of thermodynamics, fundamental thermodynamic variables, concepts of thermal and chemical equilibrium, and the application of these in relating materials' changing properties to their surroundings.

Professional Component (ABET)

3 credits Engineering Topics

Relation to Program Outcomes (ABET)

| Outcome | Coverage |
|---|----------|
| 1. An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics. | High |

Required Textbook

Thermodynamics in Materials Science, 2nd Edition

Author: Robert DeHoff

ISBN: 0-3493-4065-9

Additional and supplementary content (reading, videos, and other resources) will be updated throughout the semester and provided through Canvas or course lectures.

Course Schedule, tentative and subject to change

| | |
|--------------------------|--|
| Week 1: (8/24) | Introduction to Thermodynamics / Ch. 1 |
| Week 2: (8/29 & 8/31) | Cont. Ch. 1; Structure of Thermodynamics / Ch. 2 |
| Week 3: (9/5 & 9/7) | The Four Laws of Thermodynamics / Ch. 3; Start Ch. 4 |
| Week 4: (9/12 & 9/14) | Thermodynamic Variables and their Relations / Ch. 4 |
| Week 5: (9/19 & 9/21) | Thermodynamic Variables and their Relations / Ch. 4 |
| Week 6: (9/26 & 9/28) | Review on Tuesday, Exam 1 on Thursday |
| Week 7: (10/3 & 10/5) | Equilibrium / Ch. 5 |
| Week 8: (10/10 & 10/12) | Unary Heterogenous Systems / Ch. 7 |
| Week 9: (10/17 & 10/19) | Unary Heterogenous Systems / Ch. 7 |
| Week 10: (10/24 & 10/26) | Review Tuesday, Exam 2 on Thursday |

| | |
|----------------------------|--|
| Week 11: (10/31 & 11/2) | Multicomponent Homogeneous Systems / Ch. 8 |
| Week 12: (11/7 & 11/9) | Heterogeneous Systems / Ch. 9 |
| Week 13: (11/14 & 11/16) | Phase Diagrams / Ch. 10 |
| Week 14: (11/21 & Holiday) | Phase Diagrams / Ch. 10 |
| Week 15: (11/28 & 11/30) | Review on Tuesday, Exam 3 on Thursday |
| Week 16: (12/5) | Review and Reflect |

Lectures & Office Hours

Research shows students learn and retain information best taking notes by hand (see [Scientific American: A Learning Secret - Don't take Notes with a Laptop](#)). As I want to provide the best learning environment, I prefer you take handwritten notes in our class (tablet is fine). We might use cell phones or websites to conduct real time polling or interactive content, but it is in your best interest to put your phone away, turn off notifications on your computer and email, and close irrelevant windows during class and meetings with your group.

Office hours with the instructor or TA are provided for ***you to bring questions*** about lecture content, assignments, or related concepts. Instructor/TA will manage the logistics and moderate student discussions or co-working in office hour settings. Office hours ***will not*** include additional practice problems or lectures.

Health Practices on Contagious Illnesses

You are welcome to wear approved face coverings over your nose and mouth, and you are expected to respect the choice others make regarding this. If you are having symptoms of any illness, please stay home or wear a mask indoors. 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). Please also continue to follow healthy habits, including best practices like frequent hand washing. Following these practices is our responsibility as Gators.

Privacy Information for Class Sessions

Class sessions may be audio visually recorded for enrolled students who are unable to attend, but students are not entitled to or guaranteed this accommodation. Students who participate are agreeing to have their video or voice recorded. Audio or visual recording of your classmates cannot be shared, to protect their privacy.

Attendance Policy and Make-Up Policy

While attendance is not strictly required, it is in your best interest to come for lecture material and activities. If you must miss class, you should ask a peer or two to borrow their notes as the Instructor does not post notes.

In-person quizzes will be periodically given in class with no make-up opportunity. Tests will be exclusively given in-person during scheduled course times, the only exception being DRC accommodations that are each student's responsibility to arrange with the instructor as soon as possible and preceding exams.

If you have an academic, extenuating, or unavoidable excused absence, the Instructor will act within her abilities to assist you.

Excused absences must be consistent with university policies in the undergraduate catalog (<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>) and require appropriate documentation.

Generally, at least one week in advance notice is required for assignment or exam extension requests. In accordance with university attendance policy, acceptable reasons for absence from or failure to participate in class include illness, serious family emergencies, special curricular requirements, military obligation, severe weather conditions, religious holidays, and participation in official university activities such as music performances, athletic competition, or debate. Absences from class for court-imposed legal obligations (e.g., jury duty or subpoena) must be excused. Other reasons also may be approved. If an extenuating circumstance beyond your control causes you to miss class, get in touch with me as soon as possible, ideally ahead of the absence or deadline. Please note that assignment deadlines for other courses will not constitute approved absence or extension. Students who do not follow the approved procedure and timeliness for an assignment or exam will receive a score of zero.

Eating, drinking, side conversations, and using technology for anything besides the course are among disruptive activities that may result in a student's removal from the class period. Likewise sound from any electronic devices besides those with medical function will not be tolerated during class. Any persistent and disruptive behavior will result in the student being removed from the classroom and, depending on the nature of the behavior, reported to the department, college, or university for misconduct. If such an incident results in dismissal from class, you are not entitled to make up missed activities or exams.

Other Class Expectations

Contacting the Professor: I strongly encourage students to find me during breaks or after class, attend virtual office hours, or schedule a meeting to discuss any questions or concerns regarding the course. The university strongly encourages we communicate via Canvas to avoid potential violations of student confidentiality protected by [FERPA](#). As such, *I will not reply to emails with course questions – I will only reply to messages through Canvas.*

Messaging Hours: You may contact me via Canvas at any time that is convenient for you, I will respond within one business day between the hours of 8:30 AM and 5:30 PM. If you do not receive a reply from me after 48 hours, please resend your message. Although I may sometimes reply outside of these designated hours, responses cannot be guaranteed after 5:30 PM on weekdays, on weekends, or on academic holidays. Please plan accordingly to have your questions answered in advance of assignment deadlines and exams.

Interpersonal Conduct: Mutual respect for your classmates, the TA, the professor, and yourself is expected in all communication; all class members are expected to treat each other at all times with respect, courtesy, tolerance, fairness, and justice. This includes, but certainly is not limited to, academic integrity; it is disrespectful to yourself, your peers, and to the instructor to turn in work that is not your own.

Effort: The university recommends that students spend 9 to 12 hours per week for a 3-credit class. This can vary, but is a good initial guideline as the term begins.

Recommendations for This Classroom: For lectures, assignments, quizzes, and exams, it is in your best interest to ask questions or for clarification as soon as content or a prompt is not making sense so that we can review it or I can change my approach. ***Additionally, I expect you to take ownership of your learning experience.***

Referencing the Professor: Often, students have questions over proper naming or titling etiquette for communicating with their professors. In all communication with me throughout the duration of our course, you may use any of the following acceptable references: Professor Butala, Dr. Butala, Prof. B., or Dr. B. The use of any other references, titles, or names is not acceptable unless otherwise directly stated.

Evaluation of Grades (Subject to change)

| Assessment | Percentage of Final Grade |
|------------------------------------|----------------------------------|
| Exams (3, in-class) | 20% each (× 3) |
| Homework | 15% |
| Quizzes | 15% |
| Group work, conduct, participation | 10% |

Exams: There will be 3 in-class exams that must be taken during the scheduled course time. There will be no Final Exam, but there will be assignments that will require your continued engagement over the entire semester. If you have an accommodation for tests, it is *your responsibility to inform me and make sure the request is submitted to GATR in a timely fashion.*

Homework: Homework must be completed individually and submitted through Canvas according to the deadline on the assignment. Emailed or physical copies will not be accepted.

Quizzes: Quizzes will be given periodically during class periods and through Canvas. These are to be completed individually with no collaboration.

Groups: To facilitate community-building and discussion, you will be assigned to groups that must meet for a minimum of 1 hour per week throughout the semester. It is up to the group how you choose to spend this hour and when you meet, but I recommend using it to discuss lectures, homework, and course content. You will also periodically have group assignments. This is an opportunity for you to practice interacting with the course content as well as to build your professional network and communication skills.

Based on the agreed upon expectations of your group, part of your grade will come from your group mates' evaluation of your contribution. In doing this, consider how you can design a group dynamic that facilitates participation: develop group norms and expectations, reflect and check-in about how you're all working together, and foster a team environment where you're all helping one another to succeed.

Grading: Grades will be based on your understanding and mastery of the material as assessed by exams, quizzes, and homework, as well as your level of engagement with the course content, including through group work and participation.

You have one week after an exam, homework, or other assignment is returned to resolve any question about scores or grades. No changes to your assessment grades will be made after that time.

Grading Policy

| | | | | | | | | | | | | |
|--------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Percentage | ≥ 93 | ≥ 90 | ≥ 87 | ≥ 83 | ≥ 80 | ≥ 77 | ≥ 73 | ≥ 70 | ≥ 67 | ≥ 63 | ≥ 60 | < 60 |
| Letter Grade | A | A- | B+ | B | B- | C+ | C | C- | D+ | D | D- | E |

*The instructor reserves the right to adjust the grade distributions, however, these **will not be adjusted** for individuals.*

More information on UF grading policy may be found at:

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

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.ua.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.bluer.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.ua.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.

Violations of the honor code include, but are not limited to, plagiarism (intentional or unintentional), cheating, unauthorized collaboration and misrepresenting of any work that isn’t yours as your own. Any violation of the honor code will result in academic sanctions and further disciplinary action.

If you are uncertain of the policy for collaboration or use of resources (textbook, web, etc.) on an assignment, exam, or quiz, please ask the instructor well-ahead of the deadline for the assessment.

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
- 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 Resources:

Accessibility Services / 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.

Technology Resources

The entirety of our course will take place virtually, requiring the use of a working computer and access to audio-visual resources (webcam, microphone, speakers). If you are struggling to use Zoom or Canvas, please review these [UF Quick Start guides](#). This [link](#) also connects to UF resources regarding internet connectivity.

The UF Computing Help Desk can assist you with any of your technical issues. You can access the Help Desk 24/7 at <https://helpdesk.ufl.edu/>, 352-392- HELP (4357), or helpdesk@ufl.edu. If you use email, write from your gatorlink@ufl.edu email address, or include your UFID and/or GatorLink username (NOT your password!) in the body of the email. Provide complete information regarding the course and content to which you are referring.

Financial Services

In case of emergency financial need, UF's Aid-a-Gator program provides students with emergency funding: <https://www.sfa.ufl.edu/aidagator/>. The program is intended to "help our students need to cover costs related to unanticipated travel, additional technology requirements, or other needs related to an emergency situation."

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.

Hitchcock Field & Fork Pantry: <https://pantry.fieldandfork.ufl.edu>, assisting members of our campus community who experience food insecurity.

Counseling and Wellness Center: <https://counseling.ufl.edu>, 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 for Accessibility and Gender Equity](#) 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 Connections Center, Reitz Union, 392-1601. Career assistance and counseling; <https://career.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: <https://distance.ufl.edu/getting-help/>; <https://distance.ufl.edu/state-authorization-status/#student-complaint>.

Additional Resources

If you or someone you know is struggling with any crisis including but not limited to gender, sexual, racial, or domestic violence, there are many community and University of Florida resources available. Some of these include:

- *Student Health Care Center* (352-392-1161, shcc.ufl.edu)
- *Multicultural & Diversity Affairs* (352-392-1217, multicultural.ufl.edu)
- *UF Office of the Ombuds* (352-392-1308, <https://www.ombuds.ufl.edu/>)
- *UF Health Shands Emergency Room / Trauma Center* (352-733-0111)
- *Gainesville Police Department* (non-emergency #: 352-955-1818, gainesvillepd.org)

While faculty and staff in our department are also resources for you, please keep in mind some of us (including me) are [Title IX mandatory reporters](#).