

## Materials

EMA 3010 Class Number 31007 Section 1937

**Class Periods:** M,W,F Period 3 (9:35 am -10:25 am)

**Location:** 100% Online

**Academic Term:** Spring 2021

### 1. Instructor

**Dr. Juan Claudio Nino**

jnino@mse.ufl.edu

(352) 846 3787

Office Hours: T, R 9:30-10:30 am via Zoom or by appointment.

### 2. Teaching Assistants

Please contact through the Canvas website

- Preston Vargas, Office Hours, Tuesday and Thursday 3-4 pm via Zoom or by appointment.

### 3. Course Description

Conceptual perspective for origin of materials behavior, including structure, property, performance interrelationships. Materials selection and use of familiar materials, including metals, ceramics, polymers, electronic materials, and composites in electronics, structural and other engineering applications. (3 Credit Hours)

### 4. Course Pre-Requisites

CHM 2045 General Chemistry (or equivalent).

### 5. Course Objectives

This is an introductory course, designed to provide the fundamental concepts of Materials Science and Engineering. Students will be able to describe structure, properties, and applications of metallic, ceramic, polymeric and composite materials and how to select materials for a given application.

### 6. Professional Component (ABET)

This course provides 3 credits towards engineering sciences.

### 7. Relation to MSE Program Outcomes (ABET)

| Outcome  | Coverage* |
|--|-----------|
| 1. An ability to identify, formulate, and solve 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.                   |           |
| 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. |           |
| 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.

### 8. Required Textbooks and Software

- Title: **Fundamentals of Materials Science and Engineering: An Integrated Approach**
- Author: **William D. Callister, Jr. and David G. Rethwisch**
- Year and edition: **2019 5<sup>th</sup> Edition (Wiley), e-book with Wiley Plus and Perusall Access**
- ISBN: **978-1-119-17550-6**

PLEASE NOTE: You need to acquire the e-book version with access to both Wiley Plus and Perusall as these online tools will be used for assessment as indicated in the evaluation of grades and will provide you with additional learning tools.

**The simplest and cheapest way to acquire the e-book is via UF ALL ACCESS. This includes a UF Negotiated rate for both products of \$87.50.** Login at the following website and Opt-In to gain access to your UF All Access course materials - <https://www.bsd.ufl.edu/AllAccess> – UF All Access will provide you with your required materials digitally at a reduced price, and the charge will be posted to your student account. This option will be available starting one week prior to the start of the semester and ends three weeks after the first day of class.

## 9. Course Schedule

Below is the intended/tentative schedule of activities and exams.

| Week      | Class Date | Topics  | Book Chapter        | Pre-Class Activity | In-Class Activity |
|-----------|------------|---|---------------------|--------------------|-------------------|
|           | <b>Jan</b> |   |                     | P = Perusall       |                   |
| <b>1</b>  | 11         | Introduction - Course Workflow - CANVAS - PERUSALL - WILEY PLUS | 0                   | CANVAS             | Zoom Poll         |
|           | 13         | Student Introductions   | 0                   | CANVAS             | Zoom Poll         |
|           | 15         | Types and Applications of Materials                             | 1                   | P (R + W) 1        | Q&A + GE 1        |
| <b>2</b>  | 18         | <b>Martin Luther King Jr. Day - No Class</b>                    |                     |                    |                   |
|           | 20         | Atomic Structure and Interatomic Bonding                        | 2                   | P (R + W) 2        | Q&A               |
|           | 22         | Atomic Structure and Interatomic Bonding                        | 2                   | P (R + W) 3        | Q&A + GE 2        |
| <b>3</b>  | 25         | Structures of Metals and Ceramics                               | 3                   | P (R + W) 4        | Q&A (TA)          |
|           | 27         | Structures of Metals and Ceramics                               | 3                   | P (R + W) 5        | Q&A + GE 3        |
|           | 29         | Structures of Metals and Ceramics                               | 3                   | P (R + W) 6        | Q&A               |
|           | <b>Feb</b> |   |                     |                    |                   |
| <b>4</b>  | 1          | Structures of Metals and Ceramics                               | 3                   | P (R + W) 7        | Q&A + GE 4        |
|           | 3          | Polymer Structures  | 4                   | P (R + W) 8        | Q&A               |
|           | 5          | Polymer Structures  | 4                   | P (R + W) 9        | Q&A + GE 5        |
| <b>5</b>  | 8          | Polymer Structures  | 4                   | P (R + W) 10       | Q&A               |
|           | 10         | Polymer Structures  | 4                   | P (R + W) 11       | Q&A + Review      |
|           | 12         | <b>EXAM I (IN CLASS - CANVAS)</b>                               | <b>1-4</b>          |                    | <b>EXAM</b>       |
| <b>6</b>  | 15         | Imperfections in Solids   | 5                   | P (R + W) 12       | Q&A               |
|           | 17         | Imperfections in Solids   | 5                   | P (R + W) 13       | Q&A + GE 6        |
|           | 19         | Imperfections in Solids   | 5                   | P (R + W) 14       | Q&A               |
| <b>7</b>  | 22         | Diffusion   | 6                   | P (R + W) 12       | Q&A (TA)          |
|           | 24         | Diffusion   | 6                   | P (R + W) 13       | Q&A + GE 7        |
|           | 26         | Diffusion   | 6                   | P (R + W) 14       | Q&A + Review      |
|           | <b>Mar</b> |   |                     |                    |                   |
| <b>8</b>  | 1          | <b>EXAM II (IN CLASS - CANVAS)</b>                              | <b>5-6</b>          |                    | <b>EXAM</b>       |
|           | 3          | Mechanical Properties   | 7                   | P (R + W) 15       | Q&A               |
|           | 5          | Mechanical Properties   | 7                   | P (R + W) 16       | Q&A + GE 8        |
| <b>9</b>  | 8          | Mechanical Properties   | 7                   | P (R + W) 17       | Q&A               |
|           | 10         | Deformation and Strengthening Mechanisms                        | 8                   | P (R + W) 18       | Q&A + GE 9        |
|           | 12         | Deformation and Strengthening Mechanisms                        | 8                   | P (R + W) 19       | Q&A               |
| <b>10</b> | 15         | Deformation and Strengthening Mechanisms                        | 8                   | P (R + W) 20       | Q&A + GE 10       |
|           | 17         | Failure   | 9                   | P (R + W) 21       | Q&A               |
|           | 19         | Failure   | 9                   | P (R + W) 22       | Q&A + Review      |
| <b>11</b> | 22         | <b>EXAM III (IN CLASS - CANVAS)</b>                             | <b>7-9</b>          |                    | <b>EXAM</b>       |
|           | 24         | Phase Diagrams  | 10                  | P (R + W) 23       | Q&A               |
|           | 26         | Phase Diagrams  | 10                  | P (R + W) 24       | Q&A + GE 11       |
| <b>12</b> | 29         | Phase Diagrams  | 10                  | P (R + W) 25       | Q&A (TA)          |
|           | 31         | Phase Transformations   | 11                  | P (R + W) 26       | Q&A + GE 12       |
|           | <b>Apr</b> |   |                     |                    |                   |
|           | 2          | Phase Transformations   | 11                  | P (R + W) 27       | Q&A + Review      |
| <b>13</b> | 5          | <b>EXAM IV (IN CLASS - CANVAS)</b>                              | <b>10-11</b>        |                    | <b>EXAM</b>       |
|           | 7          | Types and Applications of Materials                             | 13                  | P (R + W) 28       | Q&A               |
|           | 9          | Composites  | 15                  | P (R + W) 29       | Q&A + GE 13       |
| <b>14</b> | 12         | Composites  | 15                  | P (R + W) 30       | Q&A               |
|           | 14         | Economic, Environmental, and Societal Issues in MSE             | 20                  | P (R + W) 31       | Q&A + GE 14       |
|           | 16         | Economic, Environmental, and Societal Issues in MSE             | 20                  | P (R + W) 32       | Q&A + Review      |
| <b>15</b> | 19         | <b>EXAM V (IN CLASS - CANVAS)</b>                               | <b>13, 15, 20</b>   |                    | <b>EXAM</b>       |
|           | 21         | Course Review - Final Preparation                               |                     |                    |                   |
| <b>16</b> | 26         | <b>FINAL EXAM - 10 AM - 12 PM (CANVAS)</b>                      | <b>All Chapters</b> |                    |                   |

## 10. Course Website

This course will use CANVAS extensively as a communication and archival tool. The students can access all relevant course information (course notes, homework, problem sets, solutions, announcements, grades, etc.) via the CANVAS

entry link: <https://elearning.ufl.edu/> or <https://ufl.instructure.com>. Within CANVAS the students can purchase and access the book as well as Perusall and Wiley Plus. Please check CANVAS frequently.

### 11. Course Format

This course uses a **team-based learning approach** that uses pre-class preparation materials (including reading assignments and watching pre-recorded lectures on Perusall as indicated in the course schedule) and active learning activities during class time. Your completion and involvement in all these aspects of the course is critical to success.

### 12. Pre-Class Preparation Materials

- a) **Reading assignments** will be your first exposure to the course topics, will engage you in social learning, and will be a key pre-class activity helping you prepare for both the pre-recorded lectures and the in-class active learning activities. Your completion of the reading and interaction will be worth 10% of the course grade and will be assessed using Perusall.
- b) **Pre-Recorded Lectures** will help you prepare for the active learning activities and are a critical aspect of learning the content of this course. You are required to watch them using Perusall. Whether you watch and interact with the lectures will be evaluated and will be worth 10% of the grade.

Beyond their grade value, your completion and involvement in this component is critical to success. Details on Perusall platform use, social learning interaction and assessment will be covered in the first class session.

### 13. Active Learning Activities

- a) **Social Learning in Perusall** will allow you to interact with your classmates and the TA by collaboratively annotating the textbook and pre-recorded lectures. You can start a new annotation thread in Perusall by highlighting text, asking a question, or posting a comment; you can also add a reply or comment to an existing thread. Each thread is like a chat with one or more members of your class, and it happens in real time. Your goals in annotating each reading assignment are to stimulate discussion by posting good questions or comments and to help others by answering their questions. Through your Perusall interaction, you also advise the Instructor how to make class time most productive during the Q&A sessions.
- b) **Attendance to Live Classes** is technically not required but highly encouraged since there will be discussion as well as individual and group work on exercises. Students are encouraged to ask questions and participate. The fundamental concepts will be repeated as required.
- c) **Group Exercises (GE)** will be given during the live classes. These exercises will be performed in groups during class time and counted for credit. In total, GEs will be worth 25% of the grade. As such, attendance is essential to receive credit for this component.

### 14. Homework Problems

Homework is voluntary and will not be graded. However, suggested homework problems will be provided via Wiley Plus to help students prepare for the exams.

### 15. Exams

- a) There will be 5 exams presented in class throughout the semester. Your lowest exam grade will be dropped. Each exam is weighted equally, and each exam will be worth 10% of your final grade. You will have 30 minutes to complete each exam. Exams will be presented on CANVAS using Respondus LockDown Browser and Zoom.
- b) There will be a comprehensive final exam during finals week that is worth 15% of the grade.
- c) You have one week after the test results are posted to resolve any questions about scores and grades. No changes to your exam grade will be made after that time.
- d) **Exam Conflicts with other course exams**. The official UF policy on exam conflict resolution states that when two exams conflict, the course with the higher number will take priority. There will be no exceptions to this rule.
- e) **Make-up exams**. Students who do not take an exam will receive a grade of 0. Excused absences require appropriate documentation to warrant a make-up exam and must be consistent with university policies in the undergraduate catalog (<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>).

### 16. Syllabus Changes

The instructor reserves the right to make changes to the syllabus as needed. Any changes will be clearly announced on CANVAS and in class.

### 17. In-Class Expectations and General Make-Up Policy

- a) **Online Teaching**. Although rarely, our class sessions may be audio visually recorded. 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. The university syllabi policy, including the information regarding COVID impacts can be found on the following website:

<http://www.syllabus.ufl.edu/syllabus-policy/>

- b) Proper behavior in class is always important and leads to a relaxed and productive educational environment. Students are expected to login into zoom 5 minutes before class time and be respectful to the instructor and to fellow students. Students who do not comply with these requirements, or who behave disorderly or disrespectfully, will be kicked out of the zoom session.
- c) Students not presenting an exam, or participating in pre-class and in-class activities will receive a grade of zero (0) and there will be no make-up. Similar to the case for exams described in 15.e, exceptions will only be entertained in cases of excused absences, which must comply with university policies in the undergraduate catalog (<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>) and require appropriate documentation. In general, acceptable reasons for excused absence include illness, serious family emergencies, special curricular requirements, military obligation, court-imposed legal obligations, religious holidays and participation in official university activities such as music performances, athletic competition or debate.

### 18. Course Communication

E-Learning will be the primary avenue for communication and course management. All announcements for the course will be made using the announcement system on the E-Learning site. Make sure and change your E-Learning settings so that you get notifications about announcements, assignments, exams, changes, etc. in a timely manner.

If you are sending e-mails to the instructor, please use CANVAS mail and be sure to include a meaningful subject phrase, and please begin your e-mail with a salutation. [I know that personal e-mails and texts are often sent without even a name to address the recipient at the opening of the communication, but professionally that is unacceptable]. Close your e-mails by typing your name. Check your e-mail for grammar and spelling. Be concise. All of these guidelines are to promote professionalism.

### 19. Evaluation of Grades

| Assignment                       | Number of Assignments     | Percentage of Final Grade |
|----------------------------------|---------------------------|---------------------------|
| Reading (Perusall)               | 32                        | 10%                       |
| Pre-Recorded Lectures (Perusall) | 32                        | 10%                       |
| Group Exercises (Zoom)           | 14                        | 25%                       |
| Term Exams (Zoom + Respondus)    | 5 (10% each, drop lowest) | 40%                       |
| Final Exam                       | 1                         | 15%                       |
|                                  |                           | 100%                      |

### 20. Grading Policy

The final grade of the course will be calculated based on the total points scored as follows:

|              |     |      |      |     |      |      |     |      |      |     |      |     |
|--------------|-----|------|------|-----|------|------|-----|------|------|-----|------|-----|
| Points       | ≥92 | ≥88  | ≥84  | ≥80 | ≥76  | ≥72  | ≥68 | ≥65  | ≥62  | ≥59 | ≥56  | <56 |
| Letter Grade | A   | A-   | B+   | B   | B-   | C+   | C   | C-   | D+   | D   | D-   | E   |
| Grade Points | 4.0 | 3.67 | 3.33 | 3.0 | 2.67 | 2.33 | 2.0 | 1.67 | 1.33 | 1.0 | 0.67 | 0   |

For more information on UF grading policy, please visit: <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

### 21. Students Requiring Accommodations

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://www.dso.ufl.edu/drc>) 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.

### 22. Course Evaluation

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu/evals>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results/>.

### 23. 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 (<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-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 or TAs in this class.

### 24. Commitment to a Safe and Inclusive Learning Environment

The 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](mailto:rbielling@eng.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)

## **25. 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.

## **26. Student Privacy**

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

## **27. 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](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/>.

### 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://www.dso.ufl.edu/documents/UF\\_Complaints\\_policy.pdf](https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf).

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



**UNIVERSITY OF FLORIDA**  
**Student Honor Code (Abridged)**

Preamble: In adopting this Honor Code, the students of the University of Florida recognize that academic honesty and integrity are fundamental values of the University community. Students who enroll at the University commit to holding themselves and their peers to the high standard of honor required by the Honor Code. Any individual who becomes aware of a violation of the Honor Code is bound by honor to take corrective action. Student and faculty support are crucial to the success of the Honor Code. The quality of a University of Florida education is dependent upon the community acceptance and enforcement of the Honor Code.

The Honor Pledge: We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty 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."***

**Violations of the Student Honor Code include (in part):**

(a) **Plagiarism**, in the form of quoting oral or written materials including but not limited to those found on the internet, whether published or unpublished, without proper attribution; or submitting a document or assignment which in whole or in part is identical or substantially identical to a document or assignment not authored by the student.

(b) **Unauthorized use of Materials or Resources ("Cheating")**. A student shall not use unauthorized materials or resources in an academic activity. Unauthorized materials or resources shall include:

1. Any paper or project authored by the student and presented by the student for the satisfaction of any academic requirement if the student previously submitted substantially the same paper or project to satisfy an academic requirement.
2. Any materials or resources prepared by another student and used without the other student's express consent or without proper attribution to the other student.
3. Any materials or resources that the faculty member has prohibited.
4. Use of a cheat sheet when not authorized to do so or use of any other resources or materials during an examination, quiz, or other academic activity without the express permission.

(c) **Prohibited Collaboration or Consultation**. A student shall not collaborate or consult with another person on any academic activity unless the student has the express authorization.

1. Prohibited collaboration or consultation shall include but is not limited to:
  - Collaborating when not authorized to do so on an examination, take-home test, writing project, assignment, or course work.
  - Collaborating or consulting in any other academic or co-curricular activity after receiving notice that such conduct is prohibited.
  - Looking at another student's examination or quiz during the time an examination or quiz is given. Communication by any means during that time, including but not limited to communication through text messaging, telephone, e-mail, other writing or verbally, is prohibited unless expressly authorized.
2. It is the responsibility of the student to seek clarification on whether or not use of materials or collaboration or consultation with another person is authorized prior to engaging in any act of such use, collaboration or consultation.