

Electronic Materials Lab

EMA 4414L Section 4411, 4412, 4413, 4414

Class Periods: Monday: lecture period 3, 9:35am-10:25am on-line

Monday: lab periods 6-7, 12:50pm-2:45pm; 8-9, 3:00pm-4:55pm

Wednesday: lab periods 6-7, 12:50pm-2:45pm; 8-9, 3:00pm-4:55pm

Location: Meet in the NRF (building 0070) 1st floor lobby

Academic Term: Spring 2021

Instructor:

Brent P. Gila

bgila@ufl.edu

352-273-2245

Office Hours: TBD

Teaching Assistant/Peer Mentor/Supervised Teaching Student:

Please contact through the Canvas website

- Ramesh Jayaraman
riayaraman2@ufl.edu

Course Description

(1cr) Hands-on experience for those specializing in electronic materials. Laboratory topics include characterization of optical and electronic properties of semiconductor materials, electronic devices characterization and semiconductor processing.

Course Pre-Requisites / Co-Requisites

EMA 4614

Course Objectives

- a. This course addresses the following MSE Program outcomes (note: Numbers refer to the list of MSE Program outcomes):
1. Learn lab safety rules and 5S principles to operate in the laboratory.
 2. Apply knowledge of mathematics, science and engineering principles to materials science and engineering.
 3. Design and conduct materials science and engineering experiments and analyze and interpret the data.
 4. Design a materials science and engineering system, component or process to meet desired needs within realistic economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability constraints.
 5. Communicate technical data and design information effectively in speech and in writing to other materials engineers.
- b. This course does not assess ABET criteria

Materials and Supply Fees

Fees will be listed on Canvas for the course

Professional Component (ABET):

This course does not assess ABET criteria

Relation to Program Outcomes (ABET):

This course does not assess ABET criteria

Outcome	Coverage*
1.	

*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

- No required textbook. All exams and projects will be based on material presented in class as well as handouts.
- A composition book is required for every student to take notes, document pre-lab and post-lab reports.

Recommended Materials

- Introduction to Microelectronic Fabrication: Volume 5 of Modular Series on Solid State Devices; Jaeger. ISBN: 9780201146950 (or other equivalent text)

Course Schedule

Week 1:	Jan 11	Introduction and safety
Week 2:	Jan 18	MLK holiday - no lab
Week 3:	Jan 25	Device Design & Process Flow
Week 4:	Feb 1	Doping and Ion Implantation
Week 5:	Feb 8	Oxidation and Dielectrics
Week 6:	Feb 15	Photolithography 1
Week 7:	Feb 22	Photolithography 2
Week 8:	Mar 1	Etching
Week 9:	Mar 8	Photolithography 3
Week 10:	Mar 15	Metal Deposition – Thermal
Week 11:	Mar 22	Spring recharge – no lab
Week 12:	Mar 29	Metal Deposition – Sputter
Week 13:	Apr 5	Cleanroom Tour
Week 14:	Apr 12	Electrical characterization of materials
Week 15:	Apr 19	Device testing
Week 16:	Apr 26	Finals week

F2F Course Policy in Response to COVID-19

We will have face-to-face instructional sessions to accomplish the student learning objectives of this course. In response to COVID-19, the following policies and requirements are in place to maintain your learning environment and to enhance the safety of our in-classroom interactions.

- You are required to wear approved face coverings at all times during class and within buildings. Following and enforcing these policies and requirements are all of our responsibility. Failure to do so will lead to a report to the Office of Student Conduct and Conflict Resolution.
- This course has been assigned a physical classroom with enough capacity to maintain physical distancing (6 feet between individuals) requirements. Please utilize designated seats and maintain appropriate spacing between students. Please do not move desks or stations.
- Sanitizing supplies are available in the classroom if you wish to wipe down your desks prior to sitting down and at the end of the class.
- Follow your instructor's guidance on how to enter and exit the classroom. Practice physical distancing to the extent possible when entering and exiting the classroom.
- If you are experiencing COVID-19 symptoms (Click here for guidance from the CDC on symptoms of coronavirus), please use the UF Health screening system and follow the instructions on whether you are able to attend class. Click here for UF Health guidance on what to do if you have been exposed to or are experiencing Covid-19 symptoms.
- Course materials will be provided to you with an excused absence, and you will be given a reasonable amount of time to make up work. Find more information in the university attendance policies.

Attendance Policy, Class Expectations, and Make-Up Policy

Behavior in class

- Safety is first!
- No behavior that can distract the other students in class will be allowed.
- Destructive behavior will result in your dismissal from the class.

Attendance

- Attendance is required and recorded, significant amount of participative as well as individual and collaborative work will be performed during the class sessions and labs are very difficult to make up in this course.
- Students are expected to comply with all laboratory guidelines, protocols, and procedures.
- Students who do not comply with these requirements or who behave disorderly or disrespectfully WILL be asked to leave.
- Leaving your cell phone on, leaving early or arriving late can be VERY distracting, you should avoid it.
- All electronic devices (laptops, cell-phones, etc.) should be turned off or in silent mode.
- Phones may not be touched while wearing gloves, students must leave the room and remove gloves before touching phones.

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.

Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Lab reports	100 each	40%
Lab notebook	100	10%
Participation	100	50%
		100%

Grading Policy

Percent	Grade	Grade Points
90.0 - 100	A	4.00
88.0 - 89.9	A-	3.67
84.0 - 87.9	B+	3.33
81.0 - 83.9	B	3.00
78.0 - 80.9	B-	2.67
75.0 - 77.9	C+	2.33
72.0 - 74.9	C	2.00
69.0 - 71.9	C-	1.67
66.0 - 68.9	D+	1.33
63.0 - 65.9	D	1.00
60.0 - 62.9	D-	0.67
0 - 59.9	E	0.00

More information on UF grading policy may be found at:
<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

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.

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

University Honesty Policy

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (<https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor 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, 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:

Health and Wellness

U Matter, We Care:

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

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

Sexual Discrimination, Harassment, Assault, or Violence

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

Sexual Assault Recovery Services (SARS)

Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

Academic Resources

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

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

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

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring.
<https://teachingcenter.ufl.edu/>.

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

Student Complaints Campus: <https://care.dso.ufl.edu>.

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