

Organic Electronics

EMA 6416 Section 21780

Class Periods: Tuesday 7th period, 1:55-2:45pm;

Thursday 7th-8th periods, 1:55pm-3:50pm

Location: NEB 102

Academic Term: Fall 2018

Instructor:

Jiangeng Xue

jxue@mse.ufl.edu

846-3775

Office Hours: Fridays, 2-3pm, RHN 237, or by appointments

Teaching Assistants: N/A

Course Description

Basics of semiconductors; electronic structures, charge transport properties, and optoelectronic devices based on organic semiconductors. 3 credit hours

Course Pre-Requisites / Co-Requisites

EMA 3413 or equivalents

Course Objectives

- Understand the basic principles of semiconductor physics and semiconductor device physics
- Understand the fundamental material properties of organic electronic materials, particularly the electronic and optical processes in these materials
- Understand the applications of organic electronic materials in various electronic and optoelectronic devices

Materials and Supply Fees

N/A

Required Textbooks and Software

N/A

Recommended Materials

- "Physics of Semiconductor Devices", by S. M. Sze and K. K. Ng, 3rd edition, ISBN 9780471143239
- "Electronic Processes in Organic Crystals and Polymers", by M. Pope and C. E. Swenberg, 2nd edition, ISBN 0195129636
- "Semiconductor Devices: Physics and Technology", by S. M. Sze, 2nd edition, ISBN 9780471333722
- "Principles of Electronic Materials and Devices," by S. O. Kasap, 3rd edition, ISBN 9780072957914
- "Organic Molecular Crystals: Interactions, Localization, and Transport Phenomena", by E. A. Silinsh and V. Capek, ISBN 1563960699

Course Schedule

Table below is a list of topics to be covered in the lectures along with the corresponding reading assignment in the textbooks. This list is subject to change.

Part	Week	LECTURE TOPICS
I. Semiconductor Physics and Devices	1	Introduction/Basics of Semiconductors
	2	p-n junctions
	3	Heterojunctions
	4	Semiconductor devices I
	5	Semiconductor devices II

II. Fundamental Properties of Organic Semiconductors	6	Electronic states in organic semiconductors
	7	Charge transport, generation, recombination
	8	Interfaces
	9	Organic thin film growth
III. Applications of Organic Semiconductors	10	OLEDs I
	11	OLEDs II
	12	Organic PV I
	13	Organic PV II
	14	Organic thin-film transistors
	15	Other organic devices

Attendance Policy, Class Expectations, and Make-Up Policy

Sections of this course are offered on UF EDGE. The lecture videos are available on the UF e-Learning (Canvas) website for all students (not just those who registered for the EDGE section) to review at any time. However, attendance is strongly encouraged for all non-EDGE students to enhance classroom learning and interaction. Electronic devices are allowed in classroom as long as they do not cause a distraction to other students. Cellular phones should be turned off or put to silent.

Excused absences are consistent with university policies in the undergraduate catalog (<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#attendance>) and require appropriate documentation. Except for emergencies, make-up exams are only allowed if requested at least one week before the regular exam time AND approved by the instructor. Make-up exams will differ from regularly-scheduled exams.

Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Exam (covering Part I)	100	30%
Student Presentation	100	30%
Homework	40	10%
Research Proposal	100	30%
		100%

There will be an in-class exam after the conclusion of Part I (Semiconductor Physics and Devices). Students will perform a critical review of a recent journal article on organic materials and/or devices, and give presentations (~15 minutes) during class. As homework assignments, students need to provide written peer evaluations of other students' presentations. In lieu of a final exam, students need to complete a written original research proposal at the end of the semester. Detailed instructions on the presentation, peer evaluation, and proposal will be given separately.

Grading Policy

The final letter grade will be assigned based on student's overall performance in the course. The following scale will be used as a guideline:

Percent	Grade	Grade Points
90.0 – 100.0	A	4.00
86.0 – 89.9	A-	3.67
82.0 – 85.9	B+	3.33
79.0 – 81.9	B	3.00
76.0 – 78.9	B-	2.67
73.0 – 75.9	C+	2.33
70.0 – 72.9	C	2.00
67.0 – 69.9	C-	1.67
64.0 – 66.9	D+	1.33
61.0 – 63.9	D	1.00

60.0 – 60.9	D-	0.67
0 – 59.9	E	0.00

In order to graduate, graduate students must have an overall GPA and a major GPA of 3.00 or better (B or better). Note: a B- average is equivalent to a GPA of 2.67, and therefore, it does not satisfy this graduation requirement. More information on UF grading policy may be found at:

<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#grades>

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 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/>.

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.

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: <http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html>

Campus Resources:

Health and Wellness

U Matter, We Care:

If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575 so that a team member can reach out to the student.

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 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://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.

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