Solid-State Electronic Devices
EEE 3396C
Sections: 2B26 and 2B27

Class Periods and Location:
Lecture: M,W,F | Period 6  (12:50 PM - 1:40 PM)   Room: LAR 330
Section 2B26 Lab: M | Period E2  - E3 (8:20 PM - 10:10 PM) Room: NEB 289
Section 2B27 Lab: T | Period 9  - 10 (4:05 PM - 6:00 PM) Room: NEB 289

Academic Term: Fall 2019

Instructor:
Prof. Ant Ural
antural@ece.ufl.edu
392-9753
Office Hours: NEB 555, TBA

Teaching Assistant/Peer Mentor/Supervised Teaching Student:
Please contact through the Canvas website
  • Colleen Weller, colleenweller@ufl.edu, NEB 289, office hours: TBA

Course Description
Introduces the principles of semiconductor electron device operation. Laboratory.
4 Credits
Grading Scheme: Letter Grade

Course Pre-Requisites / Co-Requisites
EEL 3008

Course Objectives
To present the theoretical and practical background of device physics so that students understand and are able to
design and optimize the charge transport properties of semiconductor materials and devices.

Materials and Supply Fees
The Analog Discovery (DAD) board or National Instruments Analog Discovery (NAD) board is REQUIRED for this
course (and many other ECE courses). Board ordering information for the DAD can be found at:
Board ordering info about the NAD can be found at
away, the bookstore will be carrying the NAD at a slightly elevated price.

Add’l Course Fees: $2.75

Professional Component (ABET):
4 credits of Engineering Science
Relation to Program Outcomes (ABET):

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics.</td>
<td>High</td>
</tr>
<tr>
<td>2. An ability to apply both analysis and synthesis in the engineering design process, resulting in designs that meet desired needs.</td>
<td>High</td>
</tr>
<tr>
<td>3. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.</td>
<td>High</td>
</tr>
<tr>
<td>4. An ability to communicate effectively with a range of audiences</td>
<td>Low</td>
</tr>
<tr>
<td>5. 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.</td>
<td>Low</td>
</tr>
<tr>
<td>6. An ability to recognize the ongoing need for additional knowledge and locate, evaluate, integrate, and apply this knowledge appropriately.</td>
<td>High</td>
</tr>
<tr>
<td>7. An ability to function effectively on teams that establish goals, plan tasks, meet deadlines, and analyze risk and uncertainty</td>
<td>Low</td>
</tr>
</tbody>
</table>

Required Textbooks and Software
- Solid State Electronic Devices, 7th edition
  Ben Streetman and Sanjay Banerjee
  Publisher: Pearson
  ISBN: 0133356035

Course Schedule

Weeks 1-2: Chapter 1: INTRODUCTION TO SEMICONDUCTOR MATERIALS
Week 3: Chapter 2: ATOMIC STRUCTURE AND THE PERIODIC TABLE
Weeks 4-5: Chapter 3: ENERGY BANDS AND CHARGE CARRIERS IN SEMICONDUCTORS
Weeks 6-7: Chapter 4: EXCESS CARRIERS IN SEMICONDUCTORS (THE CONTINUITY EQUATION)
Weeks 8-9-10: Chapter 5: p-n JUNCTIONS
Weeks 11-12-13: Chapter 6: METAL-OXIDE-SEMICONDUCTOR FIELD EFFECT TRANSISTOR (MOSFET)
Weeks 14-15: Chapter 7: BIPOLAR JUNCTION TRANSISTOR (BJT)
Attendance Policy, Class Expectations, and Make-Up Policy
Lecture attendance is recommended. Lab attendance is required. 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

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Total Points</th>
<th>Percentage of Final Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework Sets</td>
<td>10 each</td>
<td>15%</td>
</tr>
<tr>
<td>Labs</td>
<td>100 each</td>
<td>20%</td>
</tr>
<tr>
<td>Midterm Exam</td>
<td>100</td>
<td>30%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>100</td>
<td>35%</td>
</tr>
</tbody>
</table>

Grading Policy

<table>
<thead>
<tr>
<th>Percent</th>
<th>Grade</th>
<th>Grade Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>93.4 - 100</td>
<td>A</td>
<td>4.00</td>
</tr>
<tr>
<td>90.0 - 93.3</td>
<td>A-</td>
<td>3.67</td>
</tr>
<tr>
<td>86.7 - 89.9</td>
<td>B+</td>
<td>3.33</td>
</tr>
<tr>
<td>83.4 - 86.6</td>
<td>B</td>
<td>3.00</td>
</tr>
<tr>
<td>80.0 - 83.3</td>
<td>B-</td>
<td>2.67</td>
</tr>
<tr>
<td>76.7 - 79.9</td>
<td>C+</td>
<td>2.33</td>
</tr>
<tr>
<td>73.4 - 76.6</td>
<td>C</td>
<td>2.00</td>
</tr>
<tr>
<td>70.0 - 73.3</td>
<td>C-</td>
<td>1.67</td>
</tr>
<tr>
<td>66.7 - 69.9</td>
<td>D+</td>
<td>1.33</td>
</tr>
<tr>
<td>63.4 - 66.6</td>
<td>D</td>
<td>1.00</td>
</tr>
<tr>
<td>60.0 - 63.3</td>
<td>D-</td>
<td>0.67</td>
</tr>
<tr>
<td>0 - 59.9</td>
<td>E</td>
<td>0.00</td>
</tr>
</tbody>
</table>

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://uflbluera.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**, 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/](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](https://lss.at.ufl.edu/help.shtml).

**Career Resource Center**, Reitz Union, 392-1601. Career assistance and counseling. [https://www.crc.ufl.edu/](https://www.crc.ufl.edu/).

**Library Support**, [http://cms.uflib.ufl.edu/ask](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/](https://teachingcenter.ufl.edu/).

**Writing Studio, 302 Tigert Hall**, 846-1138. Help brainstorming, formatting, and writing papers. [https://writing.ufl.edu/writing-studio/](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)