Standardized Syllabus for the College of Engineering

EMA4614 Production of Electronic Materials

1. Catalog Description (3) – Production of materials for use in solid state electronic devices; nucleation and growth kinetics, solidification of single phase alloys, segregation, dynamics of crystal growth, selection of materials and growth techniques, characterization.
2. Pre-requisites and Co-requisites: Prereq: EMA3413 and EMA4314
3. Course Objectives - To provide the student with an up-to-date picture of how modern semiconductor chips are fabricated; comparison of Si versus compound semiconductors; processing modules such as diffusion, ion implantation, wet and dry etching and metal deposition; materials selection requirements; yield and reliability requirements; basics of component devices such as MOSFETs, bipolar transistors, LEDs and laser diodes.
4. Contribution of course to meeting the professional component.

Professional Component	**# of credits**
Math and science.	
Engineering.	3
General education.	
Other.	
Does it contain design (Y or N)?	

5. Relationship of course to program outcomes

Outcome	**Assessed?**	**Assessment Method**
a: Apply knowledge of math, science, and engineering.	Y	Homework and exam problems in which the student must describe appropriate applications of the various processing techniques
b1: Conduct experiments, analyze and interpret data.		
b2: Conduct statistical analysis.		
c: Solve materials selection and design problems.		
d: Function on teams.		
e: Identify, formulate, and solve engineering problems.		
f: Understand professional and ethical responsibility.		
g: Communicate effectively.		
h1: Understand economic impact.		
h2: Understand global, societal, and environmental impact.		
i: Engage in lifelong learning.		

j: Knowledge of contemporary issues.		
k: Use techniques, skills, and tools of MSE.		

6. Instructor – Dr. Stephen J. Pearton
    a. Office location – 343 Nuclear Science Building
    b. Telephone – (352) 846-1086
    c. E-mail address – spear@mse.ufl.edu
    d. Class Web site – http://pearton.mse.ufl.edu
    e. Office hours – Wednesdays, 9-10 am

7. Teaching Assistant - None

8. Meeting Times – Mondays, Wednesdays and Fridays, 4th period
9. Class/laboratory schedule – Class meets three periods weekly for 50 minutes
10. Meeting Location – Computer Science and Engineering (CSE) E118
11. Material and Supply Fees - $24.00
12. Textbooks and Software Required
    a. Title – Fabrication Engineering at the Micro and Nanoscale (The Oxford Series in Electrical and Computer Engineering)
    b. Author – Stephen A. Campbell
    c. Publication date and edition – 2007, 3rd Edition
    d. ISBN number - 978-0195320176
    e. There is a Sakai System page for the course containing additional relevant material, including lecture notes, solution sets from the text book and semiconductor videos https://lss.at.ufl.edu/

13. Recommended Reading (see 12 above)
14. Course Outline

Lecture	Day/Date	Topic	Assigned Problems
1	Wednesday, 8/22	General Introduction	
2	Friday, 8/24	Properties of Semiconductors	
3	Monday, 8/27	Video(Microchip)	
4	Wednesday, 8/29	Properties of Semiconductors	1-3
5	Friday, 8/31	Bulk Growth	
-	Monday, 9/03	Labor Day-no class	
6	Wednesday, 9/05	Epitaxial Growth	
7	Friday, 9/07	Epitaxial Growth	
8	Monday,9/10	Growth and characterization	
9	Wednesday, 9/12	Video (GaAs/MBE)	
10	Friday, 9/14	Characterization	
11	Monday, 9/17	Lithography /(Video Lithography)	
12	Wednesday, 9/19	Lithography	

13	Friday, 9/21	Wet Etching	
14	Monday, 9/24	Dry Etching	
15	Wednesday, 9/26	Video (Si Run I)	
16	Friday, 9/28	Quiz #1	****
17	Monday, 10/01	Dry Etching (Video Etch)	
18	Wednesday, 10/03	Deposition(Video Deposition)	
19	Friday, 10/05	Video (Si Run II)	4-6
20	Monday, 10/08	Implantation	To be distributed
21	Wednesday, 10/10	Implantation(Video Implantation)	
22	Friday, 10/12	Quiz #2	****
23	Monday, 10/15	Diffusion	
24	Wednesday, 10/17	Diffusion	
25	Friday, 10/19	Video (Overview of Semiconductor Manuf))	
26	Monday, 10/22	Annealing	
27	Wednesday 10/24	Video -Front end IC manufacture	
28	Friday, 10/26	First Exam	****
29	Monday, 10/29	Contacts	
30	Wednesday,10/31	Contacts	
31	Friday, 11/02	Process Integration/MOSFET	
32	Monday, 11/05	Video (Gate Dielectrics)	
33	Wednesday, 11/07	Video (Testing)	
-	Friday, 11/09	Homecoming (no class)	
-	Monday, 11/12	Veteran's Day (no class)	
34	Wednesday, 11/14	MESFETs/HEMTs	
35	Friday, 11/16	HBTs	
36	Monday, 11/19	LEDs	
-	Wednesday, 11/21	Thanksgiving (no class)	
-	Friday, 11/23	Thanksgiving (no class)	
37	Monday, 11/26	Video (300mm challenges)	
38	Wednesday, 11/28	Video (Interconnects)	
39	Friday, 11/30	Detectors	
40	Monday, 12/03	Review of class	
41	Wednesday, 12/05	Second Exam (optional date)***	****

*** to be decided by consultation with students. Individuals may schedule taking the exam at other times.

15. Attendance and Expectations - Attendance at the lectures is not required, but experience has shown it is more beneficial to the student's understanding of the course materials. If you attend the lectures, be prompt in your arrival as a courtesy to the other students. Cell phones must be turned off during lectures.
16. Grading – Quizzes (2) 30%, First Exam 30%, Second Exam 40%
17. Grading Scale

90-100%	A	85-89%	B^+
80-84%	B	75-79%	C^+
65-74%	C	61-64%	D^+
56-60%	D	0-55%	F

Grades are absolute and are not curved

This statement must be included in every grade scale for undergraduate level 1000-5000 syllabi:
"A C- will not be a qualifying grade for critical tracking courses. In order to graduate, students must have an overall GPA and an upper-division GPA of 2.0 or better (C or better). Note: a C- average is equivalent to a GPA of 1.67, and therefore, it does not satisfy this graduation requirement. For more information on grades and grading policies, please visit: https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

18. Make-up Exam Policy - Reasonable excuses will be entertained for absences from exams or quizzes and the student will be expected to take the exam as soon as possible after it was originally scheduled.
19. Honesty Policy – All students admitted to the University of Florida have signed a statement of academic honesty committing themselves to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action. This statement is a reminder to uphold your obligation as a UF student and to be honest in all work submitted and exams taken in this course and all others.
20. Accommodation for Students with Disabilities – Students Requesting classroom accommodation must first register with the Dean of Students Office. That office will provide the student with documentation that he/she must provide to the course instructor when requesting accommodation.
21. UF Counseling Services –Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include:
    - UF Counseling & Wellness Center, 3190 Radio Rd, 392-1575, psychological and psychiatric services.
    - Career Resource Center, Reitz Union, 392-1601, career and job search services.
22. Software Use – All faculty, staff and student 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.

Note: Statements in items 19-21, should be included as is.