Special Topics-Micro Electronical & Mechanical Manufacturing (ENGR 4390)
School of Engineering and Computing Science
Fall 2016

A. COURSE INFORMATION

Course number/section: ENGR 4390-004
Class meeting time: T/R 05:30-06:45 PM
Class location: OCNR 259
Course Website: Please refer to blackboard system

B. INSTRUCTOR INFORMATION

Instructor: Iltai (Isaac) Kim
Office location: EN 318
Office hours: M 10 AM -12 PM, T 11 AM-12PM, W 9-11 AM
Telephone: 361-825-2734
e-mail: ikim@tamucc.edu
Appointments: Email or drop-in

C. COURSE DESCRIPTION

Catalog Course Description
Basic principles and techniques in microelectronics manufacturing (semiconductor manufacturing and micro-electrical mechanical systems (MEMS)). Emphasis will on process descriptions, terminology, equipment requirements, and process controls. Basic microfabrication including semiconductor and MEMS physics and process chemistry will be combined with control schemes to arrive at overall systems descriptions.

D. PREREQUISITES AND COREQUISITES

Prerequisites

E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES

Required Textbook(s)

Optional Textbook(s) or Other References
TBA

F. STUDENT LEARNING OUTCOMES AND ASSESSMENT

Assessment is a process used by instructors to help improve learning. Assessment is
essential for effective learning because it provides feedback to both students and instructors. A critical step in this process is making clear the course’s student learning outcomes that describe what students are expected to learn to be successful in the course. The student learning outcomes for this course are listed below. By collecting data and sharing it with students on how well they are accomplishing these learning outcomes students can more efficiently and effectively focus their learning efforts. This information can also help instructors identify challenging areas for students and adjust their teaching approach to facilitate learning.

By the end of this course, students should be able to:

1. To provide student with a general understanding of materials, chemicals in semiconductor manufacturing.
2. To provide students with principles and background in device physical.
3. To provide students with understanding of various semiconductor manufacturing processes.
4. To provide students with understanding of test procedure and reliability issues in microchip fabrication

G. INSTRUCTIONAL METHODS AND ACTIVITIES

Communications: All outside-of-class communications will be conducted through the message and e-mail functions of the Blackboard site for the class. Announcements will be posted to Blackboard and e-mailed to your Islander account. Homework assignments, solutions, handouts, and other course materials will be posted to Blackboard. Grades will not be posted to Blackboard. For any e-mails from students to instructor, please enter ENGR 4390 in the email’s subject field. Each student should make sure his or her preferred e-mail address is the one in the Blackboard system, and each student should check e-mail and the Blackboard message site regularly.

H. MAJOR COURSE REQUIREMENTS AND GRADING

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
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<tbody>
<tr>
<td>Midterm Exam</td>
<td>30 %</td>
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<tr>
<td>Final Exam</td>
<td>30 %</td>
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<tr>
<td>Quizzes</td>
<td>20 %</td>
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<tr>
<td>Homework</td>
<td>20 %</td>
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<tr>
<td>Other activities ... (attendance record, bonus HWs, term project)</td>
<td>Extra %</td>
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*Grades will be assigned on a 10-point scale: 90-100=A, 80-89=B, 70-79=C, 60-69=D, below 60=F.

*Homework & Quizzes: Suggested homework problems will be assigned in class or through the
blackboard. Basically a 15-minute quiz will be given once per a couple of weeks. The lowest one quiz scores may be dropped; no make-up quizzes will be given. These will be mostly based on the homework and class-solved problems assigned for that or previous week.

I. **COURSE CONTENT/SCHEDULE**

   Lecture Notes: Downloadable from blackboard http://bb9.tamucc.edu or provided through email or class
   - Drop Day: Last day to drop a class is Friday, Nov. 11, 2016.

Note: Changes in this course schedule may be necessary and will be announced to the class by the Instructor. The assignments and exams shown are directly related to the Student Learning Outcomes described in Section F.
<table>
<thead>
<tr>
<th>Class</th>
<th>Date</th>
<th>Textbook Sections</th>
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<tbody>
<tr>
<td>1</td>
<td>Aug. 25 (R)</td>
<td>Course and Industry Overview: Chapter 1</td>
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<tr>
<td>2</td>
<td>Aug. 30 (T)</td>
<td>Semiconductor Materials: Chapter 2</td>
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<td>3</td>
<td>Sep. 1 (R)</td>
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<tr>
<td>4</td>
<td>Sep. 6 (T)</td>
<td>Device Technology: Chapter 3</td>
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<td>5</td>
<td>Sep. 8 (R)</td>
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<td>6</td>
<td>Sep. 13 (T)</td>
<td>Silicon Wafer Prep: Chapter 4</td>
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<td>7</td>
<td>Sep. 15 (R)</td>
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<tr>
<td>8</td>
<td>Sep. 20 (T)</td>
<td>Process Chemicals: Chapter 5, 6</td>
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<td>9</td>
<td>Sep. 22 (R)</td>
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<tr>
<td>10</td>
<td>Sep. 27 (T)</td>
<td>Midterm Exam 1</td>
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<td>11</td>
<td>Sep. 29 (R)</td>
<td>Oxidation Processes: Chapter 10</td>
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<td>12</td>
<td>Oct. 4 (T)</td>
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<td>13</td>
<td>Oct. 6 (R)</td>
<td>Film Deposition: Chapter 11</td>
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<td>14</td>
<td>Oct. 11 (T)</td>
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<td>15</td>
<td>Oct. 13 (R)</td>
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<td>16</td>
<td>Oct. 18 (T)</td>
<td>Metallization: Chapter 12</td>
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<td>17</td>
<td>Oct. 20 (R)</td>
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<td>18</td>
<td>Oct. 25 (T)</td>
<td>Photolithography: Chapter 13</td>
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<td>19</td>
<td>Oct. 27 (R)</td>
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<td>20</td>
<td>Nov. 1 (T)</td>
<td>Photolithography: Chapter 14</td>
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<td>21</td>
<td>Nov. 3 (R)</td>
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<td>22</td>
<td>Nov. 8 (T)</td>
<td>Etching: Chapter 16</td>
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<td>23</td>
<td>Nov. 10 (R)</td>
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<td>24</td>
<td>Nov. 15 (T)</td>
<td>Diffusion: Chapter 17</td>
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<td>25</td>
<td>Nov. 17 (R)</td>
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<td>26</td>
<td>Nov. 22 (T)</td>
<td>CMP: Chapter 18</td>
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<td>27</td>
<td>Nov. 24 (R)</td>
<td>Thanksgiving holiday</td>
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<td>28</td>
<td>Nov. 29 (T)</td>
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<td>29</td>
<td>Dec. 1 (R)</td>
<td>Circuit test: Chapter 19</td>
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J. COURSE POLICIES

Attendance/Tardiness
Students need to attend all classes.

Late Work and Make-up Exams
Make-up work and exams will be given only when you have an acceptable and verifiable excuse and notify the instructor in advance if all possible.

Extra Credit
Extra credit can be given by the instructor considering the progress of class and exams.

Cell Phone Use
Not allowed unless notified otherwise

Laptop Use
Student can use laptop during the classes, but mostly not during the exams.

Food in Class
Generally food is not allowed because it will affect the other students.

Missed Exam
It will be treated as in the case of make-up exams

Participation
Students are strongly recommended to participate all classes activity.

K. COLLEGE AND UNIVERSITY POLICIES

- Academic Integrity (University)
  University students are expected to conduct themselves in accordance with the highest standards of academic honesty. Academic misconduct for which a student is subject to penalty includes all forms of cheating, such as illicit possession of examinations or examination materials, falsification, forgery, complicity or plagiarism. (Plagiarism is the presentation of the work of another as one’s own work.) In this class, academic misconduct or complicity in an act of academic misconduct on an assignment or test will result in a failing grade.

- Classroom/Professional Behavior
  Texas A&M University-Corpus Christi, as an academic community, requires that each individual respect the needs of others to study and learn in a peaceful atmosphere. Under
Article III of the Student Code of Conduct, classroom behavior that interferes with either (a) the instructor’s ability to conduct the class or (b) the ability of other students to profit from the instructional program may be considered a breach of the peace and is subject to disciplinary sanction outlined in article VII of the Student Code of Conduct. Students engaging in unacceptable behavior may be instructed to leave the classroom. This prohibition applies to all instructional forums, including classrooms, electronic classrooms, labs, discussion groups, field trips, etc.

- Statement of Civility
  Texas A&M University-Corpus Christi has a diverse student population that represents the population of the state. Our goal is to provide you with a high quality educational experience that is free from repression. You are responsible for following the rules of the University, city, state and federal government. We expect that you will behave in a manner that is dignified, respectful and courteous to all people, regardless of sex, ethnic/racial origin, religious background, sexual orientation or disability. Behaviors that infringe on the rights of another individual will not be tolerated.

- Deadline for Dropping a Course with a Grade of W (University)
  The grade of W will be assigned to any student officially dropping a course. Please consult with the instructor before you decide to drop to be sure it is the best thing to do. Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class. Should dropping the course be the best course of action, visit the Office of the University Registrar for the Course Drop Form that must submitted. No student is eligible to receive a W without completing the official drop process by this deadline. Please consult the Academic Calendar (http://www.tamucc.edu/academics/calendar/) for the last day to drop a course.

- Grade Appeals (College of Science and Engineering)
  As stated in University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures, a student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading, may appeal the final grade given in the course. The burden of proof is upon the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is encouraged to first discuss the matter with the instructor. For complete details, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, see University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules website at http://www.tamucc.edu/provost/university_rules/index.html, and the College of Science and Engineering Grade Appeals webpage at http://sci.tamucc.edu/students/GradeAppeal.html. For assistance and/or guidance in the grade appeal process, students may contact the chair or director of the appropriate department or school, the Office of the College of Science and Engineering Dean, or the Office of the Provost.
Disability Services
The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please call (361) 825-5816 or visit Disability Services in Corpus Christi Hall 116.

If you are a returning veteran and are experiencing cognitive and/or physical access issues in the classroom or on campus, please contact the Disability Services office for assistance at (361) 825-5816.

http://disabilityservices.tamucc.edu/

Statement of Academic Continuity
In the event of an unforeseen adverse event, such as a major hurricane and classes could not be held on the campus of Texas A&M University–Corpus Christi; this course would continue through the use of Blackboard and/or email. In addition, the syllabus and class activities may be modified to allow continuation of the course. Ideally, University facilities (i.e., emails, web sites, and Blackboard) will be operational within two days of the closing of the physical campus. However, students need to make certain that the course instructor has a primary and a secondary means of contacting each student.

L. OTHER INFORMATION

Academic Advising
The College of Science & Engineering requires that students meet with an Academic Advisor as soon as they are ready to declare a major. The Academic Advisor will set up a degree plan, which must be signed by the student, a faculty mentor, and the department chair. Meetings are by appointment only; advisors do not take walk-ins. Please call or stop by the Advising Center to check availability and schedule an appointment. The College’s Academic Advising Center is located in Center for Instruction 350 or can be reached at (361) 825-3928.

Copyright Statement:

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The handouts used in this course are copyrighted. By “handouts,” I mean all materials generated for this class, which include but are not limited to lecture note materials, syllabi, quizzes, exams, lab problems, in-class materials, review sheets, and additional problem sets. Because these materials are copyrighted, you do not have the right to copy the handouts, unless I expressly grant permission. As commonly defined, plagiarism consists of passing off as one’s own the idea, words, writings, etc., which belong to another. In accordance with this definition, you are
committing plagiarism if you copy the work of another person and turn it in as your own, even if you should have the permission of that person. Plagiarism is one of the worst academic sins, for the plagiarist destroys the trust among colleagues without which research cannot be safely communicated.

GENERAL DISCLAIMER
I reserve the right to modify the information, schedule, assignments, deadlines, and course policies in this syllabus if and when necessary. I will announce such changes in a timely manner during regularly scheduled lecture periods.