16. Other Items

New Course

**AGSC 380. Workshop in Agricultural Science.** *(4-0). Credit 1 to 4.* The study, understanding and solution of human-agricultural problems based on theory learned in the classroom, library, laboratory and fieldwork completed by individuals and teams. Prerequisite: Junior or senior classification.

Change in Course

**ENTC 381. Electronics Manufacturing.**

- **Course number**
  - From: ENTC 381.
  - To: ENTC 414

- **Course title**
  - From: Electronics Manufacturing.
  - To: Micro/Nano Manufacturing.

- **Course description**
  - From: The electronics manufacturing technologies and processes; surface-mount devices and technologies. Prerequisites: CHEM 107; PHYS 208; admitted to major degree sequence (upper-level) in engineering technology.
  - To: Product miniaturization and impact; review of atomic structure, electrical and physical properties of materials; ultra-precision machining; microlithography; dry and wet etching/sputtering techniques; isotropic and anisotropic processes; pattern transfer with additive processes; surface micromachining; microreplication processes; introduction to packaging technology and nanometrology; manufacturing of selected microsystems (MEMS) and their applications. Prerequisites: CHEM 107; PHYS 208; senior or graduate in engineering or science; admitted to major degree sequence (upper-level) in engineering technology for ENTC majors.

- **Lab hours**
  - From: (2-2). Credit 3.
  - To: (2-3). Credit 3.
Texas A&M University
Departmental Request for a New Course
Undergraduate • Graduate • Professional

Submit original form and 25 copies. Attach a course syllabus to each.*

1. This request is submitted by the Department of Agricultural Leadership, Education, and Communication

2. Course prefix, number and complete title AGSC 380, Workshop in Agricultural Science

3. Course description (not more than 50 words) The study, understanding and solution of human-agricultural problems based on theory learned in the classroom, library, laboratory and fieldwork completed by individuals and teams.

4. Prerequisite(s) Junior or senior classification

5. Is this a variable credit course? ☐ Yes ☐ No

6. Is this a repeatable course? ☐ Yes ☐ No

7. Has this course been taught as a 489/689? ☐ Yes ☐ No

8. This course will be:
   a. required for students enrolled in the following degree program(s) (e.g., B.A. in history)

   b. an elective for students enrolled in the following degree program(s) (e.g., M.S., Ph.D. in geography)

   B.S. in Agricultural Science

9. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. Attach approval letters.

10. Prefix | Course # | Title (exclude punctuation)

    AGSC 380 | WORKSHOP IN AGRICULTURAL SCIENCE

    Lect. | Lab | SCH | Subject Matter Content Code | Admin. Unit | Acad. Year | FICE Code

    04 | 00 | 04 | 121 | 30 | 15 | 07 | 08 | 010366

    Do not complete shaded area.

Approval recommended by:

Christina O. Townsend
Head of Department
6-13-06

Chair, College Review Committee
J. White
07-13-06

Dean of College
J. Johnson
7-14-06

Submitted to Coordinating Board by:

Dean of College

Director of Academic Support Services

* Attach a syllabus according to the guidelines on the Internet site www.tamu.edu/admissions/oaras. To have this form reviewed, please send to Linda F. Lacey, Mail Stop 1265 or fax to 847-8737.
AGSC 380—Workshop in AGSC
Summer 2006
3 hours credit

Instructor: Dr. Julie Harlin
979-862-3014
ej-harlin@tamu.edu

Course Objective: Provide unique opportunities outside the university environment for agricultural science majors to develop skills they will need as agricultural science teachers. This workshop is designed for AGSC majors or those pursuing AGSC Teacher Certification. Students will be actively involved in planning events for and attending the Texas State FFA Convention as well as the Agricultural Science Teacher Professional Improvement Conference. The course provides 3-hours credit and an increased knowledge in teamwork and social skills in FFA program planning and AGSC teacher issues. This course can count as an elective or scientific ag elective. Below are the required dates for the course. Students must be able to attend all dates AND will not be able to take any other courses. To enroll in this course, fill out the attached form and return to room 104 Scoates.

Course Goals:
- Increase awareness of outside of class responsibilities of agricultural science teachers;
- Improve professionalism of new teachers through observation of outstanding teachers;
- Increase awareness of student supervision issues;
- Increase awareness of teacher issues across the state.

Course Dates:

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Location</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 2nd</td>
<td>4pm-5pm</td>
<td>On-Campus Scoates 118</td>
<td>Informational Meeting (pay $38 for shirt/nametag)</td>
</tr>
<tr>
<td>July 5th</td>
<td>2pm-5pm</td>
<td>On-Campus Scoates 118</td>
<td>State FFA Convention and Teachers Planning</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(auction items/pick up shirts/nametags/paired with school)</td>
</tr>
<tr>
<td>July 11th</td>
<td>TBA</td>
<td>Off-Campus</td>
<td>State FFA Convention</td>
</tr>
<tr>
<td>July 12th</td>
<td>All Day</td>
<td>Fort Worth, TX</td>
<td>State AGSC Teacher</td>
</tr>
<tr>
<td>July 13th</td>
<td>All Day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>July 14th</td>
<td>TBA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>July 18th</td>
<td>9am-4pm</td>
<td>On-Campus</td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>Time</td>
<td>Location</td>
<td>Description</td>
</tr>
<tr>
<td>------------</td>
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<td>------------------------</td>
</tr>
<tr>
<td>July 19th</td>
<td>9am-4pm</td>
<td>Scootes 118</td>
<td>Conference Planning</td>
</tr>
<tr>
<td>July 20th</td>
<td>9am-4pm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>July 23rd</td>
<td>TBA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>July 24th</td>
<td>All Day</td>
<td>Off-Campus</td>
<td>State AGSC Teacher</td>
</tr>
<tr>
<td>July 25th</td>
<td>All Day</td>
<td>Amarillo, TX</td>
<td>Conference</td>
</tr>
<tr>
<td>July 26th</td>
<td>All Day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>July 27th</td>
<td>All Day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>July 28th</td>
<td>TBA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aug 7th</td>
<td>5pm</td>
<td></td>
<td>Reflective Journal</td>
</tr>
<tr>
<td>Due</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Course Travel:**
Though this experience will be directed through the Department of Agricultural, Leadership, Education & Communications, students will be responsible for coordinating their own travel, lodging, etc. Students who enroll in this course should be good representatives of the Department, maintaining professional behavior at all times.

**Lodging:** Room reservations have been made at Fairfield Inn-Fossil Creek ($67/night) in Fort Worth and La Quinta-East ($60/night) in Amarillo. Depending on the number of students in a room, you should anticipate hotel expenses between $150-200 for this course.

**Meals:** Students may eat as cheaply or expensively as desired. Many restaurant choices including fast food are available. Since many hotels do have continental breakfast and some of your meals will be complimentary, you should anticipate meal expenses between $100-150 for this course.

**Transportation:** Students are responsible for arranging their own transportation and associated costs. Since many faculty will be attending these events, it may be possible to arrange transportation with a departmental faculty member. In all instances, students should follow safe driving practices including following the speed limit and safety belts.

**Attire:** You will need a couple of pair of khaki pants and two-three changes of professional dress. We will order two shirts and a nametag for you that will cost $38 total.

**Reflective Journal Description and Requirements:**
Though you will experience a variety of activities during AGSC 380 this summer, we have learned that you do not grow from your experiences until you have had a chance to reflect upon them. To facilitate the reflection process, you will be required to turn in a reflective journal at the conclusion of this course. Below are the format and guidelines to follow for your journal.

**Journal Format:** Narrative format utilizing the following headings—

- **Date**
- **Description of Each Activity Attended** (Briefly describe what you did or observed on this date.)
- **Initial Reactions of Each Activity** (What did you think as you participated?)
- **Reflections of the Day** (Looking back now, what do you think you gained from each activity?)
Journal Guidelines:

➢ Record the information above for the following days:
  ▪ Four days of State FFA Convention (Tuesday-Friday)
  ▪ On-campus preparation (one write up for the three days)
  ▪ Five days of State Ag Teachers Conference (Monday-Friday)

➢ Include an additional reflection entitled “Overall Reflections” to reflect on the entire course:
  ▪ What did you initially hope to learn from this course?
  ▪ Did you learn what you expected to learn? Why or why not?
  ▪ What experience did you most value? Why?
  ▪ What would you change about the course in the future?
  ▪ What advice would you give to a student taking this course next summer?

➢ Turn in your reflections typed in MS Word.
➢ Reflective Journal due by 5:00 p.m. the Monday after State Ag Teachers Conference emailed as an attachment to j-harlin@tamu.edu.

Course Grade:

Your grade in this course will be determined by two primary indicators:

➢ 50 points—Attendance and participation in course meetings and activities. Includes arriving on time, maintaining appropriate dress at all times, and behaving in a professional manner.

➢ 50 points—Completion of reflective journal. Late assignments will be penalized 10% off per day late.

Statement on Disabilities: 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 contact the Department of Student Life, Services for Students with Disabilities, in Cain Hall or call 845-1637.

Aggie Honor Code: “An Aggie does not lie, cheat, or steal or tolerate those who do.” Upon accepting admission to Texas A&M University, a student immediately assumes a commitment to uphold the Honor Code, to accept responsibility for learning, and to follow the philosophy and rules of the Honor System. Students will be required to state their commitment on examinations, research papers, and other academic work. Ignorance of the rules does not excuse any member of the TAMU community from the requirements or procedures of the Honor System. For additional information please visit: www.tamu.edu/aggiehonor/

Copyrights: Please note that all handouts and supplements used in this course are copyrighted. This includes all materials generated for this class, including but not limited to syllabi, exams, in-class materials, review sheets, and lecture outlines. Materials may be downloaded or photocopied for personal use only, and may not be given to other individuals.
Texas A&M University  
Departmental Request for a Change in Course Information  
Undergraduate • Graduate • Professional  
• Submit original form and 2 copies •

1. This request is submitted by the Department of Engineering Technology & Industrial Distribution C20

2. Course prefix, number and complete title of course: ENTC 381, Introduction to Micro/nano Manufacturing

3. Change requested: 
   a) Prerequisite(s): From CHEM 107; PHYS 208; admitted to major degree sequence (upper-level) in engineering technology
   b) Withdrawal (reason)
   c) Cross-list with Cross-listed courses require the signatures of both department heads.
   d) Change in course title and description. Enter complete current course title and current course description; complete proposed course title and proposed course description in items 4 and 5.
   e) Change in credit/contact hours. Complete item 6b. Underscore change(s). Attach a course syllabus.

4. Complete current course title and current course description: ENTC 381, Electronics Manufacturing
The electronics manufacturing technologies and processes; surface-mount devices and technologies.

5. Complete proposed course title and proposed course description (not to exceed 50 words): Product miniaturization and impact; review of atomic structure, electrical and physical properties of materials. Ultraprecision machining; micro lithography; dry and wet etching/sputtering techniques; isotropic and anisotropic processes; pattern transfer with additive processes; surface micromachining; microparticle replication processes; introduction to packaging technology and nanometrology; manufacturing of selected microsystems (MEMS) and their applications.

6. a) As currently in course inventory:

<table>
<thead>
<tr>
<th>Prefix</th>
<th>Course #</th>
<th>Title (exclude punctuation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENTC</td>
<td>381</td>
<td>ELECTRONICS MANUFACTURING</td>
</tr>
<tr>
<td>Lect.</td>
<td>Lab</td>
<td>SCH</td>
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<tr>
<td>020203</td>
<td>15061200190932</td>
<td>003632</td>
</tr>
</tbody>
</table>

b) Changed to:

<table>
<thead>
<tr>
<th>Prefix</th>
<th>Course #</th>
<th>Title (exclude punctuation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENTC</td>
<td>414</td>
<td>MICRO/NANO MANUFACTURING</td>
</tr>
<tr>
<td>Lect.</td>
<td>Lab</td>
<td>SCH</td>
</tr>
<tr>
<td>020303</td>
<td>001905267308</td>
<td>003632</td>
</tr>
</tbody>
</table>

Approval recommended by:

Head of Department  
Date  
Chair, College Review Committee  
Date  
Dean of College  
Date  
Dean of College  
Date

Submitted to Coordinating Board by:

Director of Academic Support Services  
Date  
Effective Date  
6 of 10 GG
Texas A&M University  
Department of Engineering Technology & Industrial Distribution

Class: ENTC 414, Introduction to Micro/nano Manufacturing  
Professor: Dr Wayne N.P. Hung. Office: 117D Thompson Hall, Tel: (979) 845-4989  
Email: hung@tamu.edu, website: http://etidweb.tamu.edu/faculty/hung

Schedule: Lecture: Mon, Wed 10:20-11:10 AM  
Lab: R, 8:00-9:50 AM, (Sec. 501)  
F, 8:00-9:50 AM (Sec. 502)

Prerequisites: CHEM 107; PHYS 208; senior or graduate in engineering or science; admitted to major degree sequence (upper-level) in engineering technology for ENTC majors.

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topic</th>
<th>Reading &amp; Homework</th>
<th>Lab</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>Introduction. Project assignment. Advanced metrology.</td>
<td>Ch 1</td>
<td>No lab this week</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Atomic structure &amp; material properties. Wafer fabrication.</td>
<td>Ch 2, Hw 1, Ch 4.</td>
<td>Lab orientation, Project selection</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Pattern generation. Lithography.</td>
<td>Ch 8, Ch 9, Hw 2</td>
<td>Lab projects start</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Lithography (continue), Wet etching.</td>
<td>Ch 11, Hw 3</td>
<td>Optical and electron microscopy</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Wet etching (continue)</td>
<td><strong>Quiz #1</strong></td>
<td>Lithography</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Dry etching, Dry etching (continue)</td>
<td>Ch 11, Hw 4</td>
<td>Vacuum technology</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>Thin film. Thin film (continue)</td>
<td>Ch 13, Hw 5</td>
<td>Surface mount technology</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>Thin film (continue), Laser processing.</td>
<td>Hand out, Hw 6</td>
<td>Lab project progress report</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>X-ray processing. Electron beam processing.</td>
<td>Ch 15, 20, Hw 7</td>
<td>Micro fabrication: EDM</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>Ion beam processing.</td>
<td><strong>Quiz #2</strong></td>
<td>Micro fabrication: molding</td>
</tr>
<tr>
<td>11</td>
<td></td>
<td>MEMS and applications, NEMS and applications</td>
<td>Ch 24, Hw 8</td>
<td>Lab project</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>Other microsystems and applications, Process integration.</td>
<td>Ch 28, Ch 18, Hw 9</td>
<td>Lab project</td>
</tr>
<tr>
<td>13</td>
<td></td>
<td>Novel processes. Novel processes.</td>
<td>Hand out, Hw 10</td>
<td>Lab project</td>
</tr>
<tr>
<td>14</td>
<td></td>
<td>Project presentation, Project presentation and review</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td>Final exam</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Homework and Exam Policy
An Aggie does not lie, cheat or steal or tolerate those who do

Grade: Homework & presentation 15%, Lab 10%, Quiz #1 15%, Quiz #2 15%, Final 45%.
Any make-up/special quiz must be agreed and arranged before the class quiz except for excused absences as defined in the Student Rules.
Final grade: A (90-100), B (80-89), C (70-79), D (60-69), F (<60).
References: http://student-rules.tamu.edu,
http://www.tamu.edu/admissions/records/registration/prereg_schedule.html,
Office of Student Counseling Service, and Office of International Student Service.

1. Check the class website for handouts, solution to homework, previous exams, and contact information.
2. Late homework: 0 point deduction if submitting to my office within the due date (before 5pm), -25 points afterward. No late homework is accepted after the solution is posted on the web (2 days after the due date) except for excused absences as defined in the Student Rules.
3. We will have closed-book and closed-note exams, but you are allowed to have 1 letter-sized sheet to write notes and formulas for each exam.

Laboratory
1. Lab orientation will be conducted during the 2nd week of class.
2. Description and scope of lab projects will be distributed and explain. Each project allows a group of students to explore either a microfabrication process or physical phenomenon in further details. The project could be among the provided list or being suggested by students subjected to the instructor's approval.
3. Possible laboratory projects: microassembly, lithography, scanning electron microscopy, optical microscopy, microEDM, micromolding, surface mount technology, non contact metrology techniques, micromachining, vacuum technology, surface engineering, material characterization using energy beam...
4. Each subgroup working on a lab project will share the same grade. There will be two group presentations (week # 8 and #14) for the whole class.
5. Make sure you are familiar with the equipment and procedure before starting a lab project since SAFETY is our number-one priority.
ACADEMIC INTEGRITY STATEMENT

All students have the responsibility to be fully acquainted with and to comply with University Regulations. Every student should be familiar with the content of University Regulations regarding academic dishonesty.

Aggie Honor Code: “An Aggie does not lie, cheat, or steal or tolerate those who do.”

Upon accepting admission to Texas A&M University, a student immediately assumes a commitment to uphold the Honor Code, to accept responsibility for learning and to follow the philosophy and rules of the Honor System. Students will be required to state their commitment on examinations, research papers, and other academic work. Ignorance of the rules does not exclude any member of the Texas A&M University community from the requirements or the processes of the Honor System. For additional information please visit: www.tamu.edu/aggiehonor/.

On all course work, assignments, and examinations at Texas A&M University, the following Honor Pledge shall be preprinted and signed by the student:

“On my honor, as an Aggie, I have neither given nor received unauthorized aid on this academic work.”

AMERICANS WITH DISABILITIES ACT POLICY STATEMENT

The Americans with Disabilities Act (ADA) is a federal antidiscrimination 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 contact the Department of Student Life, Services for Students with Disabilities in Room B118 of Cain Hall or call 845-1637.
ENTC 414. Introduction to Micro/Nano Manufacturing.  
(3-2). Credit 3. Total 14 weeks. Prerequisite: CHEM 107; PHYS 208; senior or graduate in engineering or science; admitted to major degree sequence (upper-level) in engineering technology for ENTC majors.

Product miniaturization and impact; review of atomic structure, electrical and physical properties of materials. Ultraprecision machining; microlithography; dry and wet etching/sputtering techniques; isotropic and anisotropic processes; pattern transfer with additive processes; surface micromachining; microreplication processes; introduction to packaging technology and nanometrology; manufacturing of selected microsystems (MEMS) and their applications.

APPROACH AND DETAILED SYLLABUS

This introductory course is designed for engineering or science students who would like to have a broad understanding of current micro/nano manufacturing processes in preparation to work directly or indirectly in this field. Although most processes were originated from the field of microelectronics, the leveraging of micro/nano manufacturing into diversified and interdisciplinary fields is emphasized. Short theories are presented as basis for understanding a process capability. The classroom lecture is complimented with demonstration of selected processing and nanometrology equipment at various campus engineering/science laboratories and centers. Interdisciplinary mini-project and project presentation allow small teams to have hands-on experience while broadening their knowledge in other subject areas.

Background Review (3 hrs)
Survey of product trend, product miniaturization and its impact. Atomic structure; models and relation to the basic electrical, physical, and mechanical properties of materials.

Micro/nano Manufacturing Processes (24 hrs)
Ultraprecision machining; diamond tool and requirement. Ductile regime machining. Microlithography using UV, electron, or ion beams. Pattern transfer using wet etching processes; dry etching processes with plasma, photon, or physical beam; micromachining using electron beam, ion beam, and laser; isotropic versus anisotropic etching. Thin film and additive techniques; physical and chemical vapor deposition, plasma spraying, oxidation growth, and doping. Molecular beam epitaxy.

Integration and Novel Processes (6 hrs)
Surface micromachining for manufacturing of MEMS and other microdevices. Microreplication and other novel techniques; LIGA, micromolding, microEDM, and hot embossing.

Analysis, Measurement, and Applications (9 hrs)
Survey and presentation of packaging technology. Advanced metrology and surface characterizing techniques: AFM/STM, SEM, EDS, WDS, and XPS. Selected case studies and applications from diverse fields.