

Establishing a Graduate Certificate Program

The first step in establishing a new graduate certificate is the preparation of a proposal by qualified group of faculty. If the proposed program will be focused in an existing department, program or college, the proposal should be routed through the corresponding curriculum committees. College curriculum committees will forward the appropriately amended proposal to the Graduate College Catalog and Curriculum Committee. Proposals for interdisciplinary programs with no obvious departmental or college focus shall be submitted directly to the Graduate College Catalog and Curriculum Committee.

The proposal will be reviewed by the Graduate Curriculum and Catalog Committee, by the Graduate Council, by the Graduate Dean, and by the Provost.

The following information should be included in the proposal:

1. Name of the proposed graduate certificate.

Semiconductor Engineering

2. Name of the departments and/or programs involved.

ECpE, MSE. ECpE will be the lead department.

3. Name of the contact person.

Vikram Dalal, ECpE

4. Need for the graduate certificate.

Semiconductor engineering is critical technology and the U.S. is embarked on a major thrust in this area with the CHIPS act. There is a critical need for semiconductor engineers with hands-on experience in semiconductor materials and device research and fabrication to meet the needs of US industry. New manufacturing plants coming up in the U.S. over the next 3-5 years need over 10,000 engineers with experience in the semiconductor field. A graduate certificate will allow Iowa State students to master the basics of the semiconductor science and technology

5. Objective of the graduate certificate.

To provide the needed education in the field of semiconductor materials, devices and manufacturing technology

6. General description of the graduate certificate.

It will involve students taking 4 graduate level courses in the field.

7. Graduate certificate requirements including:

- a. Admission standards and prerequisites for the certificate program.

B.S. degree in engineering, physics or chemistry with a GPA>3.0

- b. Courses and seminars.

1. Required courses:

EE/MSE 532 (Microelectronic Fabrication Techniques),
EE 536 (Physics of Semiconductor Devices)
MSE 552 (Scanning and Auger Electron Microscopy)

2. Optional courses: Choose one from the following:

EE 535(Physics of Semiconductors)
EE538 (Optoelectronic Devices and Applications)
EE540X (Characterization of Semiconductor Devices)
MSE652 (Transmission Electron Microscopy)
MSE 574X (Crystal Growth Science and Practice)

8. General description of the resources currently available and future resource needs:

- a. A list of supporting faculty members including a brief description of their expertise relating to the graduate certificate.

All these courses are already in the catalog and will be taught.

EE535: Vikram Dalal

EE536: Santosh Pandey

EE532: Meng Lu and Santosh Pandey

EE538: Jaeyoun Kim

EE540X: Santosh Pandey and Vikram Dalal

MSE 552: Scott Chumbley / Sid Pathak / Tim Cullinan

MSE 652: Lin Zhou / Pete Collins

MSE 574X: Ralph Napolitano

Some of these courses that do not involve laboratory work can be taught on-line and will be accessible to remote students.

- b. The effects of any new courses on faculty workload.

It will not add any significant workload to the faculty since these courses are already scheduled to be offered. we expect that many of the students taking some of these courses may add one or two courses and obtain their certificate.

- c. Other resources required for the program including graduate assistants, laboratories and other facilities, supplies, etc.

Additional TA time maybe required if the student enrollments increase significantly.

- 9. Relationship of the proposed graduate certificate to the strategic plans of the department, college, and the university.

The certificate fits in very well with the strategic plans for both ECpE and MSE. ECpE has made Materials. devices and systems one of its five strategic area and has made significant (over a million \$) new investments in equipment in this area over the past three years, and is in the process of hiring a new faculty in this area starting next academic year.

- 10. Plan for periodic review of the certificate program.

We will review the program every five years by convening a review panel involving faculty from other universities and industry scientists, as well as by evaluating how well the graduates of this certificate program have been accepted by the semiconductor industry.

Note: Certificate-only students are not eligible for Federal Financial Aid unless the Certificate Program applies for approval to participate. If interested, contact the Student Financial Aid Office. Certificates that apply go through an application process requiring an agreement to follow the annual reporting and disclosure requirements, as set forth by the DOE under Gainful Employment federal regulations.