

17-96



# THE FACULTY SENATE

July 14, 2006

## MEMORANDUM

**TO:** President Robert M. Gates  
**SUBJECT:** Approval of University Curriculum Committee Items (FS.24.09)

At its regular meeting on July 10, 2006, the Faculty Senate approved the following curriculum items from the University Curriculum Committee and submits them for your approval. Attached is a copy of the material sent to our Senators.

### Special Consideration

Dwight Look College of Engineering  
Certificate in Polymer Specialty

#### New Courses:

AERO 406 Polymer Nanocomposites and their Applications  
BMEN 482 Polymeric Biomaterials  
MEEN 451 Viscoelastic Materials

Thank you for your time and consideration. Please inform me of your action on this matter.

R. Douglas Slack  
Speaker

### Attachment

*forms + db updated*

cc: David Prior  
Karan Watson  
Paul Meyer  
Linda Lacey  
Kemble Bennett

Approved:

  
Robert M. Gates, President

8-10-06

Date

Report of the University Curriculum Committee  
June 9, 2006  
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### 3. Special Consideration

Dwight Look College of Engineering  
Certificate in Polymer Specialty

#### New Courses

**AERO 406. Polymer Nanocomposites and their Applications. (3-0). Credit 3.** Recent advances and methodologies in processing and characterization of nanostructured polymers and nanocomposites, as well as their commercial applications; investigate polymers filled with nanometer-size inclusions, including nanoparticles, nanotubes, nanofibers, and nanoclays; macroscale, microscale and nanoscale characterizations investigated in relation to properties of interest. Prerequisites: Senior classification or approval of the instructor; junior or senior classification.

**BMEN 482. Polymeric Biomaterials. (3-0). Credit 3.** Preparation, properties, and biomedical applications of polymers including: polymerization; structure-property relationships; molecular weight and measurement; morphology; thermal transitions; network formation; mechanical behavior; polymeric surface modification; polymer biocompatibility and bioadhesion; polymers in medicine, dentistry, and surgery; polymers for drug delivery; polymeric hydrogels; and biodegradable polymers. Prerequisite: BMEN 342 or approval of instructor; junior or senior classification.

**MEEN 451. Viscoelastic Materials. (3-0). Credit 3.** Mechanical and mathematical basis for modeling linear viscoelastic materials which focus on polymeric solid materials; characterization of viscoelastic material properties from experimental tests; applications of stress and deformation relationships for viscoelastic structural members subjected to axial, torsional, and bending loads. Prerequisites: CVEN 305; junior or senior classification.



DWIGHT  
LOOK  
COLLEGE OF  
ENGINEERING  
TEXAS A&M  
UNIVERSITY

TEXAS  
ENGINEERING  
EXPERIMENT  
STATION

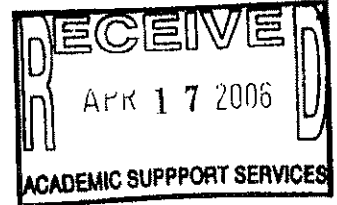
TEXAS  
TRANSPORTATION  
INSTITUTE

TEXAS  
ENGINEERING  
EXTENSION  
SERVICE

H1

ENGINEERING PROGRAM • THE TEXAS A&M UNIVERSITY SYSTEM

April 17, 2006



MEMORANDUM

TO: Linda Lacey

FROM: Jo W. Howze *Mark H. Lee for*

SUBJECT: Proposed 2006-2007 Undergraduate Certificate Program in Polymer Specialty

The Dwight Look College of Engineering is proposing an undergraduate certificate program in Polymer Specialty. The proposed certificate has been developed by Drs. Denis O'Neal, Ken Hall, and Helen Reed. This package includes:

- Proposed Undergraduate Certificate Program in Polymer Specialty
- New Course Request for AERO 406 Polymer Nanocomposites and their Applications
- New Course Request for BMEN 482 Polymeric Biomaterials
- New Course Request for MEEN 451 Viscoelastic Materials

**TEXAS A&M UNIVERSITY  
DWIGHT COLLEGE OF ENGINEERING**

**Proposed Undergraduate Certificate Program  
in Polymer Specialty**

**Reason for Being**

The annual world wide production of the polyolefins exceeds 120,000,000,000kg. Polyolefins production in Texas alone represents 70 percents of the U.S. market, 18 percent of the world market, and is a \$26 billion per year industry. Given the huge importance the polyethylene, polypropylene, polystyrene and other engineering polymers, a very important goal of the Texas A&M University is to educate and train workforce in the State of Texas to provide necessary knowledge regarding polymer structure-property relationship, catalysis, polymer chemistry, mechanical properties, barrier properties, processing, and modeling

Currently there are no schools in the State of Texas that offer a formal polymer curriculum, despite the significant role the polymer industry plays in the state's economy. Many of the engineers graduating from Texas A&M University will find themselves working with polymers in one form or another. Companies specializing in polymer synthesis and manufacturing (e.g., Dow Chemical, ExxonMobil, Innovene, Engelhard, Solvay, etc.) strongly desire engineers with a strong polymer background. The proposed polymer certificate program will provide this knowledge, which will reduce training time required to turn Texas A&M students into productive members of the industrial workforce in Texas. This emphasis in polymers will give our students a significant edge over those from other universities who have no documented polymer knowledge. TAMU students will be able to fill jobs in Texas that often go to students from out of state schools with established polymer curricula (e.g., Southern Mississippi, University of Akron, UMass, etc.). Ultimately this certificate program will serve to keep native Texans in Texas by better preparing them for the State's job market.

It is because of the great demand in Polymer understanding that the Faculty of the Polymer Technology Center (PTC) at Texas A&M University (TAMU) is proposing a Polymer Specialty Certificate Program. The objective of this certificate is to provide an interdisciplinary educational program for undergraduate students interested in pursuing a polymer career. Polymer students at TAMU benefit from the distinguished research, education, and industrial outreach that comprise the PTC. This program will be the first of its kind offered in the State of Texas. Students will be able to structure an individualized program from a selection of courses to meet their career objectives.

The object of the Polymer Specialty Certificate would be to provide a framework for engineers and suitably prepared science major to gain exposure to polymer dominated course work from several science and engineering disciplines with an added commitment to introduce sustainable development into all courses included as electives in the program.

## Who and What the Program is Designed For

The Undergraduate Polymer Specialty Certificate is intended to address the interests of industry in educating engineering BS graduates with an interdisciplinary understanding of the importance of polymer to any engineering applications. The elective courses for the certificate program have been selected with the following criteria in mind:

1. Senior level course
2. Minimal course prerequisites to allow the majority of engineering or science disciplines to take the course
3. Commitment to develop engineered sustainable principles into the course materials over time

The Polymer Specialty Certificate Program would be accessible to most engineers and many science majors, particularly Chemistry, Chemical, Aerospace and Mechanical Engineering majors with sufficient science exposure. The ability to offer the certificate to non-engineering majors helps to increase the number of graduates with substantial exposure to polymer thinking.

## Benefits

The value of the certificate to the student will be to broaden his or her exposure to a diverse polymer science and engineering curriculum and thereby differentiate the student from peers.

Industry will value graduates with the Polymer Specialty Certificate because they will have a more diverse background in polymers. Further, the graduates will have a focus that would foster entrepreneurial thinking and expand the employment horizons beyond the traditional industrial jobs.

## Description

The proposed undergraduate Polymer Specialty Certificate Program will consist of (4) three-hour courses for a total of 12 credit hours. Two of the courses will be core curriculum which may count for 6 credits toward the student's departmental degree. Core courses will include MEEN 458 (Processing & Characterization of Polymers) and CHEM 466 (Polymer Chemistry). An additional six hours will be comprised of (2) three-hour science or engineering electives. Completion of 12 semester credit hours of the following courses earn a Polymer Certificate and the specialty is recorded on the student's permanent University record.

### Required Courses - 6 semester credit hours

Course Code	Course Title	Instructor	When Offered	Frequency Offered	Credit Hours
MEEN 458	Processing & Characterization of Polymers	Jaime Grunlan	Spring 2006	Annually/Spring	3
CHEM 466	Polymer Chemistry	Stephen A. Miller	Spring 2006	Annually/Spring	3

Elective Courses – 6 or more semester credit hours from the polymer courses listed below. Up to 3 hours of coursework can be substituted with research emphasizing polymers (provided polymer coursework has been initiated – research must receive prior approval)

Course Code	Course Title	Instructor	When Offered	Frequency Offered	Credit Hours
CHEN 451	Intro to Polymer Engineering	Michael Bevan	Fall 2005	Annually/Fall	3
MEEN 455	Engineering with Plastics	Hung-Jue Sue	Fall 2006	Annually/Fall	3
MEEN 471	Elements of Composite Materials	Terry S. Creasy	Spring 2006	TBA	3
AERO 406	Polymer Nanocomposites and Their Applications	Zoubeida Ounaies	Spring 2007	TBA	3
MEEN 451	Viscoelastic Solids	Anastasia Mulliana	Fall 2005	TBA	3
MEEN/CHEN/ AERO/CHEM 485	Individual Research	PTC Faculty	Spring 2006	Every Semester	3
BMEN 482	Polymeric Biomaterials	Melissa A. Grunlan	Spring 2006	TBA	3
CHEN 642	Colloidal & Interfacial	Michael Bevan	Spring 2006	Even years/Spring	3

A grade of C or above is required in all of the above courses.

**Courses Included:**

**Aerospace Engineering**

AERO 406 – Polymers and Composites

**Biomedical Engineering**

BMEN 482 & 682 – Polymeric Biomaterials

**Chemical Engineering**

CHEN 451 – Introduction to Polymer Engineering

CHEN 642 – Colloidal & Interfacial

**Chemistry Engineering**

CHEM 466- Polymer Chemistry

**Mechanical Engineering**

MEEN 455 – Engineering with Plastics

MEEN 458 – Processing and Characterization of Polymers

MEEN/CHEN/AERO/CHEM 485 – Individual Research

MEEN 471 – Elements of Composite Materials

MEEN 451 – Viscoelastic Solids

### **Expected number of students**

This program is open to science and engineering undergraduate students enrolled at TAMU. Interested students should consult with their advisors and the PTC Program Coordinator. Typically we will have about 40 students for the undergraduate courses and 20 students for the graduate courses.

### **Resources**

No new resources are needed. Members of the Polymer Technology Industrial Consortium support the effort of creating the Undergraduate Polymer Specialty Program.

### **List of Faculty**

#### **Aerospace Engineering**

Zoubeida Ounaies, AERO 406

#### **Biomedical Engineering**

Melissa Grunlan, BMEN 482

#### **Chemical Engineering**

Michael Bevan, CHEN 451, CHEN 642

#### **Chemistry Department**

Stephen A. Miller, CHEM 466

#### **Mechanical Engineering**

Hung-Jue Sue, MEEN 455

Jaime Grunlan, MEEN 458

PTC Faculty, MEEN/CHEN/AERO/CHEM 485

Terry Creasy, MEEN 471

Anastasia Muliana, MEEN 451

### **State whether the certificate is depended upon conferral of degree**

The proposed undergraduate Polymer Specialty Certificate Program will be conferred upon completion of the BS degree in engineering or the BS degree in science and award of the diploma.

### **Course syllabi**

See Attached Exhibit A

### **Letters of Support for the Polymer Technology Center Certificate Program**

See Attached Exhibit B

# **EXHIBIT A**

# **COURSE SYLLABI**



**Texas A&M University**  
**Departmental Request for a New Course**  
**Undergraduate • Graduate • Professional**

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Submit original form and 2 copies. Attach a course syllabus to each.

1. This request is submitted by the Department of Aerospace Engineering
2. Course prefix, number and complete title AERO 406 Polymer Nanocomposites and Their Applications
3. Course description (not more than 50 words) This course focuses on recent advances and methodologies in processing and characterization of nanostructured polymers and nanocomposites, as well as their commercial applications. We will investigate polymers filled with nanometer-size inclusions, including nanoparticles, nanotubes, nanofibers and nanoclays. Macroscale, microscale, and nanoscale characterizations are investigated in relation to properties of interest.
4. Prerequisite(s) Senior standing or permission of the instructor. Cross-listed with \_\_\_\_\_  
Cross-listed courses require the signatures of both department heads.
5. Is this a variable credit course?  Yes  No If yes, from \_\_\_\_\_ to \_\_\_\_\_.
6. Is this a repeatable course?  Yes  No If yes, this course may be taken \_\_\_\_\_ times. Will the course be repeated within the same semester/term?  Yes  No
7. Has this course been taught as a 489/689?  Yes  No If yes, how many times? 1 Indicate the number of students enrolled for each academic period it was taught. Spring 2007
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 Engineering pursuing Specialty Polymer Certificate

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)												
	A E R O	4 0 6	P O L Y M N A N O C O M P & A P P L												
	Lect.	Lab	SCH	Subject Matter Content Code				Admin. Unit		Acad. Year		FICE Code			
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Approval recommended by:

*Sorry* [Signature] Helin L. Reed 4/4/06  
 Head of Department Date

[Signature] 4-13-06  
 Chair, College Review Committee Date

Head of Department (if cross-listed course) Date

[Signature] 4-13-06  
 Dean of College Date

Submitted to Coordinating Board by:

Dean of College Date

Director of Academic Support Services

Date Effective Date

## 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 Biomedical Engineering
2. Course prefix, number and complete title BMEN 482 Polymeric Biomaterials
3. Course description (not more than 50 words) Preparation, properties, and biomedical applications of polymers including: polymerization; structure-property relationships; molecular weight and measurement; morphology; thermal transitions; network formation; mechanical behavior; polymeric surface modification; polymer biocompatibility and bioadhesion; polymers in medicine, dentistry, and surgery; polymers for drug delivery; polymeric hydrogels; and biodegradable polymers.
4. Prerequisite(s) BMEN 342, or instructor approval Cross-listed with \_\_\_\_\_  
Cross-listed courses require the signatures of both department heads.
5. Is this a variable credit course?  Yes  No If yes, from \_\_\_\_\_ to \_\_\_\_\_.
6. Is this a repeatable course?  Yes  No If yes, this course may be taken \_\_\_\_\_ times. Will the course be repeated within the same semester/term?  Yes  No
7. Has this course been taught as a 489/689?  Yes  No If yes, how many times? 1 Indicate the number of students enrolled for each academic period it was taught. as 689, once, 11/06A
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 biomedical engineering

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)											
BMEN		482		POLYMERIC BIOMATERIALS											
Lect.	Lab	SCH	Subject Matter Content Code				Admin. Unit	Acad. Year	FICE Code						
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Approval recommended by:

[Signature] 03/08/06  
Head of Department Date

[Signature] 4-13-06  
Chair, College Review Committee Date

Head of Department (if cross-listed course) Date

[Signature] 4-13-06  
Dean of College Date

Submitted to Coordinating Board by:

Dean of College Date

Director of Academic Support Services Date Effective Date

\* Attach a syllabus according to the guidelines on the Internet site oar-as.tamu.edu. To have this form reviewed, please send to Linda F. Lacey, Director of Academic Support Services, 1265 TAMU or fax to 847-8737.

A38

**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 Mechanical Engineering
2. Course prefix, number and complete title MEEN 451, Viscoelastic Materials
3. Course description (not more than 50 words) Mechanical and mathematical basis for modeling linear viscoelastic materials which focus on polymeric solid materials; characterization of viscoelastic material properties from experimental tests; applications of stress and deformation relationships for viscoelastic structural members subjected to axial, torsional, and bending loads.
4. Prerequisite(s) CVEN 305; junior or senior standing Cross-listed with \_\_\_\_\_  
Cross-listed courses require the signatures of both department heads.
5. Is this a variable credit course?  Yes  No If yes, from \_\_\_\_\_ to \_\_\_\_\_.
6. Is this a repeatable course?  Yes  No If yes, this course may be taken \_\_\_\_\_ times. Will the course be repeated within the same semester/term?  Yes  No
7. Has this course been taught as a 489/689?  Yes  No If yes, how many times? \_\_\_\_\_ Indicate the number of students enrolled for each academic period it was taught. \_\_\_\_\_

8. This course will be:

a. required for students enrolled in the following degree program(s) (e.g., B.A. in history)

Students pursuing the Polymer Specialty Certificate Program

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

B.S. in Mechanical Engineering

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)											
M E E N		4 5 1	V I S C O E L A S T I C M A T E R I A L S											
Lect.	Lab	SCH	Subject Matter Content Code				Admin. Unit	Acad. Year	FICE Code					
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Approval recommended by:

[Signature] 3/29/06  
 Head of Department Date

[Signature] 4/3/06  
 Chair, College Review Committee Date

[Signature] 4/5/06  
 Head of Department (if cross-listed course) Date

[Signature] 4/13/06  
 Dean of College Date

Submitted to Coordinating Board by:

\_\_\_\_\_  
 Dean of College Date

\_\_\_\_\_  
 Director of Academic Support Services

\_\_\_\_\_  
 Date

\_\_\_\_\_  
 Effective Date

\* Attach a syllabus according to the guidelines on the Internet site [www.tamu.edu/admissions/oaras](http://www.tamu.edu/admissions/oaras). To have this form reviewed, please send to Linda F. Lacey, Mail Stop 1265 or fax to 847-8737.

OAR/AS-10/99