Graduate Council Doc. No. 11-17a

Print Form

Office of the Registrar
FORM 40G REV. 7/08

PURDUE UNIVERSITY
REQUEST FOR ADDITION, EXPIRATION, OR REVISION OF A GRADUATE COURSE
(50000-60000 LEVEL)

EfD 3/-09
(201320)

DEPARTMENT School of Materials Engineering

EFFECTIVE SESSION Spring ~~2010~~ ~~2012~~ 2013

INSTRUCTIONS: Please check the items below which describe the purpose of this request.

- [X] 1. New course with supporting documents (complete proposal form)
- [ ] 2. Add existing course offered at another campus
- [ ] 3. Expiration of a course
- [ ] 4. Change in course number
- [ ] 5. Change in course title
- [ ] 6. Change in course credit/type
- [ ] 7. Change in course attributes
- [ ] 8. Change in instructional hours
- [ ] 9. Change in course description
- [ ] 10. Change in course requisites
- [ ] 11. Change in semesters offered
- [ ] 12. Transfer from one department to another

PROPOSED:		EXISTING:	
Subject Abbreviation	MSE	Subject Abbreviation	
Course Number	~~507~~ 56700	Course Number	
Long Title	Polymer Synthesis		
Short Title	polymer synthesis		

Abbreviated title will be entered by the Office of the Registrar if omitted. (30 CHARACTERS ONLY)

TERMS OFFERED Check All That Apply:
[ ] Summer [ ] Fall [X] Spring

CAMPUS(ES) INVOLVED
[ ] Calumet [ ] N. Central
[ ] Cont Ed [ ] Tech Statewide
[ ] Ft. Wayne [X] W. Lafayette
[ ] Indianapolis

CREDIT TYPE
1. Fixed Credit: Cr. Hrs. 3
2. Variable Credit Range: Minimum Cr. Hrs ____ (Check One) To [ ] Or [ ]
Maximum Cr. Hrs. ____
3. Equivalent Credit: Yes [ ] No [X]
4. Thesis Credit: Yes [ ] No [X]

COURSE ATTRIBUTES: Check All That Apply
1. Pass/Not Pass Only [ ]
2. Satisfactory/Unsatisfactory Only [ ]
3. Repeatable [ ]
Maximum Repeatable Credit: [ ]
4. Credit by Examination [ ]
5. Special Fees [ ]
6. Registration Approval Type: Department [ ] Instructor [ ]
7. Variable Title [ ]
8. Honors [ ]
9. Full Time Privilege [ ]
10. Off Campus Experience [ ]

Schedule Type	Minutes Per Mtg	Meetings Per Week	Weeks Offered	% of Credit Allocated
Lecture	50	3	16	100
Recitation				
Presentation				
Laboratory				
Lab Prep				
Studio				
Distance				
Clinic				
Experiential				
Research				
Ind. Study				
Pract/Observ				

Cross-Listed Courses

RECEIVED
OFFICE OF THE REGISTRAR
2012 FEB 27 AM 10:40

COURSE DESCRIPTION (INCLUDE REQUISITES/RESTRICTIONS):
Sem. 2, Class 3, Cr. 3 (Offered in Alternate Years), Prerequisite: CHEM 257 00 Organic Chemistry
Analyze properties of polymers and correlate them to chemical structure. Apply methods and mechanisms of polymer chemistry to industrial and laboratory synthesis. Examine the kinetic and design factors that control polymer structures. Professor Youngblood.

Calumet Department Head	Date	Calumet School Dean	Date	Calumet Undergrad Curriculum Committee	Date
Fort Wayne Department Head	Date	Fort Wayne School Dean	Date	Fort Wayne Chancellor	Date
Indianapolis Department Head	Date	Indianapolis School Dean	Date	R. Cipra Undergrad Curriculum Committee	2/16/2010 Date
North Central Department Head	Date	North Central Chancellor	Date	APPROVED 2/16/12 Date Approved by Graduate Council	
West Lafayette Department Head	1/25/12 Date	West Lafayette College/School Dean	2/22/10 Date	Graduate Council Secretary	2/23/12 Date
State Area Committee Convener	2/16/12 Date	Graduate Dean	Date	West Lafayette Registrar	3/23/12 Date

OFFICE OF THE REGISTRAR

D 3/22/12

MSE 56700

Supporting Document for a New Graduate Course

To: Purdue University Graduate Council

From:
Faculty Member: Jeffrey P. Youngblood
Department: Materials Engineering
Campus: West Lafayette

Date:

Subject: Proposal for New Graduate Course-Documentation Required by the Graduate Council to Accompany Registrar's Form 40G

For Reviewer's comments only (Select One)

Reviewer:

Comments:

Contact for information if questions arise:
Name: Jeffrey P. Youngblood
Phone Number: 496-2294
E-mail: jpyoungb@purdue.edu
Campus Address: ARMS 2233

Course Subject Abbreviation and Number: MSE 56700

Course Title: Polymer Synthesis

A. Justification for the Course:

- Provide a complete and detailed explanation of the need for the course (e. g., in the preparation of students, in providing new knowledge/training in one or more topics, in meeting degree requirements, etc.), how the course contributes to existing majors and/or concentrations, and how the course relates to other graduate courses offered by the department, other departments, or interdisciplinary programs.

- Justify the level of the proposed graduate course (50000- or 60000-level) including statements on, but not limited to: (1) the target audience, including the anticipated number of undergraduate and graduate students who will enroll in the course; and (2) the rigor of the course.

B. Learning Outcomes and Method of Evaluation or Assessment:

- Describe the course objectives and student learning outcomes that address the objectives (i.e., knowledge, communication, critical thinking, ethical research, etc.).

- Describe the methods of evaluation or assessment of student learning outcomes. (Include evidence for both direct and indirect methods.)

- Grading criteria (select from dropdown box); include a statement describing the criteria that will be used to assess students and how the final grade will be determined.

Criteria Exams and Quizzes

- Identify the method(s) of instruction (select from dropdown box) and describe how the methods promote the likely success of the desired student learning outcomes.

Method of Instruction Lecture

C. Prerequisite(s):

- List prerequisite courses by subject abbreviation, number, and title.
- List other prerequisites and/or experiences/background required. If no prerequisites are indicated, provide an explanation for their absence.

D. Course Instructor(s):

- Provide the name, rank, and department/program affiliation of the instructor(s).
- Is the instructor currently a member of the Graduate Faculty? — Yes — No
  (If the answer is no, indicate when it is expected that a request will be submitted.)

E. Course Outline:

- Provide an outline of topics to be covered and indicate the relative amount of time or emphasis devoted to each topic. If laboratory or field experiences are used to supplement a lecture course, explain the value of the experience(s) to enhance the quality of the course and student learning. For special topics courses, include a sample outline of a course that would be offered under the proposed course.

F. Reading List (including course text):

- A primary reading list or bibliography should be limited to material the students will be required to read in order to successfully complete the course. It should not be a compilation of general reference material.
- A secondary reading list or bibliography should include material students may use as background information.

G. Library Resources

- Describe the library resources that are currently available or the resources needed to support this proposed course.

H. Example of a Course Syllabus (While not a necessary component of this supporting document, an example of a course syllabus is available, for information, by clicking on the link below, which goes to the *Graduate School's Policies and Procedures Manual for Administering Graduate Student Programs*. See Appendix K.)

http://www.gradschool.purdue.edu/downloads/Graduate_School_Policies_and_Procedures_Manual.pdf

MSE 56700

SUPPORTING DOCUMENT FOR MSE 56700
NEW GRADUATE COURSE

A. Justification for the Course:

The primary purpose of this course is to develop an understanding of how polymers are made synthetically, both in the laboratory and industrially, as well as understand critical factors such as reaction kinetics and polymer properties.

This class goes across a variety of disciplines (MSE, CHM, CHE & BME) and the content has been coordinated with MSE 525 (Structure-Property Relationships of Engineering Polymers) and CHE 544 (Structure and Physical Behavior of Polymer Systems). Expected enrollment would be between 10-15 graduate level students and 5-10 undergraduate level students.

The goals of this class are to analyze properties of a polymer and correlate them to chemical structure; to present methods and mechanisms of polymer chemistry and apply them to industrial and everyday realities; to examine the kinetic and design factors that control polymer structures.

B. Learning Outcomes and Method of Evaluation of Assessment:

Upon completion of the course, the student will understand, predict and design polymer properties based on polymer structure and how and why certain reactions take place through mechanisitic means. They will be able to produce a polymer structure based on known reactants and retrosynthetically design a chemical route to a variety of polymer structures. As well as, intuitively grasp the kinetic factors involved to predict such things a molecular weight, polydispersity, and others. They will understand polymer chemistry in relation to everyday materials and why industrial practice is as is.

Grading criteria will be derived from 3 mid-term exams and 1 comprehensive final and

C. Prerequisites: CHEM 257, Organic chemistry

D. Course Instructor: Professor Jeffrey P. Youngblood, Associate Professor of Materials Engineering and, currently, Chairman of the MSE Graduate Committee

E. Course Outline

Week	*Topic*
1	Basic organic chemistry, basic polymer structure
2	T_g; T_m, gel point, geometric and stereo isomerism, MW, step vs. chain polymers
3	Step Polymers: esters, carbonates, amides, imides, urethanes
4	Step Polymers: phenolics, urea-formaldehyde, epoxy, silicones, specialties

MSE 5Q700

Exam 1

5 Step Polymers: kinetics; Radical Chain: intro, T_c, initiation, propagation,

6 Radical Chain: termination, chain transfer, inhibition/retardation, acceleration,

7 Radical Chain: reaction kinetics; ATRP; TEMPO;

8 Copolymerization, Emulsion Polymerization

Exam 2

9 Anionic Chain: intro, initiation, termination, end control,

10 Anionic Chain: structure; Cationic Chain: initiation, propagation, termination

11 Anionic and cationic kinetics, ring opening polymerization

12 Basic organometallic chemistry

Exam 3

13 Catalysis: Ziegler-Natta;

14 Catalysis: olefin metathesis

15 Heteroatom Polymers, Conducting Polymers; Tie-in; review

Final

F. Reading List:
Textbook: "Principles of Polymerization", 4th Ed., G. Odian (Wiley-Itnerscience, 2004)

G. Library Resources: No library resources needed

H. Example of Course Syllabus

MSE 56700

Engineering Faculty Document No. 31-09
December 3, 2008

TO: The Engineering Faculty

FROM: The Faculty of the School Materials Engineering

RE: New Dual-Level Course, MSE 56700

The faculty of the School of Materials Engineering have approved the following new course and is being submitted to the Engineering Faculty with a recommendation for approval:

MSE 56700 Polymer Synthesis
Sem. 2. Class 3, Cr. 3. (Offered in Alternate Years)
Prerequisites: CHEM 25700 Organic Chemistry

Description: Analyze properties of polymers and correlate them to chemical structure. Apply methods and mechanisms of polymer chemistry to industrial and laboratory synthesis. Examine the kinetic and design factors that control polymer structures.

Reason: This class has now been offered three times as MSE 597Y, in Fall 2004 (25 students), Fall 2006 (17 students), and Spring 2008 (16 students) with good enrollment from students across a variety of disciplines (MSE, Chem, ChemE, BME). The primary purpose of this course is to develop an understanding of how polymers are made synthetically, both in the laboratory and industrially, as well as understand critical factors such as reaction kinetics and polymer properties. The techniques cover a large design space of polymers, however, the focus is on commodity, engineering and specialty resins to give an insight into the importance of the respective material that is being discussed. The content of this course has been coordinated with MSE 52500 (Structure-Property Relationships of Engineering Polymers) and CHE 54400 (Structure and Physical Behavior of Polymer Systems).

Sincerely yours,

Keith J. Bowman
Head and Professor
School of Materials Engineering
Professor, School of Engineering Education
(by courtesy)

APPROVED FOR THE FACULTY
OF THE SCHOOLS OF ENGINEERING
BY THE ENGINEERING
CURRICULUM COMMITTEE

ECC Minutes #23

Date 4/1/09

Chairman ECC R. Cipra

MSE 59700

MSE 597Y
Polymer Synthesis
Instructors: Jeffrey P. Youngblood, jpyoungb@purdue.edu, ARMS 2233, 496-2294

Course Description: Chemical synthetic routes to preparation of various polymers as well as the kinetic expressions for their reactions. Relations to industrial versus laboratory preparation are explored. Control of structure (chemical, tacticity, etc) and how this applies to properties is also taught.

Prerequisite: CHEM 257 Organic Chemistry

Goals:
To analyze properties of a polymer and correlate them to chemical structure. To present methods and mechanisms of polymer chemistry and apply them to industrial and everyday realities. To examine the kinetic and design factors that control polymer structures

Objectives:
Upon completion of the course, the student is able to:

- Understand, predict and design polymer properties based on polymer structure
- Understand how and why certain reactions take place through mechanistic means.
- Produce a polymer structure based on known reactants and retrosynthetically design a chemical route to a variety of polymer structures
- Intuitively grasp the kinetic factors involved to predict such things as molecular weight, polydispersity, and others.
- Understand polymer chemistry in relation to everyday materials and why industrial practice is as is.

Textbook:
"Principles of Polymerization", 4th Ed., G. Odian (Wiley-Interscience, 2004).

Professional category content as estimated by faculty member who prepared this course description:

Engineering Science: 3 Credits

Assessment:
3 mid-term exams (20% each) and 1 comprehensive final (40%)

MSE 59700

Spring 2008 Syllabus

Week	*Topic*
1	Basic organic chemistry, basic polymer structure
2	T_g; T_m, gel point, geometric and stereo isomerism, MW, step vs. chain polymers
3	Step Polymers: esters, carbonates, amides, imides, urethanes
4	Step Polymers: phenolics, urea-formaldehyde, epoxy, silicones, specialties
	Exam 1
5	Step Polymers: kinetics; Radical Chain: intro, T_c, initiation, propagation,
6	Radical Chain: termination, chain transfer, inhibition/retardation, acceleration,
7	Radical Chain: reaction kinetics; ATRP; TEMPO;
8	Copolymerization, Emulsion Polymerization
	Exam 2
9	Anionic Chain: intro, initiation, termination, end control,
10	Anionic Chain: structure; Cationic Chain: initiation, propagation, termination
11	Anionic and cationic kinetics, ring opening polymerization
12	Basic organometallic chemistry
	Exam 3
13	Catalysis: Ziegler-Natta;
14	Catalysis: olefin metathesis
15	Heteroatom Polymers, Conducting Polymers; Tie-in; review
	Final

Engineering Faculty Document No. 31-09
December 3, 2008

TO: The Engineering Faculty

FROM: The Faculty of the School Materials Engineering

RE: New Dual-Level Course, MSE 56700

The faculty of the School of Materials Engineering have approved the following new course and is being submitted to the Engineering Faculty with a recommendation for approval:

MSE 56700 Polymer Synthesis
Sem. 2. Class 3, Cr. 3. (Offered in Alternate Years)
Prerequisites: CHEM 25700 Organic Chemistry

Description: Analyze properties of polymers and correlate them to chemical structure. Apply methods and mechanisms of polymer chemistry to industrial and laboratory synthesis. Examine the kinetic and design factors that control polymer structures.

Reason: This class has now been offered three times as MSE 597Y, in Fall 2004 (25 students), Fall 2006 (17 students), and Spring 2008 (16 students) with good enrollment from students across a variety of disciplines (MSE, Chem, ChemE, BME). The primary purpose of this course is to develop an understanding of how polymers are made synthetically, both in the laboratory and industrially, as well as understand critical factors such as reaction kinetics and polymer properties. The techniques cover a large design space of polymers, however, the focus is on commodity, engineering and specialty resins to give an insight into the importance of the respective material that is being discussed. The content of this course has been coordinated with MSE 52500 (Structure-Property Relationships of Engineering Polymers) and CHE 54400 (Structure and Physical Behavior of Polymer Systems).

Sincerely yours,

Keith J. Bowman
Head and Professor
School of Materials Engineering
Professor, School of Engineering Education
(by courtesy)

APPROVED FOR THE FACULTY
OF THE SCHOOLS OF ENGINEERING
BY THE ENGINEERING
CURRICULUM COMMITTEE

ECC Minutes #23

Date 4/1/09

Chairman ECC R. Cipra

MSE 597Y
Polymer Synthesis
Instructors: Jeffrey P. Youngblood, jpyoungb@purdue.edu, ARMS 2233, 496-2294

Course Description: Chemical synthetic routes to preparation of various polymers as well as the kinetic expressions for their reactions. Relations to industrial versus laboratory preparation are explored. Control of structure (chemical, tacticity, etc) and how this applies to properties is also taught.

Prerequisite: CHEM 257 Organic Chemistry

Goals:
To analyze properties of a polymer and correlate them to chemical structure. To present methods and mechanisms of polymer chemistry and apply them to industrial and everyday realities. To examine the kinetic and design factors that control polymer structures

Objectives:
Upon completion of the course, the student is able to:

- Understand, predict and design polymer properties based on polymer structure
- Understand how and why certain reactions take place through mechanistic means.
- Produce a polymer structure based on known reactants and retrosynthetically design a chemical route to a variety of polymer structures
- Intuitively grasp the kinetic factors involved to predict such things as molecular weight, polydispersity, and others.
- Understand polymer chemistry in relation to everyday materials and why industrial practice is as is.

Textbook:
"Principles of Polymerization", 4th Ed., G. Odian (Wiley-Interscience, 2004).

Professional category content as estimated by faculty member who prepared this course description:

Engineering Science: 3 Credits

Assessment:
3 mid-term exams (20% each) and 1 comprehensive final (40%)

Spring 2008 Syllabus

Week	*Topic*
1	Basic organic chemistry, basic polymer structure
2	T_g; T_m, gel point, geometric and stereo isomerism, MW, step vs. chain polymers
3	Step Polymers: esters, carbonates, amides, imides, urethanes
4	Step Polymers: phenolics, urea-formaldehyde, epoxy, silicones, specialties
	Exam 1
5	Step Polymers: kinetics; Radical Chain: intro, T_c, initiation, propagation,
6	Radical Chain: termination, chain transfer, inhibition/retardation, acceleration,
7	Radical Chain: reaction kinetics; ATRP; TEMPO;
8	Copolymerization, Emulsion Polymerization
	Exam 2
9	Anionic Chain: intro, initiation, termination, end control,
10	Anionic Chain: structure; Cationic Chain: initiation, propagation, termination
11	Anionic and cationic kinetics, ring opening polymerization
12	Basic organometallic chemistry
	Exam 3
13	Catalysis: Ziegler-Natta;
14	Catalysis: olefin metathesis
15	Heteroatom Polymers, Conducting Polymers; Tie-in; review
	Final

Office of the Registrar
FORM 40G REV. 7/08

PURDUE UNIVERSITY

REQUEST FOR ADDITION, EXPIRATION, OR REVISION OF A GRADUATE COURSE (50000-60000 LEVEL)

Print Form

EFD 3/1-09

DEPARTMENT School of Materials Engineering

EFFECTIVE SESSION Spring 2010

INSTRUCTIONS: Please check the items below which describe the purpose of this request.

- [X] 1. New course with supporting documents (complete proposal form)
- [ ] 2. Add existing course offered at another campus
- [ ] 3. Expiration of a course
- [ ] 4. Change in course number
- [ ] 5. Change in course title
- [ ] 6. Change in course credit/type
- [ ] 7. Change in course attributes
- [ ] 8. Change in instructional hours
- [ ] 9. Change in course description
- [ ] 10. Change in course requisites
- [ ] 11. Change in semesters offered
- [ ] 12. Transfer from one department to another

PROPOSED:		EXISTING:	
Subject Abbreviation	MSE	Subject Abbreviation	
Course Number	567	Course Number	
Long Title	Polymer Synthesis		
Short Title	polymer synthesis		

Abbreviated title will be entered by the Office of the Registrar if omitted. (30 CHARACTERS ONLY)

TERMS OFFERED
Check All That Apply:
[ ] Summer [ ] Fall [X] Spring

CAMPUS(ES) INVOLVED
[ ] Calumet [ ] N. Central
[ ] Cont Ed [ ] Tech Statewide
[ ] Ft. Wayne [X] W. Lafayette
[ ] Indianapolis

CREDIT TYPE
1. Fixed Credit: Cr. Hrs. 3
2. Variable Credit Range: Minimum Cr. Hrs ____ (Check One) To [ ] Or [ ] Maximum Cr. Hrs. ____
3. Equivalent Credit: Yes [ ] No [ ]
4. Thesis Credit: Yes [ ] No [ ]

COURSE ATTRIBUTES: Check All That Apply
1. Pass/Not Pass Only [ ]
2. Satisfactory/Unsatisfactory Only [ ]
3. Repeatable [ ]
Maximum Repeatable Credit: [ ]
4. Credit by Examination [ ]
5. Special Fees [ ]
6. Registration Approval Type: Department [ ] Instructor [ ]
7. Variable Title [ ]
8. Honors [ ]
9. Full Time Privilege [ ]
10. Off Campus Experience [ ]

Schedule Type	Minutes Per Mtg	Meetings Per Week	Weeks Offered	% of Credit Allocated
Lecture	50	3	16	100
Recitation				
Presentation				
Laboratory				
Lab Prep				
Studio				
Distance				
Clinic				
Experiential				
Research				
Ind. Study				
Pract/Observ				

Cross-Listed Courses

COURSE DESCRIPTION (INCLUDE REQUISITES/RESTRICTIONS):

Sem. 2, Class 3, Cr. 3 (Offered in Alternate Years), Prerequisite: CHEM 257 Organic Chemistry
Analyze properties of polymers and correlate them to chemical structure. Apply methods and mechanisms of polymer chemistry to industrial and laboratory synthesis. Examine the kinetic and design factors that control polymer structures.

Calumet Department Head	Date	Calumet School Dean	Date	Calumet Undergrad Curriculum Committee	Date
Fort Wayne Department Head	Date	Fort Wayne School Dean	Date	Fort Wayne Chancellor	Date
Indianapolis Department Head	Date	Indianapolis School Dean	Date	R Cipra Undergrad Curriculum Committee	2/16/2010 Date
North Central Department Head	Date	North Central Chancellor	Date	Date Approved by Graduate Council	
West Lafayette Department Head	12/5/09 Date	West Lafayette College/School Dean	2/22/10 Date	Graduate Council Secretary	Date
Graduate Area Committee Convener	Date	Graduate Dean	Date	West Lafayette Registrar	Date

OFFICE OF THE REGISTRAR

Supporting Document for a New Graduate Course

To: Purdue University Graduate Council

From:
Faculty Member: Jeffrey P. Youngblood
Department: Materials Engineering
Campus: West Lafayette

Date:

Subject: Proposal for New Graduate Course-Documentation Required by the Graduate Council to Accompany Registrar's Form 40G

For Reviewer's comments only (Select One)

Reviewer:

Comments:

Contact for information if questions arise:
Name: Jeffrey P. Youngblood
Phone Number: 496-2294
E-mail: jpyoungb@purdue.edu
Campus Address: ARMS 2233

Course Subject Abbreviation and Number: MSE 56700

Course Title: Polymer Synthesis

A. Justification for the Course:

- Provide a complete and detailed explanation of the need for the course (e. g., in the preparation of students, in providing new knowledge/training in one or more topics, in meeting degree requirements, etc.), how the course contributes to existing majors and/or concentrations, and how the course relates to other graduate courses offered by the department, other departments, or interdisciplinary programs.

- Justify the level of the proposed graduate course (50000- or 60000-level) including statements on, but not limited to: (1) the target audience, including the anticipated number of undergraduate and graduate students who will enroll in the course; and (2) the rigor of the course.

B. Learning Outcomes and Method of Evaluation or Assessment:

- Describe the course objectives and student learning outcomes that address the objectives (i.e., knowledge, communication, critical thinking, ethical research, etc.).

- Describe the methods of evaluation or assessment of student learning outcomes. (Include evidence for both direct and indirect methods.)

- Grading criteria (select from dropdown box); include a statement describing the criteria that will be used to assess students and how the final grade will be determined.

Criteria Exams and Quizzes

- Identify the method(s) of instruction (select from dropdown box) and describe how the methods promote the likely success of the desired student learning outcomes.

Method of Instruction Lecture

C. Prerequisite(s):

- List prerequisite courses by subject abbreviation, number, and title.
- List other prerequisites and/or experiences/background required. If no prerequisites are indicated, provide an explanation for their absence.

D. Course Instructor(s):

- Provide the name, rank, and department/program affiliation of the instructor(s).
- Is the instructor currently a member of the Graduate Faculty? ___ Yes ___ No
  (If the answer is no, indicate when it is expected that a request will be submitted.)

E. Course Outline:

- Provide an outline of topics to be covered and indicate the relative amount of time or emphasis devoted to each topic. If laboratory or field experiences are used to supplement a lecture course, explain the value of the experience(s) to enhance the quality of the course and student learning. For special topics courses, include a sample outline of a course that would be offered under the proposed course.

F. Reading List (including course text):

- A primary reading list or bibliography should be limited to material the students will be required to read in order to successfully complete the course. It should not be a compilation of general reference material.
- A secondary reading list or bibliography should include material students may use as background information.

G. Library Resources

- Describe the library resources that are currently available or the resources needed to support this proposed course.

H. Example of a Course Syllabus (While not a necessary component of this supporting document, an example of a course syllabus is available, for information, by clicking on the link below, which goes to the *Graduate School's Policies and Procedures Manual for Administering Graduate Student Programs*. See Appendix K.)

http://www.gradschool.purdue.edu/downloads/Graduate_School_Policies_and_Procedures_Manual.pdf

SUPPORTING DOCUMENT FOR MSE 56700
NEW GRADUATE COURSE

A. Justification for the Course:

The primary purpose of this course is to develop an understanding of how polymers are made synthetically, both in the laboratory and industrially, as well as understand critical factors such as reaction kinetics and polymer properties.

This class goes across a variety of disciplines (MSE, CHM, CHE & BME) and the content has been coordinated with MSE 525 (Structure-Property Relationships of Engineering Polymers) and CHE 544 (Structure and Physical Behavior of Polymer Systems). Expected enrollment would be between 10-15 graduate level students and 5-10 undergraduate level students.

The goals of this class are to analyze properties of a polymer and correlate them to chemical structure; to present methods and mechanisms of polymer chemistry and apply them to industrial and everyday realities; to examine the kinetic and design factors that control polymer structures.

B. Learning Outcomes and Method of Evaluation of Assessment:

Upon completion of the course, the student will understand, predict and design polymer properties based on polymer structure and how and why certain reactions take place through mechanisitic means. They will be able to produce a polymer structure based on known reactants and retrosynthetically design a chemical route to a variety of polymer structures. As well as, intuitively grasp the kinetic factors involved to predict such things a molecular weight, polydispersity, and others. They will understand polymer chemistry in relation to everyday materials and why industrial practice is as is.

Grading criteria will be derived from 3 mid-term exams and 1 comprehensive final and

C. Prerequisites: CHEM 257, Organic chemistry

D. Course Instructor: Professor Jeffrey P. Youngblood, Associate Professor of Materials Engineering and, currently, Chairman of the MSE Graduate Committee

E. Course Outline

Week	*Topic*
1	Basic organic chemistry, basic polymer structure
2	T_g; T_m, gel point, geometric and stereo isomerism, MW, step vs. chain polymers
3	Step Polymers: esters, carbonates, amides, imides, urethanes
4	Step Polymers: phenolics, urea-formaldehyde, epoxy, silicones, specialties

Exam 1

5 Step Polymers: kinetics; Radical Chain: intro, T_c, initiation, propagation,

6 Radical Chain: termination, chain transfer, inhibition/retardation, acceleration,

7 Radical Chain: reaction kinetics; ATRP; TEMPO;

8 Copolymerization, Emulsion Polymerization

Exam 2

9 Anionic Chain: intro, initiation, termination, end control,

10 Anionic Chain: structure; Cationic Chain: initiation, propagation, termination

11 Anionic and cationic kinetics, ring opening polymerization

12 Basic organometallic chemistry

Exam 3

13 Catalysis: Ziegler-Natta;

14 Catalysis: olefin metathesis

15 Heteroatom Polymers, Conducting Polymers; Tie-in; review

Final

F. Reading List:
Textbook: "Principles of Polymerization", 4th Ed., G. Odian (Wiley-Itnerscience, 2004)

G. Library Resources

H. Example of Course Syllabus

Office of the Registrar
FORM 40G REV. 7/08

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REQUEST FOR ADDITION, EXPIRATION, OR REVISION OF A GRADUATE COURSE
(50000-60000 LEVEL)

Print Form

EFD 3/09

DEPARTMENT School of Materials Engineering

EFFECTIVE SESSION Spring 2010

INSTRUCTIONS: Please check the items below which describe the purpose of this request.

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PROPOSED:		EXISTING:	
Subject Abbreviation	MSE	Subject Abbreviation	
Course Number	587	Course Number	
Long Title	Polymer Synthesis		
Short Title	polymer synthesis		

Abbreviated title will be entered by the Office of the Registrar if omitted. (30 CHARACTERS ONLY)

TERMS OFFERED
Check All That Apply:
[ ] Summer [ ] Fall [X] Spring

CAMPUS(ES) INVOLVED
[ ] Calumet [ ] N. Central
[ ] Cont Ed [ ] Tech Statewide
[ ] Ft. Wayne [X] W. Lafayette
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CREDIT TYPE
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2. Variable Credit Range:
Minimum Cr. Hrs
(Check One) To [ ] Or [ ]
Maximum Cr. Hrs.
3. Equivalent Credit: Yes [ ] No [ ]
4. Thesis Credit: Yes [ ] No [ ]

COURSE ATTRIBUTES: Check All That Apply
1. Pass/Not Pass Only [ ]
2. Satisfactory/Unsatisfactory Only [ ]
3. Repeatable [ ]
Maximum Repeatable Credit: [ ]
4. Credit by Examination [ ]
5. Special Fees [ ]
6. Registration Approval Type
Department [ ] Instructor [ ]
7. Variable Title [ ]
8. Honors [ ]
9. Full Time Privilege [ ]
10. Off Campus Experience [ ]

Schedule Type	Minutes Per Mtg	Meetings Per Week	Weeks Offered	% of Credit Allocated
	50	3	16	100
Lecture				
Recitation				
Presentation				
Laboratory				
Lab Prep				
Studio				
Distance				
Clinic				
Experiential				
Research				
Ind. Study				
Pract/Observ				

Cross-Listed Courses

COURSE DESCRIPTION (INCLUDE REQUISITES/RESTRICTIONS):

Sem. 2, Class 3, Cr. 3 (Offered in Alternate Years), Prerequisite: CHEM 257 Organic Chemistry
Analyze properties of polymers and correlate them to chemical structure. Apply methods and mechanisms of polymer chemistry to industrial and laboratory synthesis. Examine the kinetic and design factors that control polymer structures.

Calumet Department Head	Date	Calumet School Dean	Date	Calumet Undergrad Curriculum Committee	Date
Fort Wayne Department Head	Date	Fort Wayne School Dean	Date	Fort Wayne Chancellor	Date
Indianapolis Department Head	Date	Indianapolis School Dean	Date	R. Cipra Undergrad Curriculum Committee	3/16/2010 Date
North Central Department Head	Date	North Central Chancellor	Date	Date Approved by Graduate Council	
West Lafayette Department Head	12/5/09 Date	West Lafayette College/School Dean	8/02/10 Date	Graduate Council Secretary	Date
Graduate Area Committee Convener	Date	Graduate Dean	Date	West Lafayette Registrar	Date

OFFICE OF THE REGISTRAR

PURDUE
UNIVERSITY

SCHOOL OF MATERIALS ENGINEERING

Engineering Faculty Document No. 31-09
December 3, 2009

TO: The Engineering Faculty

FROM: The Faculty of the School Materials Engineering

DATE: November 17, 2008

RE: New Dual-Level Course, MSE 567

The faculty of the School of Materials Engineering have approved the following new course and is being submitted to the Engineering Faculty with a recommendation for approval:

MSE 567 Polymer Synthesis
Sem. 2. Class 3, Cr. 3. (Offered in Alternate Years)
Prerequisites: CHEM 257 Organic Chemistry

Description: Analyze properties of polymers and correlate them to chemical structure. Apply methods and mechanisms of polymer chemistry to industrial and laboratory synthesis. Examine the kinetic and design factors that control polymer structures.

Reason: This class has now been offered three times, in Fall 2004 (25 students), Fall 2006 (17 students), and Spring 2008 (16 students) with good enrollment from students across a variety of disciplines (MSE, Chem, ChemE, BME). The primary purpose of this course is to develop an understanding of how polymers are made synthetically, both in the laboratory and industrially, as well as understand critical factors such as reaction kinetics and polymer properties. The techniques cover a large design space of polymers, however, the focus is on commodity, engineering and specialty resins to give an insight into the importance of the respective material that is being discussed. The content of this course has been coordinated with MSE 525 (Structure-Property Relationships of Engineering Polymers) and CHE 544 (Structure and Physical Behavior of Polymer Systems).

Sincerely yours,

Keith J. Bowman
Head and Professor
School of Materials Engineering
Professor, School of Engineering Education
(by courtesy)

APPROVED FOR THE FACULTY
OF THE SCHOOLS OF ENGINEERING
BY THE ENGINEERING
CURRICULUM COMMITTEE

ECC Minutes _____

Date _____

Chairman ECC _____

School of Materials Engineering
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