**PURDUE UNIVERSITY**
REQUEST FOR ADDITION, EXPIRATION,
OR REVISION OF AN UNDERGRADUATE COURSE
(10000-49999 LEVEL)

**DEPARTMENT** School of Electrical and Computer Engineering (ECE)  
**EFFECTIVE SESSION** Fall 2011  
**SUMMER 2012 (201230)**

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

- [X] New course with supporting documents
-  
-  
-  
-  
-  
-  
-  
-  

**PROPOSED:**

<table>
<thead>
<tr>
<th>Subject Abbreviation</th>
<th>ECE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course Number</td>
<td>30834</td>
</tr>
<tr>
<td>Long Title</td>
<td>Fundamentals of Computer Graphics</td>
</tr>
<tr>
<td>Short Title</td>
<td>Fund of Computer Graphics</td>
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**EXISTING:**

<table>
<thead>
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<th>Subject Abbreviation</th>
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**TERMS OFFERED**

- [ ] Summer
- [X] Fall
- [ ] Spring

**CAMPUS(ES) INVOLVED**

- Calumet
- Cont Ed
- Ft. Wayne
- Indianapolis
- [X] W. Lafayette

**CREDIT TYPE**

1. Fixed Credit: Cr. Hrs. 3
2. Variable Credit Range: 
   - Minimum Cr. Hrs.  
   - Maximum Cr. Hrs.  
3. Equivalent Credit: Yes

**COURSE ATTRIBUTES:**

- [ ] Pass/Not Pass Only
- [ ] Satisfactory/Unsatisfactory Only
- [ ] Repeatable
- [ ] Maximum Repeatable Credit:  
- [ ] Credit by Examination
- [ ] Special Fees
- [ ] Registration Approval Type
- [ ] Instructor
- [ ] Variety Title
- [ ] Honors
- [ ] Full Time Privilege
- [ ] Off Campus Experience

**Schedule Type**

- Lecture
- Recitation
- Presentation
- Laboratory
- Lab Prep
- Studio
- Experiential
- Research
- Ind. Study
- Pract/Obs

- Minutes Per Week 50
- Weeks Offered 16
- % of Credit Allocated 100

**COURSE DESCRIPTION (INCLUDE REQUISITES/RESTRICTIONS):**

See attachment.

**COURSE LEARNING OUTCOMES:**

See attachment.

**Calumet Department Head**

Date

**Calumet School Dean**

Date

**Fort Wayne Department Head**

Date

**Fort Wayne School Dean**

Date

**Indianapolis Department Head**

Date

**Indianapolis School Dean**

Date

**North Central Department Head**

Date

**North Central Chancellor**

Date

**West Lafayette Department Head**

Date

**West Lafayette College/School Dean**

Date

**West Lafayette Registrar**

Date

**OFFICE OF THE REGISTRAR**

LD 1/25/12
Form 40 Attachments

School of Electrical and Computer Engineering (EFD 54-10)

Description: Fundamental principles and techniques of computer graphics. The course covers the basics of going from a scene representation to a raster image using OpenGL. Specific topics include coordinate manipulations, perspective, basics of illumination and shading, color models, texture maps, clipping and basic raster algorithms, fundamentals of scene constructions.

Restrictions: Must be enrolled in the School of Electrical and Computer Engineering

Prerequisites: ECE 36800

Course Learning Outcomes:

i. an understanding of the design issues for creating raster graphics.
ii. an ability to apply rendering techniques to an actual computer graphics problem and associated datasets.
iii. an understanding of object transformations, representations, transformations and perspective projections.
iv. an understanding of color, illumination, and shading techniques.
v. an understanding of the rendering and rasterization techniques.
vi. an understanding of the application of computer graphics techniques to visualization, animation, and computer aided design.
TO: The Faculty of the College of Engineering
FROM: The Faculty of the School of Electrical and Computer Engineering
RE: New Undergraduate Course: ECE 30834, Fundamentals of Computer Graphics (Cross-listed with CS 33400)

The faculty of the School of Electrical and Computer Engineering has approved the following new course. This action is now submitted to the Engineering Faculty with a recommendation for approval.

ECE 30834 Fundamentals of Computer Graphics
Sem. Fall, Spring; Cr. 3, Lecture 3
Prerequisites: ECE 36800
Restrictions: Must be enrolled in: School of Electrical and Computer Engineering
Description: Fundamental principles and techniques of computer graphics. The course covers the basics of going from a scene representation to a raster image using OpenGL. Specific topics include coordinate manipulations, perspective, basics of illumination and shading, color models, texture maps, clipping and basic raster algorithms, fundamentals of scene constructions.

Reason: The experimental version of this course (ECE 495E/49500) has been offered jointly with Computer Science (cross-listed with CS 33400) in Fall 2003, Spring 2004, Fall 2004, Fall 2006, Spring 2007, Spring 2008, Fall 2008, Spring 2009, Fall 2009 (15 enrolled), Spring 2010 (21 enrolled), and Fall 2010 (17 enrolled). This course is a popular computer engineering elective for BSCmpE students.

[Signatures]
on behalf of V. Balakrishnan, Head
School of Electrical and Computer Engineering

Suni Prabhakar, Interim Head
Department of Computer Science

APPROVED FOR THE FACULTY OF THE SCHOOLS OF ENGINEERING BY THE ENGINEERING CURRICULUM COMMITTEE
ECC Minutes: 6
Date: 10/31/2011
Chairman ECC: [Signature]
ECE 30834 - Fundamentals of Computer Graphics

Lecture Hours: 3.0 Credits: 3.0

Requisites:
ECE 36800

Requisites by Topic:
Programming, Data Structures

Catalog Description:
This course will cover basic and advanced principles of interactive computer graphics: raster graphics, color models, anti-aliasing and texture, image-space and object-space methods, 3D homogeneous coordinates, perspective, illumination models, depth cueing, hidden line elimination, morphing and other techniques.

Supplementary Information:
Spring 2009 CRN 17254

Required Text(s):


Recommended Text(s): None.

Course Outcomes:

A student who successfully fulfills the course requirements will have demonstrated:

i. an understanding of the design issues for creating raster graphics. [1,4; b,c,j]
ii. an ability to apply rendering techniques to an actual computer graphics problem and associated datasets. [1,3,4; a,c,e,k]
iii. an understanding of object transformations, representations, transformations and perspective projections. [1,2,3,4; a]
iv. an understanding of color, illumination, and shading techniques. [1,3,4; a]
v. an understanding of the rendering and rasterization techniques. [1,3,4; a]
vi. an understanding of the application of computer graphics techniques to visualization, animation, and computer aided design. [7; j,k]

Assessment Method for Course Outcomes: The course outcomes will be assessed through student submission of working programs, and two in class examinations.

Lecture Outline:
Supporting Documentation EFD 54-10

<table>
<thead>
<tr>
<th>Week(s)</th>
<th>Topics</th>
</tr>
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<tbody>
<tr>
<td>1-2</td>
<td>Brief overview of computer graphics and architecture (rendering pipeline), graphics software, and graphics applications. Introduction to the OpenGL library, example programs.</td>
</tr>
<tr>
<td>3</td>
<td>Raster basics: drawing lines and circles, clipping algorithms, polygon intersection. Alias effects, techniques to counter them.</td>
</tr>
<tr>
<td>4-5</td>
<td>From scene to image: Objects, transforms, color and illumination models, polygonal object representation, texture maps, view port clipping, rasterization.</td>
</tr>
<tr>
<td>6-7</td>
<td>Perspective and projection, affine and projective coordinates, rigid body motions. Object manipulation, concepts from projective geometry.</td>
</tr>
<tr>
<td>8-9</td>
<td>Color perception and color models, local illumination, ambient, diffuse and specular light models. Material properties. Gouraud and Phong shading.</td>
</tr>
<tr>
<td>10-11</td>
<td>Basic ray tracing, direct and indirect illumination, reflection and refraction. Constructive Solid Geometry (CSG), ray tracing CSG models.</td>
</tr>
<tr>
<td>14-15</td>
<td>Survey of basic tools and techniques for animation, scientific visualization, and computer-aided design.</td>
</tr>
</tbody>
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**Engineering Design Content:**

- Analysis
- Construction
- Testing
CS 33400 - Fundamentals Of Computer Graphics

Credit Hours: 3.00. Fundamental principles and techniques of computer graphics. The course covers the basics of going from a scene representation to a raster image using OpenGL. Specific topics include coordinate manipulations, perspective, basics of illumination and shading, color models, texture maps, clipping and basic raster algorithms, fundamentals of scene constructions. CS 314 is recommended. Typically offered Fall.
0.000 OR 3.000 Credit hours

Levels: Graduate, Professional, Undergraduate
Schedule Types: Distance Learning, Lecture, Practice Study Observation

All Sections for this Course

Offered By: College of Science
Department: Computer Science

Course Attributes:
CH Technical Electives, Upper Division

May be offered at any of the following campuses:
West Lafayette

Restrictions:
Must be enrolled in one of the following Programs:
  Computer Science-BS
  Elect Comp Engr-BSE
  Computer Engr-BSE

Prerequisites:
(Undergraduate level MA 26500 Minimum Grade of D- or Undergraduate level MA 35000 Minimum Grade of D- or Undergraduate level MA 35100 Minimum Grade of D-) and (Undergraduate level CS 24000 Minimum Grade of D- or (Undergraduate level FCE 26400 Minimum Grade of D- or Undergraduate level EE 26400 Minimum Grade of D-) and (Undergraduate level FCE 36800 Minimum Grade of D- [may be taken concurrently]) or Undergraduate level EE 36800 Minimum Grade of D-)