**Courses must be submitted by October 15, 2010, and finalized by the end of the fall semester to make the next catalog (2011-12) production**

DATE (CHANGE DATE EACH TIME REVISED):  APRIL 21, 2011; REV 9.8.11
PROGRAM AREA(S) :  COMP, MATH, PHYS
**Directions:  All of sections of this form must be completed for course modifications. Use YELLOWED areas to enter data.  All documents are stand alone sources of course information.**

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1. **Indicate Changes and Rationale for the Change.** *[Mark all change areas that apply and follow with justification.  Be as brief as possible but, use as much space as necessary.]*

| | |
|---|---|
| ☐ Course title | ☐ Course Content |
| x Prefix/suffix | ☐ Course Learning Outcomes |
| ☐ Course number | ☐ References |
| ☐ Units | ☐ GE |
| ☐ Staffing formula and enrollment limits | ☐ Other ☐ |
| ☐ Prerequisites/Corequisites | ☐ Reactivate Course |
| x Catalog description | |
| ☐ Mode of Instruction | |

**Rationale:**  PHYS 510 has been a core course for the MS in Mathematics and the MS in Computer Science courses since its inception. It uses and teaches significant mathematical and computer science tools to explore topics in image analysis. Cross-listing this course better reflects the nature of the course.

2. **Course Information.**
*[Follow accepted catalog format.]* (**Add additional prefixes i f cross-listed**)

| OLD | NEW |
|---|---|
| Prefix PHYS  Course# 510 | Prefix COMP/MATH/PHYS  Course# 510 |
| Title Advanced Image Analysis Techniques  Units (3) | Title Advanced Image Analysis Techniques  Units (3) |
| 3 hours  lecture per week | 3 hours  lecture per week |
| ☐ hours  blank per week | ☐ hours blank  per week |
| ☐ Prerequisites:  Admission to the Computer Science or Mathematics Graduate Program | ☐ Prerequisites:  Admission to the MS in Mathematics Program or MS in Computer Science Program |
| ☐ Consent of Instructor Required for Enrollment | ☐ Consent of Instructor Required for Enrollment |
| ☐ Corequisites: ☐ | ☐ Corequisites: ☐ |
| **Catalog Description** (Do not use any symbols): | **Catalog Description** (Do not use any symbols)**:** |
| Image processing course in the fundamentals of 2-D digital signal processing with emphasis in image processing techniques, image filtering design and applications. Programming exercises in Matlab (or Octave) will be used to implement the various processes, and their performance on synthetic and real images will be studied. Applications in medicine, robotics, consumer electronics and communications. | Fundamentals of 2-D digital signal processing with emphasis in image processing techniques, image filtering design and applications. Programming exercises in Matlab (or Octave) will be used to implement the various processes, and their performance on synthetic and real images will be studied. Applications in medicine, robotics, consumer electronics and communications. |
| General Education Categories: ☐ | General Education Categories: ☐ |
| Grading Scheme (Select one below): | Grading Scheme (Select one below): |
| x  A – F | x  A – F |
| ☐  Credit/No Credit | ☐  Credit/No Credit |
| ☐  Optional (Student's Choice) | ☐  Optional (Student's Choice) |
| Repeatable for up to ☐  units | Repeatable for up to ☐  units |
| Total Completions  1 | Total Completions  1 |
| Multiple Enrollment in Same Semester  Y/N   N | Multiple Enrollment in Same Semester  Y/N   N |
| Course Level: | Course Level: |
| ☐  Undergraduate | ☐  Undergraduate |
| ☐  Post-Baccalaureate | ☐  Post-Baccalaureate |
| x Graduate | x Graduate |

**3. Mode of Instruction (Hours per Unit are defaulted)**  Hegis Code(s)_____

**Existing**

| | Units | Hours Per Unit | Benchmark Enrollment | Graded |
|---|---|---|---|---|
| Lecture | **3** | **1** | **24** | x |
| Seminar | | **1** | | |
| Lab | | **3** | | |
| Activity | | **2** | | |
| Field Studies | | | | |
| Indep Study | | | | |
| Other blank | | | | |

**Proposed**

| | Units | Hours Per Unit | Benchmark Enrollment | Graded | CS No. (filled out by Dean) |
|---|---|---|---|---|---|
| Lecture | **3** | **1** | **24** | x | |
| Seminar | | **1** | | | |
| Lab | | **3** | | | |
| Activity | | **2** | | | |
| Field Studies | | | | | |
| Indep Study | | | | | |
| Other blank | | | | | |

## 4. Course Attributes:

General Education Categories: All courses with GE category notations (including deletions) must be submitted to the GE website: http://summit.csuci.edu/geapproval. Upon completion, the GE Committee will forward your documents to the Curriculum Committee for further processing.

**A (English Language, Communication, Critical Thinking)**
  A-1 Oral Communication
  A-2 English Writing
  A-3 Critical Thinking

**B (Mathematics, Sciences & Technology)**
  B-1 Physical Sciences
  B-2 Life Sciences – Biology
  B-3 Mathematics – Mathematics and Applications
  B-4 Computers and Information Technology

**C (Fine Arts, Literature, Languages & Cultures)**
  C-1 Art
  C-2 Literature Courses
  C-3a Language
  C-3b Multicultural
  **D (Social Perspectives)**
  **E (Human Psychological and Physiological Perspectives)**
  **UDIGE/INTD Interdisciplinary**
  **Meets University Writing Requirement**
  **Meets University Language Requirement**

**American Institutions, Title V Section 40404**: Government   US Constitution   US History
Refer to website, Exec Order 405, for more information: http://senate.csuci.edu/comm/curriculum/resources.htm
**Service Learning Course** (Approval from the Center for Community Engagement must be received before you can request this course attribute).

**5. Justification and Requirements for the Course.** *[Make a brief statement to justify the need for the course]*

**OLD**
The course is a core course for MS in Computer Science and MS in Applied Mathematics.

**NEW**
The course is a core course for MS in Mathematics and the MS in Computer Science.

  Requirement for the Major/Minor
x Elective for the Major/Minor
  Free Elective

  Requirement for the Major/Minor
x Elective for the Major/Minor
  Free Elective

**Submit Program Modification if this course changes your program.**

**6. Student Learning Outcomes.** (List in numerical order. You may wish to visit resource information at the following website: http://senate.csuci.edu/comm/curriculum/resources.htm)

Upon completion of the course, the student will be able to:

**OLD**

1. match, register, recognize, classify, and cluster, 2D data
2. analyze complex image configurations.
3. Demonstrate knowledge of image processing techniques
4. write original computer code for a image analysis
5. use applications of 2D analysis in algorithms
6. analyze scientific visualization processes.
7. organize and express ideas clearly and convincingly in oral and written forms.

Upon completion of the course, the student will be able to:

**NEW**

1. Match, register, recognize, classify, and cluster 2D data
2. Analyze complex image configurations
3. Demonstrate knowledge of image processing techniques
4. Write original computer code for an image analysis
5. Use applications of 2D analysis in algorithms
6. Analyze scientific visualization processes
7. Organize and express ideas clearly and convincingly in oral and written forms

**7. Course Content in Outline Form.** (Be as brief as possible, but use as much space as necessary)

**OLD**

a) 2-D digital signal processing
b) image processing techniques
c) image filtering design and applications
d) programming to implement the various processes
e) performance on synthetic and real images
f) applications in medicine, robotics, consumer electronics and communications

**NEW**

a) 2-D digital signal processing
b) image processing techniques
c) image filtering design and applications
d) programming to implement the various processes
e) performance on synthetic and real images
f) applications in medicine, robotics, consumer electronics and communications

**Does this course content overlap with a course offered in your academic program? Yes** ▮ **No** ▮
**If YES, what course(s) and provide a justification of the overlap.** ▮

**Does this course content overlap a course offered in another academic area? Yes** ▮ **No** ▮
**If YES, what course(s) and provide a justification of the overlap.** ▮

**Overlapping courses require Chairs' signatures.**

**8. Cross-listed Courses (Please note each prefix in item No. 1)**
      **A. List cross-listed courses (Signature of Academic Chair(s) of the other academic area(s) is required).**
      **B. List each cross-listed prefix for the course: COMP, MATH, PHYS**
      **C. Program responsible for staffing: MATH/PHYS**

**9. References.** *[Provide 3-5 references]*

**OLD**

- *Geometric Tools for Computer Graphics (The Morgan Kaufmann Series in Computer Graphics and Geometric Modeling) P*hilip J. Schneider, David H. Eberly , Morgan Kaufmann; 2002, ISBN: 1558605940
- *Beyond the Third Dimension: Geometry, Computer Graphics, and Higher Dimensions ,* Thomas F. Banchoff, Scientific American Library Series, W H Freeman & Co., 1996, ISBN: 0716760150
- *Advanced Animation and Rendering Techniques,* Wall, Addison-Wesley, 1999, 0201544121

**NEW**

- *Geometric Tools for Computer Graphics (The Morgan Kaufmann Series in Computer Graphics and Geometric Modeling) P*hilip J. Schneider, David H. Eberly , Morgan Kaufmann; 2002, ISBN: 1558605940

- *Beyond the Third Dimension: Geometry, Computer Graphics, and Higher Dimensions ,* Thomas F. Banchoff, Scientific American Library Series, W H Freeman & Co., 1996, ISBN: 0716760150
*Advanced Animation and Rendering Techniques,* Wall, Addison-Wesley, 1999, 0201544121

**10. Tenure Track Faculty qualified to teach this course.**
Physics and Mathematics Faculty, particularly Dr. Geoff Dougherty and Dr. Kathryn Leonard

**11. Requested Effective Date or First Semester offered:  S'12**

**12. New Resource Requested:   Yes** ▮   **No** x
**If YES, list the resources needed.**

   **A. Computer Needs (data processing, audio visual, broadcasting, other equipment, etc.)**

   **B. Library Needs (streaming media, video hosting, databases, exhibit space, etc.)**

   **C. Facility/Space/Transportation Needs:**

   **D. Lab Fee Requested: Yes** ▮   **No** ▮   **( Refer to the Dean's Office for additional processing)**
   **E. Other.** ▮

**13. Will this course modification alter any degree, credential, certificate, or minor in your program? Yes** ▮  **No** x
If, YES attach a program update or program modification form for all programs affected.
Priority deadline for New Minors and Programs:  October 4, 2010 of preceding year.
Priority deadline for Course Proposals and Modifications:   October 15, 2010.
Last day to submit forms to be considered during the current academic year:  April 15th.

Cindy Wyels (Director, MS in Mathematics)                                          4/21/11

Proposer(s) of Course Modification                                         Date
Type in name.  Signatures will be collected after Curriculum approval.

# Approval Sheet

**Course:** PHYS 510 (cross-list as COMP/ MATH/ PHYS 510)
If your course has a General Education Component or involves Center affiliation, the Center will also sign off during the approval process.

Multiple Chair fields are available for cross-listed courses.

| Program Chair | | |
|---|---|---|
| | Signature | Date |

| Program Chair | | |
|---|---|---|
| | Signature | Date |

| Program Chair | | |
|---|---|---|
| | Signature | Date |

| General Education Chair | | |
|---|---|---|
| | Signature | Date |

| Center for Intl Affairs Director | | |
|---|---|---|
| | Signature | Date |

| Center for Integrative Studies Director | | |
|---|---|---|
| | Signature | Date |

| Center for Multicultural Engagement Director | | |
|---|---|---|
| | Signature | Date |

| Center for Civic Engagement and Service Learning  Director | | |
|---|---|---|
| | Signature | Date |

| Curriculum Chair | | |
|---|---|---|
| | Signature | Date |

| Dean of Faculty | | |
|---|---|---|
| | Signature | Date |