<table>
<thead>
<tr>
<th>New Course Request</th>
<th>Indiana University</th>
<th>Indianapolis Campus</th>
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<tbody>
<tr>
<td>Check Appropriate Boxes:</td>
<td>Undergraduate credit</td>
<td>Graduate credit</td>
</tr>
<tr>
<td>1. School/Division</td>
<td>Science / Mathematical Sciences</td>
<td>2. Academic Subject Code</td>
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<tr>
<td>3. Course Number</td>
<td>171</td>
<td>4. Instructor</td>
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<tr>
<td>5. Course Title</td>
<td>Multidimensional Mathematics</td>
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<tr>
<td>Recommended Abbreviation (Optional)</td>
<td>(Limited to 32 Characters including spaces)</td>
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<td>6. First time this course is to be offered (Semester/Year):</td>
<td>Fall 2008</td>
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<td>7. Credit Hours: Fixed at</td>
<td>3</td>
<td>or Variable from</td>
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<td>8. Is this course to be graded S-F (only)? Yes No X</td>
<td>Yes No X</td>
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<td>10. Course description (not to exceed 50 words) for Bulletin publication:</td>
<td>P: 159 or 154 (minimum grade of C) or equivalent, and one year of high school geometry. Fall, Spring, Summer. An introduction to mathematics in more than two dimensions. Graphing of curves, surfaces and functions in three dimensions. Two and three dimension vector spaces with vector operations. Solving systems of linear equations using matrices. Basic matrix operations and determinants.</td>
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<td>11. Lecture Contact Hours: Fixed at</td>
<td>3</td>
<td>or Variable from</td>
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<tr>
<td>12. Non-Lecture Contact Hours: Fixed at</td>
<td>0</td>
<td>or Variable from</td>
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<td>13. Estimated enrollment:</td>
<td>80</td>
<td>of which 0 percent are expected to be graduate students.</td>
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<td>14. Frequency of scheduling:</td>
<td>Every Sem</td>
<td>Will this course be required for majors? Yes.</td>
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<td>15. Justification for new course:</td>
<td>To introduce students to multidimensional math at an earlier stage in their career.</td>
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<td>16. Are the necessary reading materials currently available in the appropriate library?</td>
<td>Yes.</td>
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<td>17. Please append a complete outline of the proposed course, and indicate instructor (if known), textbooks, and other materials.</td>
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<td>18. If this course overlaps with existing courses, please explain with which courses it overlaps and whether this overlap is necessary, desirable, or unimportant.</td>
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<td>19. A copy of every new course proposal must be submitted to departments, schools, or divisions in which there may be overlap of the new course with existing courses or areas of strong concern, with instructions that they send comments directly to the originating Curriculum Committee. Please append a list of departments, schools, or divisions thus consulted.</td>
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Submitted by:  
Barbara
Department Chairman/Division Director  
Date: 3/2/08

Approved by:  
[Signature]  
Date: 3/14/08

Dean
Chancellor/Vice-President

Dean of Graduate School (when required)

University Enrollment Services

After School/Division approval, forward the last copy (without attachments) to University Enrollment Services for initial processing, and the remaining four copies and attachments to the Campus Chancellor or Vice-President.

UPS 724  
University Enrollment Services Final—White; Chancellor/Vice-President—Blue; School/Division—Yellow; Department/Division—Pink; University Enrollment Services Advance—White
Math 171 - Multidimensional Mathematics

Course Outline and Syllabus

Objectives
To introduce students to mathematics in more than two dimensions. To develop the ability to graph curves, surfaces and functions in three dimensions. To understand different coordinate systems. To introduce students to two and three dimensional vector spaces and vector operations. To introduce students to the use of matrices to solve linear equations and to familiarize the students with basic matrix operations.

Textbooks


Content

1. In two dimensions students will learn
   • graph sketching, conic sections, parametric equations for curves
   • the relationship between Cartesian and polar coordinate systems
   • complex numbers, their geometric representation and roots of algebraic equations

2. The students will be introduced to $\mathbb{R}^2$ and $\mathbb{R}^3$ as vector spaces
   • Cartesian coordinates for $\mathbb{R}^3$
   • vectors in two and three dimensions
   • the dot and cross products
   • orthogonality
   • vector equations for lines and planes

3. The students will learn about the geometry of $\mathbb{R}^3$ including
   • lines and planes
   • parametric equations for curves
   • functions of two variables and their graphs
   • level curves and contour maps for functions of two variables
   • quadric surfaces
   • surfaces of revolution
   • parametric equations for surfaces
   • the relationship between Cartesian, cylindrical and spherical coordinate systems
4. Students will learn about the relationship between linear equations and matrices including
   - solving systems of equations using matrices
   - Gaussian elimination and row-echelon forms
   - matrix operations
   - inverse matrices
   - determinants for $2 \times 2$, $3 \times 3$ and $4 \times 4$ matrices
DEPARTMENT: Mathematical Sciences

EFFECTIVE SESSION: Fall 2006

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

- New course with supporting documents
- Add existing course offered at another campus
- Expiration of a course
- Change in course number
- Change in course title
- Change in course credit/credit type
- Change in course attributes (department head signature only)
- Change in instructional hours
- Change in course description
- Change in course requisites
- Change in semesters offered (department head signature only)
- Transfer from one department to another

PROPOSED:
- Subject Abbreviation: MATH
- Course Number: 171
- Long Title: MultiDimensional Mathematics
- Short Title: MultiDimensional Math

EXISTING:

TERMS OFFERED:
- Summer  ☑
- Fall  ☑
- Spring

CAMPUS(E) INVOLVED:
- Calumet
- Cont Ed
- Ft. Wayne
- Tech Statewide
- Indianapolis
- X West Lafayette

CREDIT TYPE:

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<th>Credit Type</th>
<th>Minimum Cr. Hrs.</th>
<th>Maximum Cr. Hrs.</th>
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<td>Variable Credit Range:</td>
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<tr>
<td>Maximum Cr. Hrs.</td>
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Equivalent Credit: Yes ☑ No ☐

Institutional Type:

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<th>Instructional Type</th>
<th>Minutes Per Mtg.</th>
<th>Meetings Per Week</th>
<th>Weeks Offered</th>
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COURSE ATTRIBUTES:

- Pass/No Pass Only ☑
- Satisfactory/Unsatisfactory Only ☑
- Repeatable ☑
- Maximum Repeatable Credit:  
- Credit by Examination ☑
- Designator Required ☑
- Special Fees ☑
- Registration Approval Type: Department ☑ Instructor ☑
- Variable Title ☑
- Remedial ☑
- Honors ☑
- Full Time Privilege ☑
- Off Campus Experience ☑

COURSE DESCRIPTION (INCLUDE REQUISITES):

P: 159 or 154 (minimum grade of C) or equivalent, and one year of high school geometry. An introduction to mathematics in more than two dimensions. Graphing of curves, surfaces and functions in three dimensions. Two and three dimensional vector spaces with vector operations. Solving systems of linear equations using matrices. Basic matrix operations and determinants.

Calumet Department Head Date
Calumet School Dean Date

Ft. Wayne Department Head Date
Ft. 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