# Official Course Outline Information

**FACULTY/DEPARTMENT:** PHYSICS

**COURSE NAME/NUMBER:** PHYS 381

**FORMER COURSE NUMBER:** MATH 381

**UC FV CREDITS:** 3

**COURSE DESCRIPTIVE TITLE:** MATHEMATICAL PHYSICS

**CALENDAR DESCRIPTION:**
This course will give students a wide arsenal of mathematical techniques and tools to increase their ability in setting up and solving problems. The solution of partial differential equations with applications to many areas of physics is the biggest single theme of the course. Also included will be special functions, calculus of variations and integral equations.

**NOTE:** Students may obtain credit for either MATH 381 or PHYS 381, but not both. This course is cross-listed as MATH 381.

**PREREQUISITES:** MATH 211, one of PHYS 221 or MATH 255, and one of PHYS 112 or any second year Math course

**COREQUISITES:**

<table>
<thead>
<tr>
<th>SYNONYMOUS COURSE(S)</th>
<th>SERVICE COURSE TO:</th>
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<tbody>
<tr>
<td>(a) Replaces: N/A</td>
<td></td>
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<tr>
<td>(b) Cannot take MATH 381 for further credit</td>
<td>(Department / Program)</td>
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**TOTAL HOURS PER TERM:** 43

**STRUCTURE OF HOURS:**

<table>
<thead>
<tr>
<th>Lectures:</th>
<th>Seminar:</th>
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<tbody>
<tr>
<td>43 hrs</td>
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<tr>
<th>Laboratory:</th>
<th>Field Experience:</th>
<th>Student Directed Learning:</th>
<th>Other (Specify):</th>
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<tbody>
<tr>
<td>hrs</td>
<td>hrs</td>
<td>hrs</td>
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**MAXIMUM ENROLMENT:** 36

**EXPECTED FREQUENCY OF COURSE OFFERING:** Once per year

**WILL TRANSFER CREDIT BE REQUESTED?** (lower-level courses only) YES NO

**WILL TRANSFER CREDIT BE REQUESTED?** (upper-level requested by department) YES NO

**TRANSFER CREDIT EXISTS IN BCCAT TRANSFER GUIDE:** YES NO

**AUTHORIZED SIGNATURES:**

<table>
<thead>
<tr>
<th>Course designer(s):</th>
<th>Chairperson:</th>
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<tbody>
<tr>
<td>Peter Mulhern</td>
<td>(Curriculum Committee)</td>
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<table>
<thead>
<tr>
<th>Department Head:</th>
<th>PAC Approval in Principle Date:</th>
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<tbody>
<tr>
<td>Peter Mulhern</td>
<td>December 14, 2001</td>
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<tr>
<th>Dean:</th>
<th>PAC Final Approval Date:</th>
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<tbody>
<tr>
<td>J. Snodgrass</td>
<td>December 14, 2001</td>
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LEARNING OBJECTIVES / GOALS / OUTCOMES / LEARNING OUTCOMES:

To give the student the ability to model a system, physical or otherwise, as a series of mathematical equations.
To give the student the ability to solve these equations.

METHODS:

Lecture, demonstration, small group practice, discussion, audiovisual presentation, use of models and charts.

PRIOR LEARNING ASSESSMENT RECOGNITION (PLAR):

Credit can be awarded for this course through PLAR  YES  X  NO

METHODS OF OBTAINING PLAR:

Initial oral discussion
Successful completion of a final exam

TEXTBOOKS, REFERENCES, MATERIALS:

[Textbook selection varies by instructor. An example of texts for this course might be:]

C. Ray Wylie and Louis C. Barrett, Advanced Engineering Mathematics
Murray R. Spiegel, Advanced Mathematics for Scientists and Engineers

SUPPLIES / MATERIALS:

STUDENT EVALUATION:

[An example of student evaluation for this course might be:]

Assignments 25%
Midterm 30%
Final exam 45%

COURSE CONTENT:

[Course content varies by instructor. An example of course content might be:]

1. A week of review including the interchanging of limits (differentiating under the integral sign, integrating series term by term etc.). Introduction to the big D operator techniques for solving differential equations.

2. Fourier Series.

3. Fourier Integrals.

4. Special Functions I (Gamma, Beta, Ei, Si, Erf).

5. Special Functions II (Bessel functions, Legendre, Hermite, Laguerre polynomials) Sturm-Liouville systems.


7. Calculus of Variations and applications.