Mathematics

MATH 481  **Vector and Tensor Analysis**  credit: 3 OR 4 hours.
Introductory course in modern differential geometry focusing on examples, broadly aimed at students in mathematics, the sciences,
and engineering. Emphasis on rigorously presented concepts, tools and ideas rather than on proofs. The topics covered include
differentiable manifolds, tangent spaces and orientability; vector and tensor fields; differential forms; integration on manifolds and
Generalized Stokes Theorem; Riemannian metrics, Riemannian connections and geodesics. Applications to configuration and phase
spaces, Maxwell equations and relativity theory will be discussed. 3 or 4 undergraduate hours. 3 or 4 graduate hours. 4 hours of credit
requires approval of the instructor and department with completion of additional work of substance. Prerequisite: MATH 241 and one of
MATH 415 or MATH 416 or equivalent.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
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<tbody>
<tr>
<td>38087</td>
<td>Lecture-Discussion</td>
<td>F13</td>
<td>02:00 PM - 02:50 PM</td>
<td>MWF</td>
<td>145 - Altgeld Hall</td>
<td>Pascaleff, J</td>
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<td>38089</td>
<td>Lecture-Discussion</td>
<td>F14</td>
<td>02:00 PM - 02:50 PM</td>
<td>MWF</td>
<td>145 - Altgeld Hall</td>
<td>Pascaleff, J</td>
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<tr>
<td>69639</td>
<td>Online</td>
<td>XGR</td>
<td>ARRANGED -</td>
<td>-</td>
<td>-</td>
<td>Carpenter, B</td>
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Credit Hours: 3 hours
Open to both undergraduate and graduate students.

Credit Hours: 4 hours
Instructor Approval Required
Not intended for Undergrad - Urbana-Champaign.
Graduate students requesting the 4 credit hour section must first register for the 3 hour section. If the instructor is willing to offer
extra work to graduate students for the 4-hour section, students can get an approval form from 313 Altgeld Hall between the first day
of the semester and the 8th week of the semester.

Restricted to MS: Civil Engr - Online - UIUC, MCS:Computer Sci Online -UIUC, MS:Industrial Engr Online-UIUC, MS:Mechanical
Engineering -UIUC, MS:Env Engr CivilEngr ONL-UIUC, MS: Aerospace Engr-Online-UIUC, or MENG:Mech Engineering Onl-UIUC.
This course is available to undergrads as an online Academic Year term offering. See https://netmath.illinois.edu/college/math-481.
XGR Section restricted to Engineering Online graduate degree-seeking students in MSAE, MSCE, MCS, MSIE, and MSME. For
more details on this course section, see http://engineering.illinois.edu/online/courses/. Non-degree students please register for
MATH 481 M16 section.