Texas A&M University  
Departmental Request for a New Course  
Undergraduate • Graduate • Professional  
* Submit original form and attach a course syllabus. *

1. This request is submitted by the Department of Mechanical Engineering.

2. Course prefix, number and complete title of course: MEEN 616 Foundation of Continuum Mechanics

3. Course description (not to exceed 50 words): Mathematical description of continuum mechanics principles, including: tensor analysis, generalized description of kinematics and motion, conservation laws for mass and momentum, invariance and symmetry principles; application to generalized formulation of constitutive expressions for various fluids and solids.

4. Prerequisite(s): MATH 410, MATH 451 or equivalent

Cross-listed with:

Cross-listed courses require the signature of both department heads.

5. Is this a variable credit course? ☐ Yes ☑ No  
   If yes, from _____ to _____

6. Is this a repeatable course? ☐ Yes ☑ No  
   Will this course be repeated within the same semester? ☐ Yes ☑ No  
   If yes, this course may be taken _____ times.

7. Has this course been taught as a 489/689? ☐ Yes ☑ No  
   If yes, how many times? _____

8. This course will be:
   a. required for students enrolled in the following degree programs(s) (e.g., B.A. in history)

   b. an elective for students enrolled in the following degree program(s) (e.g., M.S., Ph.D. in geography)

M.S. or Ph.D. students in MEEN and other engineering degree programs cannot receive credit for both MEEN 616 and MATH 604

9. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments.  
   Attach approval letters.

10. Prefix | Course # | Title (excluding punctuation)  
        | M E E N | 6 1 6 F O U N D O F C O N T M E C H A N I C S  
        | Lect. | Lab | SCH | CIP and Fund Code | Admin. Unit | Acad. Year | FICE Code | Level |
        | 0 3 0 0 | 0 3 1 4 1 9 0 1 0 0 0 6 1 9 2 0 | 1 - 1 | 0 0 3 6 3 2 |

Approval recommended by:

Head of Department  
Date  
Head of Department (if cross-listed course)  
Date  
Submitted to Coordinating Board by:  
Associate Director, Curricular Services  
Date  
Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra.williams@tamu.edu.
Curricular Services – 10/08
Texas A&M University
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10. Approval recommended by:

    Head of Department Date

    Head of Department (if cross-listed course) Date

    Submitted to Coordinating Board by: Date

    Associate Director, Curricular Services Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra.williams@tamu.edu.
Curricular Services — 10/08
MEEN 616
Foundation of Continuum Mechanics

Instructor: Dr. K.R. Rajagopal
Office: 314 ENPH - Office Wing
Telephone: (979) 862-4552
E-Mail: krajagopal@tamu.edu

Course Description:
Mathematical description of continuum mechanics principles, including: tensor analysis, generalized description of kinematics and motion, conservation laws for mass and momentum, invariance and symmetry principles; application to generalized formulation of constitutive expressions for various fluids and solids.

Prerequisites: MATH 410, MATH 451, or equivalent

Grade:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test 1</td>
<td>30%</td>
</tr>
<tr>
<td>Test 2</td>
<td>30%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>40%</td>
</tr>
</tbody>
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Grading Scale: A≥90; B≥80; C≥70; D≥60; F<60

Syllabus:
1. Definition of a Body
2. Kinematics: Motion, Velocity, Deformation Gradient, Stretch Tensors, Strain Tensors, Relative Deformation Gradient, Relative Stretch Tensor, Velocity Gradient, Spin Tensor, Vorticity, Rivlin-Ericksen Tensors
1. Definition of Histories of Quantities
2. Forces: Surface and Body Forces
3. Concept of Stress
5. Momentum, Balance of Angular Momentum
6. Galilean Invariance and Frame Indifference
7. Introduction to Elastic Materials: Restrictions due to Galilean Invariance
9. Materials, Crystal Classes
10. Restriction of Constitutive Equations due to Material Symmetry
11. Linearization of Constitutive Equations for a General Non-Linear Elastic Material
12. Introduction to Fluids: Navier-Stokes Fluid
13. Generalized Stokesian Fluid, Fluid of the Differential Type, Fluids of the Rate Type
Americans with Disabilities Act (ADA)

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe, you have a disability requiring an accommodation, please contact Disability Services, in Cain Hall, Room B118, or call 845-1637. For additional information visit http://disability.tamu.edu

Academic Integrity

For additional information visit http://disability.tamu.edu/aggiehonor

"An Aggie does not lie, or steal, or tolerate those who do."