

**TO:** The Engineering Faculty

**FROM:** The Faculty of the School of Mechanical Engineering

**RE:** New Course - ME 53100 Characterization of Particles, Powders, and Compacts

The Faculty of the School of Mechanical Engineering has approved the following new course. This action is now submitted to the Engineering Faculty with a recommendation for approval.

**ME 53100 Characterization of Particles, Powders, and Compacts**, Sem. 2, alternate years, Class 3, cr. 3. Prerequisites: ME 309 or equivalent.

Familiarize students with the properties and methods used to characterize the mechanical behavior of particles, powders, and compacts, with the intention of using these properties for process and performance design. Students work with a subset of the measurement methods in a laboratory setting. Students successfully completing the course will be able to define and describe the significant properties of particles, powders, and compacts; describe and demonstrate techniques used to measure these properties; and demonstrate how these properties are useful in product and manufacturing performance.

**Reason:** This course has been taught four times on an experimental basis with the following enrollments: spring 2010 – 9 students, fall 2011 – 15 students, spring 2013 – 12 students, and spring 2015 – 15 students. This course provides students with the motivation, properties, and methods for characterizing particles, powders, and compacts. The course serves as a foundational course for students pursuing further studies in particle and powder processing. The intention is to list co-list the course with Agricultural and Biological Engineering and Chemical Engineering since students from these disciplines have consistently enrolled in the course.



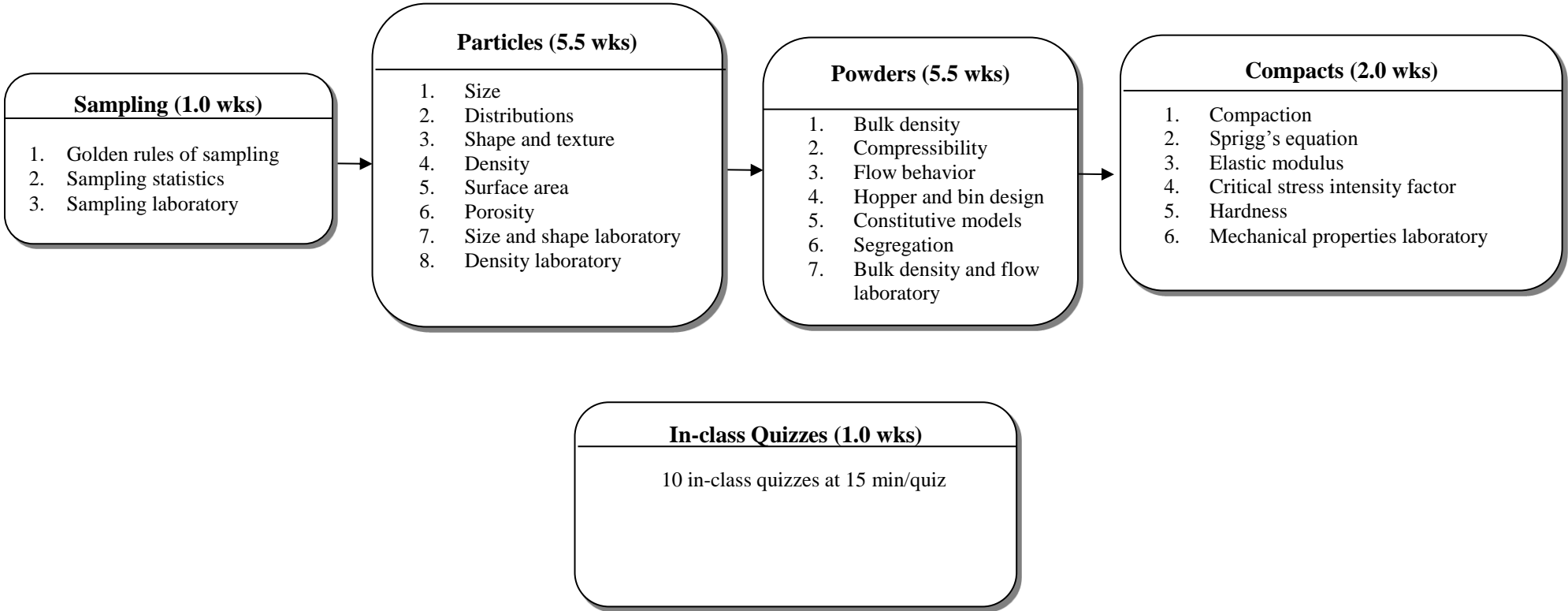
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James D. Jones, Associate Head/Professor  
School of Mechanical Engineering

**ME 53100**  
**CHARACTERIZATION OF PARTICLES, POWDERS, AND COMPACTS**

**Course Outcomes**

- Students successfully completing the course will be able to:
1. define and describe the significant properties of particles, powders, and compacts,
  2. describe and demonstrate techniques used to measure these properties,
  3. demonstrate how these properties are useful in product and manufacturing performance, and
  4. pursue further studies on particle and powder characterization.



<b>COURSE NUMBER:</b> ME 53100		<b>COURSE TITLE:</b> Characterization of Particles, Powders, and Compacts	
<b>REQUIRED COURSE OR ELECTIVE COURSE:</b> Elective		<b>TERMS OFFERED:</b> Spring, alternate years	
<b>TEXTBOOK/REQUIRED MATERIAL:</b> None		<b>PRE-REQUISITES:</b> ME 309 Introductory Fluid Mechanics or equivalent	
<b>COORDINATING FACULTY:</b> C. Wassgren		<b>COURSE OUTCOMES</b> [Related ME Program Outcomes in brackets]:	
<b>COURSE DESCRIPTION:</b> Familiarize students with the properties and methods used to characterize the mechanical behavior of particles, powders, and compacts, with the intention of using these properties for process and performance design. Students work with a subset of the measurement methods in a laboratory setting. Students successfully completing the course will be able to define and describe the significant properties of particles, powders, and compacts; describe and demonstrate techniques used to measure these properties; and demonstrate how these properties are useful in product and manufacturing performance.		Students successfully completing the course will be able to: <ol style="list-style-type: none"> <li>1. define and describe the significant properties of particles, powders, and compacts,</li> <li>2. describe and demonstrate techniques used to measure these properties,</li> <li>3. demonstrate how these properties are useful in product and manufacturing performance, and</li> <li>4. pursue further studies on particle and powder characterization.</li> </ol>	
<b>ASSESSMENTS TOOLS:</b> <ol style="list-style-type: none"> <li>1. Five laboratory reports.</li> <li>2. 10 in-class quizzes.</li> </ol>		<b>RELATED ME PROGRAM OUTCOMES:</b>	
<b>PROFESSIONAL COMPONENT:</b> <ol style="list-style-type: none"> <li>1. Engineering Topics: Engineering Science – 75% Engineering Laboratory – 25%</li> </ol>		A1. Engineering Fundamentals A3. Experimental Skills A6. Impact of Engineering Solutions B1. Communication Skills B2. Teamwork Skills	
<b>NATURE OF LABORATORY CONTENT:</b> Five integrated laboratories provide hands-on experience. Laboratory reports provide technical report writing experience. <ol style="list-style-type: none"> <li>1. Sampling</li> <li>2. Particle size and shape</li> <li>3. Particle density</li> <li>4. Powder bulk density and flow</li> <li>5. Compact mechanical properties</li> </ol>			
<b>COMPUTER USAGE:</b> Computer usage for laboratory assignments is required.			
<b>COURSE STRUCTURE/SCHEDULE:</b> <ol style="list-style-type: none"> <li>1. Lecture – 2 days per week at 75 minutes. Laboratories are held in place of lectures, not in addition to lectures.</li> </ol>			
<b>PREPARED BY:</b> C. Wassgren		<b>REVISION DATE:</b> 05 / 2016	