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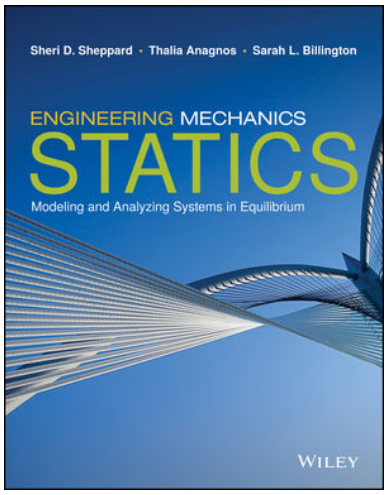

Engineering Mechanics: Statics: Modeling and Analyzing Systems in Equilibrium

Sheri D. Sheppard, Thalia Anagnos, Sarah L. Billington

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DESCRIPTION

Mechanics courses tend to provide engineering students with a precise, mathematical, but less than engaging experience. Students often view the traditional approach as a mysterious body of facts and “tricks” that allow idealized cases to be solved. When confronted with more realistic systems, they are often at a loss as to how to proceed. To address this issue, this course empowers students to tackle meaningful problems at an early stage in their studies.

Engineering Mechanics: Statics, First Edition begins with a readable overview of the concepts of mechanics. Important equations are introduced, but the emphasis is on developing a “feel” for forces and moments, and for how loads are transferred through structures and machines. From that foundation, the course helps lay a motivational framework for students to build their skills in solving engineering problems.

ABOUT THE AUTHOR

Sheri D. Sheppard, Ph.D., is the Carnegie Foundation for the Advancement of Teaching Senior Scholar principally responsible for the Preparations for the Professions Program (PPP) engineering study. She is an Associate Professor of Mechanical Engineering at Stanford University. She received her Ph.D. from the University of Michigan in 1985. Besides teaching both undergraduate and graduate design-related classes at Stanford University, she conducts research on weld fatigue and impact failures, fracture mechanics, and applied finite element analysis.
Dr. Sheppard was recently named co-principal investigator on a NSF grant to form the Center for the Advancement of Engineering Education (CAEE), along with faculty at the University of Washington, Colorado School of Mines, and Howard University. She was co-principal investigator with Professor Larry Leifer on a multi-university NSF grant that was critically looking at engineering undergraduate curriculum (Synthesis). In 1999, Sheri was named a fellow of the American Society of Mechanical Engineering (ASME) and the American Association for the Advancement of Science (AAAS). Recently Sheri was awarded the 20 04 ASEE Chester F. Carlson Award in recognition of distinguished accomplishments in engineering education. Before coming to Stanford University, she held several positions in the automotive industry, including senior research engineering at Ford Motor Company's Scientific Research Lab. She also worked as a design consultant, providing companies with structural analysis expertise.

Thalia Anagnos, Ph.D., is the Associate Vice President for Graduate and Undergraduate Programs at San Jose State University. She has taught graduate and undergraduate courses in mechanics, structural analysis nd design, probability and reliability, and technical writing. She earned her Ph.D. from Stanford University and has focused much of her research on seismic hazard mitigation. Most recently she was involved in a multi-university study of older nonductile concrete buildings that are vulnerable to collapse in earthquakes. She is the Past-President of the Earthquake Engineering Research Institute (EERI) and served as the co-Leader of Education, Outreach, and Training for the Network for Earthquake Engineering Simulation from 2009 to 2014. She was named as San Jose State's Outstanding Professor in 2011 and received the College of Engineering Applied Materials Award for Excellence in Teaching in 2013.

Sarah L. Billington, Ph.D., is professor of Civil & Environmental Engineering at Stanford University where she is a Senior Fellow at the Woods Institute for the Environment and the Milligan Family University Fellow in Undergraduate Education. She teaches undergraduate and graduate design, as well as analysis and materials related classes, and her research focuses on durable and sustainable materials for the built environment. Sarah served as Associate Chair of her Department from 2009-2015. She is a Fellow of the American Concrete Institute and has served on the Board of Directors for the Network for Earthquake Engineering Simulation (NEES Inc., 2006-2009) and the Structural Engineers Association of Northern California (SEAONC, 2012-2014). Prior to joining Stanford's faculty she was Assistant Professor of Civil & Environmental Engineering at Cornell University from 1997 to

2002. She completed her M.S. and Ph.D. at The University of Texas at Austin and her undergraduate degree was from Princeton University.

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To address student learning and mastery challenges, ***Engineering Mechanics: STATICS*** provides:

• **ORION FOUNDATIONS**:

An adaptive practice system that helps students build their proficiency on important prerequisite math and physics topics and use their study time most effectively.

• **Diagnostic assessment** before each new chapter: Students can gauge their readiness for each new chapter—and what they may need to review further—with a brief diagnostic quiz.

• **A consistent instructional cadence** of tell, show, do: For each new major concept within a chapter, students will read or watch a passage that develops it, then see solved examples that apply it, and finally have an opportunity to master it through progressive, interactive exercises.

• **Scaffolded learning:**

Practice exercises and a selection of homework problems will use techniques such as hints, partial solutions, feedback on common mistakes, and progressive complexity to build student confidence and reinforce skills.

• **Optional pathways and resources**: The course supports differences in students' ideal learning styles. For example, they will be able to choose a preferred pathway through the conceptual and example content: video, textual, or a mixture of both. All practice exercises will be available to students for self-study, even if they are not formally assigned by instructors for assessment.

Resources

Additional instructor resources

• **Animations and simulations**: including lecture and example videos that enhance visualization skills and allow "what if" analysis is available in WileyPLUS.

• **Solutions manual**: Typed solutions to all exercises, using the same solution procedure as the worked examples.

• **Electronic figures**: All figures from the text are available electronically for use in creating your own lectures.

Additional student resources

• The text website www.wiley.com/college/sheppard includes **answers to selected exercises** from the text to help students check that they have solved the exercises correctly.

FEATURES

Emphasis on sketching: The importance of communicating solutions through graphics is continuously emphasized. An innovative illustration format that uses engineering graph paper background and a hand-sketched look reinforces how students should be documenting their solutions.

Development of structured problem-solving procedures: A consistent analysis procedure is introduced early in the online course and used consistently throughout all worked examples. Several key steps are emphasized, including explicitly listing Assumptions made, and the importance of Draw and Check as part of the solution.

Analyzing dynamic motion with computers: Throughout the book, examples and exercises make use of computational approaches. Exercises that require the computer are labeled Computational, making it easy for the instructor to locate.

Application of principles to engineering systems: System Analysis (SA) Exercises offer students the opportunity to apply mechanics principles to broader systems. These exercises are more open-ended than those in other parts of the course, and can have more than one correct answer.

Inclusion of useful study tools: Learning Objectives open each chapter. “Just the Facts” sections at the end of each chapter summarize key terms, key equations, and key concepts. Key equations are highlighted in yellow and key terms in bold blue type when they first appear.

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