

Mechanical Design for the Stage

TH3375
Spring 2017

Classroom: MPAC 51
Lecture 10:00 – 11:50 am T,Th
Office Hours: 10:00 – 11:00 am MWF

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Course Description:

An introduction to the design process used by TD's, Props Masters and Automation Designers to create stage effects.

Student Learning Outcomes:

UMD SLO#3: Think critically and creatively in seeking solutions to practical and theoretical problems.

TH-04: Organize and implement discipline specific techniques in a creative process.

Students will apply techniques used the design process to create mechanical devices which conform to the specifics and functions of the exercises while also maintaining a sense of aesthetics and craftsmanship. This process will ask students to identify the need within the design, apply information gain from classroom instruction and experimentation, develop the model and analyze its effectiveness.

Required Supplies: 25' tape measure, grid paper notebook (4 sq. / in.), simple hand drafting tools including, architect's scale rule, triangles, mechanical pencils, etc.

Textbook: Suggested but not required.

Making Things Move – DIY Mechanisms for Inventors, Hobbyists and Artists, by Dustyn Roberts, 2011.

The Physics of Theatre: Mechanics, by Verda Beth Martell & Eric C. Martell, 2015.

Other Related References:

Mechanical Design for the Stage, by Alan Hendrickson, Focal Press, 2008.

The Backstage Handbook, third edition, by Paul Carter, Broadway Press, 1994.

The Illustrated Theatre Production Guide 2nd Ed., John Holloway, Focal Press, 2010

Student Conduct Code:

Appropriate classroom conduct promotes an environment of academic achievement and integrity. Disruptive behavior that substantially or repeatedly interrupts either the instructor's ability to teach, or student learning is prohibited. Students are expected to adhere to Board of Regents Policy: Student Conduct Code: www1.umn.edu/regents/policies/academic/Student_Conduct_Code.pdf.

Attendance:

Attendance is required and will be taken. An excused absence is defined by the University and you can read more about the policy at www.d.umn.edu/vcaa/ExcusedAbsence.html. Any known absences should be made know to the instructor immediately. If you are ill, you must notify the instructor BEFORE class otherwise it will be counted as an unexcused absence. More than three unexcused absences will result in the lowering of your overall final grade 10 points per absence. Tardiness is also frowned upon. Three tardies (being one – 15 minutes late) will equal one unexcused absence. Arriving to class more than 15 minutes late will result in an unexcused absence.

Grading:

Final grade will be determined by cumulative score of the following projects:

Projects – 40%

Rube Goldberg Device :

Project Description: The student will create a Rube Goldberg device to crack an egg into a bowl. A majority of the egg and no more than half the shell can land in the bowl. The device should be no bigger than a 3' x 3' x 3' area. There should be no fewer than five unique interactions each of which contributes to the final goal. The only human interaction allowed is to initiate the action. From start to finish the process should take no longer than five minutes.

Mousetrap Car:

Project Description: The student is to design and build using a mouse trap as the source of power. The cars will then be tested for speed and distance. Special awards will be given to the fastest car, the car which travels the furthest and the most aesthetically pleasing car.

Truss Construction Project:

Project Description: The student is to create a truss system which will be tested for load bearing capabilities. Using a construction material of the instructor's choice, the student is to design and build a truss which will span a three foot gap and support a 15 lbs point load for 2 minutes. Special award will be given to the student whose truss supports the most weight. Another award will be given for aesthetic quality and craftsmanship.

Final Project – 30%

The Star Trek Door:

Project Description: The final project simulates a scenic effect which takes place in a fictional play adaptation of the old "Star Trek" series. Based on the given set design and parameters discussed in our "production meeting", the team is to design and create a no larger than half scale solution of the effect. The solution should include mechanisms or systems covered during the semester.

Various worksheets/assignments –30%

Grade Breakdown: 100 – 90%: A, 89 – 80%: B, 79 – 70%: C, 69 – 60%: D, 59 – 0%: F

Course Calendar

All projects/dates are subject to change

<u>Date</u>	<u>Topic</u>	
1/12	Syllabus, Course Expectations, "Mechanical Design & Technical Theatre"	
1/17	Discussion Topic: Recognizing Simple Machines in Theatre	Simple Machine Wkst
1/19	Discussion Topic: Rube Goldberg Project - <u>Simple Machine Wkst due</u>	RGP Sketch
1/24	Review RGP Sketches/Discuss potential problems/solutions	RGP Scaled Drawing
1/26	<u>No Class – Instructor at KC/ACTF</u>	

1/30	Review design, create shopping lists	
2/2	In-class work on device	
2/7	In-class work on device	
2/9	Presentation of device	
2/14	Discussion: Statics and Load calculation/reactions	Statics worksheet
2/16	Discussion: Platforms and Trusses	
2/21	Discussion: Material and Connector Choices – <u>Statics Worksheet Due</u>	
2/23	Discussion: Truss Construction Project	Truss Design Sketch
2/28	Review Truss design/construction method	
3/2	In-class work on Truss Construction project	
3/14	In-class work on Truss Construction Project	
3/16	Present Project	
3/21	Discussion: Forces, Friction, Torque and Mechanical Energy	Force Calculation wksht
3/23	Mouse-trap Car Project – Designs and calculations – <u>Worksheet Due</u>	
3/28	In-class work on Project	
3/30	Present Mouse-trap Car Project	
4/4	Discussion: Hydraulic and Pneumatic systems	Fluid Power wksht
4/8	In-class project: Create a wagon braking system – <u>Worksheet Due</u>	
4/11	Discussion: Motors – AC, DC and factors to consider	
4/13	Discussion: Drive Systems – Gears, couplers and bearings.	
4/18	Discussion: Final Project	
4/20	Discussion: Research, Sketches, and potential issues	
4/25	In-class work on Project	
4/27	In-class work on Project	

Finals Week – Star Trek Door presentation May 5 @ 10:00am