The Art and Science of Theatrical Robots

Spring 2026 - CSE 4990-02 / 4990-H02 / 6990-02

Meeting Times:	Tuesday, Thursday 3:30 PM - 4:45 PM	**Meeting Location:**	Butler 103

Instructor

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Contributing Theatre Faculty

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Basic Course Information

Course Description

This project-driven course explores the creative and technical integration of robotics and the performing arts. Students collaboratively develop original works of robotic theatre, engaging in every phase of production—from narrative development and world-building to the design, fabrication, and programming of robotic performers. Situated at the intersection of engineering and creative practice, the course emphasizes cross-disciplinary fluency: students gain hands-on experience in robotic system design and implementation while cultivating skills in dramaturgy, movement composition, and theatrical direction. Framed within the context of human-robot interaction (HRI), the course invites students to explore the expressive and communicative potential of robots in live performance. The experience culminates in a public evening of robotic theatre that showcases the fusion of technical innovation and theatrical artistry.
*(**Prerequisite:** None)*

Course Website

All course resources, announcements, and assignments will be provided via Canvas (https://canvas.msstate.edu). Students should check Canvas and their university email accounts regularly for updates related to the course.

Textbook & Course Material

No textbook is required for this course. Materials will be provided to students via Canvas and through the course's website: **https://robotsonstage.com**

Required Hardware & Software

To complete coursework, students will need regular access to a computer with at least one available USB port, internet connectivity, and the ability to run a modern web browser. Laptops are most convenient as they are easily co-located with robots across different environments.

All robotic hardware will be provided.

All necessary tools, equipment, and software will be provided for use throughout the semester.

Course Experience:

Operating less like a traditional class and more like a hands-on production workshop, this course is a journey to create an original work of robotic theatre. You will form a small team and take on a singular challenge: create a compelling work of theatre starring robots you design and build yourselves.

While all essential skills are taught from the ground up, the course is designed to meet you where you are and challenge you to produce your best work.

Together, we will navigate an intensely human, yet remarkably technical journey, fusing the art of storytelling with the engineering of structures and code, striving to create a performance that an audience can genuinely connect with. Expect a fast-paced, collaborative environment where you are constantly making, testing, and refining your ideas.

Learning Goals:

After completing this course, students should be able to:

- Integrate foundational knowledge, skills, and techniques from the performing arts and human-robot interaction to inform the design of social robots for performance contexts.
- Design, fabricate, assemble, and program expressive robotic characters capable of delivering compelling performances in a theatrical environment.
- Design and execute core creative and technical aspects (e.g., story development, dramaturgy, direction, set design, costume design, sound design, lighting design, etc.) of theatrical productions.
- Demonstrate proficiency in integrating robotic characters with theatrical technology (e.g., stage automation, intelligent lighting, projection mapping, etc.) and theatrical production approaches and roles (e.g., creative design and development teams, technical operations teams, etc.).
- Assess the impacts of robotic character elements—including appearance, voice, movement, timing, and integration with theatrical elements such as lighting and sound—on audience perception, engagement, empathy, and relatability.
- Critically evaluate and iteratively refine robotic character designs based on storytelling goals, peer/audience perceptions, and technical performance within a theatrical setting.

Coursework & Grading

Your work will be assessed regularly (see *Checkpoints* section) across five categories.

Category	Weight
Story Writing & Refinement Create an original theatrical script featuring robotic characters, this includes: • Crafting a compelling narrative with clear characters, stakes, and emotional arcs. • Developing dialogue and structure that support live performance. • Refining your story through feedback, peer reviews, and dramaturgical exploration.	20%
Robotic Character Design & Development Design and build custom robotic characters to perform in your story, this includes: • Creating physical designs that reflect your characters' personalities and roles. • Using the hardware toolkit to fabricate, assemble, and customize your robots. • Designing your robotic character's voice. • Designing and fabricating your robotic character's costume and appearance.	20%
Robotic Character Dynamics & Behavior Program and operate your robots to express themselves convincingly on stage. • Developing expressive behaviors such as gestures, movements, sounds, and lights. • Using provided software tools to choreograph actions in sync with the performance. • Ensuring that robot blocking (positioning and movement on stage) works seamlessly within scenes and enhances visual storytelling. • Coordinating robotic behaviors with other characters—robotic or human—to create clear, engaging, and emotionally resonant interactions.	20%
World Design & Dynamics Create a theatrical world that supports and enhances your story, including: • Designing sets, lighting, sound, and other stage elements to match your narrative tone. • Ensuring the robotic characters move and perform effectively within the environment. • Using design to convey mood, theme, and transitions in the performance. • Coordinating robotic performer and technical theatrical elements for a seamless and immersive experience.	20%
Live Performance A public performance will serve as the culmination of your work. This requires: • Presenting a cohesive and engaging show that integrates all course elements. • Participating in structured rehearsals to refine pacing, coordination, and transitions—building rigor, consistency, and confidence in your final performance. • Executing timing, cues, and stage direction with reliability and professionalism. • Troubleshooting and adapting as needed during the live event.	20%

* Graduate students see "Graduate Assignment" for additional requirements.

Teams, Scripts & Shows

After exchanging story ideas and getting to know your classmates, you will be asked to form teams of two to three members to complete the bulk of your semester's work. While each person will be directly responsible for one robotic character's development and performance, teams will work together to create the story that motivates each robotic character's design and shapes the dynamics of the interactions between robotic characters.

Each team will collaboratively write one script that will serve as the guiding foundation for their show and consequently the creative and technical work throughout the semester. While more detailed considerations will be provided in class, there are three primary constraints* to be cognizant of while authoring scripts:

(1) Robotic Leads: all lead characters in a script will be played by robots

(2) Equal Performance Time: all lead characters should receive approximately equal performance time

(3) Show Runtime: scripts with two lead characters should have a runtime between 8 - 10 minutes, and scripts with three lead characters should have a runtime between 12 - 15 minutes.

** As with all aspects of the course, constraints may be adjusted after discussion and consensus among the students and instructor.*

Checkpoints

Your overall course grade will be a product of your work across the five categories described in the table above. **Timely and good-faith efforts to achieve the goals within each category are critical to achieving full credit.** Concrete evaluations of progress across each area will be performed via brief and regular in-class demonstrations and through the submission of digital show assets via Canvas. The checkpoints contributing to each category include*:

Story Writing & Refinement

- Initial story ideas submission (Friday, Jan. 30th*)
- Team / Group formation (Wednesday, Feb. 4th*)
- Team script first submission (Friday, Feb. 20th*)
- Team 1 page of script with blocking notes (for blocking demo) (Thursday, April 2nd*)
- Team locked prompt script (includes all blocking, final version) - (Saturday, April 18th*)

Robotic Character Design & Development

- Initial robotic character sketches and concept document submission (Wednesday, Feb. 25th*)
- Demonstration of robotic character's physical structure design (Thursday, Mar. 5th*)
- Demonstration of robotic character's voice design (a few lines) (Thursday, Mar. 5th*)
- Demonstration of robotic character's costume design (Thursday, Mar. 26th*)
- Submission documenting final robotic character design (Monday, May 4th*)

Robotic Character Dynamics & Behavior

- Demonstration of robotic character gestures. (Thursday, Mar. 26th*)
- Demonstration of robotic character blocking (~1 page of script). (Thursday, April 2nd*)
- Demonstration of character interactions via rehearsals. (Week of April 14th*)
- Submission of all locked robotic character behavior and voice files. (Saturday, April 17th*)

World Design & Dynamics

- Initial conceptual designs of world document submission. (Thursday, April 9th*)
- Demonstration of world design and dynamics via rehearsals. (Week of April 14th*)
- Submission of locked lighting looks and cues. (Saturday, April 18th*)
- Submission of locked audio assets and cues. (Saturday, April 18th*)
- Submission of locked digital scenic assets and all other locked assets. (Saturday, April 18th*)

Live Performance

- Participation in rehearsals and final performance. (Week of April 21st*)
- Performance of show with character meeting all requirements. (Friday, April 24th*)
- Submission of final feedback and reflections on project. (Monday, May 4th*)

* Minor changes to checkpoints and due dates are expected to occur throughout the semester. Submission and demonstration dates will be adjusted and announced as each area is covered.

Public Performance

Final performances will be conducted as an evening of robotic theatre in which each group will perform their show one after another for an audience. This performance will take place on **Friday, April 24th (*tentative)** from **7:30 PM to 9:00 PM** in McComas Hall Theatre and will be open to the public.

Graduate Assignment & Overall Grading Scheme

Students enrolled in the graduate section of the course (6990) will submit two-page summaries and critiques of two recent journal articles or substantial conference papers related to human-robot interaction in the performing arts. The first summary must be submitted by **Friday, Feb. 13th** and the second by **Friday, Mar. 27th.**

These assignments will be weighted as 10% of the student's final grade, while the other coursework will be weighted as 90% of the final grade.

Overall Grading Scale

A	B	C	D	F
90% - 100%	80% - 89%	70% - 79%	60% - 69%	0% - 59%

Topic Schedule*

Week	Tuesday	Thursday
1		January 15th Theatre, HRI & Team Building
2	January 20th Social Robots & HRI	January 22nd Story & Expression
3	January 27th Story & Expression II	January 29th Storytelling on Stage
4	February 3rd Tech Workshop - Story	February 5th Sketching Story & Robotic Characters
5	February 10th Anatomy of a Robot	February 12th Designing & Building Robots
6	February 17th Robots on Stage & Scene Partners	February 19th Blocking & Locomotion
7	February 24th Designing & Building Robots II	February 26th Tech Workshop - Design & Build
8	March 3rd Voice & Gesture	March 5th Tech Workshop - Voice & Gesture
Spring Break		
9	March 17th Costuming	March 19th Tech Workshop - Costuming
10	March 24th Scenic Design	March 26th Sound Design
11	March 31st Lighting & Projection	April 2nd Tech Workshop - Show Elements
12	April 7th Show Control & Wizarding	April 9th Tech Workshop - Show Control
13	April 14th Blocking Rehearsals	April 16th Run-throughs
14	April 21st Dress-Tech Rehearsals	April 23rd Dress Rehearsals
15	April 28th Reflections on Performance	April 30th Tech Workshop - Final Documentation

* This schedule is an approximation and will be updated throughout the semester.

Checkpoints by Date*

Week	Date	Checkpoint
3	Fri, Jan 30, 2026	Post initial story ideas to Canvas discussion board.
4	Wed, Feb 4, 2026	Submit Team/Group members via Canvas.
5	Fri, Feb 13, 2026	Graduate students: submit first paper.
6	Fri, Feb 20, 2026	Submit team script (first version) via Canvas.
7	Wed, Feb 25, 2026	Submit initial robotic character and concept sketches via Canvas.
8	Thu, Mar 5, 2026	Demo of robotic character's physical structure. Demo of robotic character's voice (a few lines).
10	Thu, Mar 26, 2026	Demo of robotic character's costume. Demo of robotic character's gestures.
	Fri, Mar 27, 2026	Graduate students: submit second paper.
11	Thu, Apr 2, 2026	Demo of 1 page of blocking from script. Submit demo page with blocking annotations via Canvas.
12	Thu, Apr 9, 2026	Submit initial conceptual designs of world via Canvas.
13	Tue, Apr 14, 2026	Demo of character interactions via rehearsals. Demo of world design and dynamics via rehearsals.
	Sat, Apr 18, 2026	Submit locked prompt script (includes all blocking, final version). Submit locked robotic character behavior and voice files. Submit locked lighting looks and cues. Submit locked audio assets and cues. Submit locked digital scenic assets and all other locked assets.
14	Tue, Apr 21, 2026	Participate in rehearsals.
	Fri, Apr 24, 2026	Perform your show.
15	Mon, May 4, 2026	Submit all final documentation of robotic character design. Submit all final documentation of show design. Submit final feedback and reflections.

* Minor changes to checkpoints and due dates are expected to occur throughout the semester. Submission and demonstration dates will be adjusted and announced as each area is covered.

Topic Outline & Contact Hours

Storytelling & Sketching (6 contact hours)
- Storytelling (3 hours)
- Storytelling Workshop (1.5 hours)
- Sketching for Story (1.5 hours)

Social Robots (9 contact hours)
- Social Robots & HRI (3 hours)
- Anatomy of Robots (1.5 hours)
- Designing and Building Robots (3 hours)
- Design and Build Workshop (1.5 hours)

Designing Robotic Characters for the Stage (9 contact hours)
- Robots on Stage (1.5 hours)
- Robot Locomotion (1.5 hours)
- Voice & Gesture (3 hours)
- Costuming (3 hours)

Technical Theatre with Robots (9 contact hours)
- Scenic Design (1.5 hours)
- Lighting and Projection (3 hours)
- Sound Design (1.5 hours)
- Show Control & Wizarding (3 hours)

Performance & Documentation (9 contact hours)
- Early Rehearsal Process (3 hours)
- Dress Rehearsal Process (3 hours)
- Performance Process (1.5 hours)
- Documentation (1.5 hours)

Policies

Classroom Policy & Attendance

Attendance of all class meetings is expected (see AOP 12.09). Students should notify the instructor as soon as possible about a planned or unexpected absence from class.

Class Make-Up Policy

Students should work with the instructor in advance (at least a week ahead) to make plans for completing any work that will be missed due to a planned absence. If an unplanned excused absence (defined in AOP 12.09) occurs, it is the student's responsibility to contact the instructors as soon as possible to arrange make up work.

AI Policy: Permitted in This Course with Attribution

Students are permitted to use Generative AI Tools to support their work in this course. With the exception of story authoring, students are encouraged to explore the use of Generative AI Tools in their work. Students must give credit and cite any AI-generated material according to rules of documentation including in-text citations, quotations, and references. Students should always include documentation that describes the specific tools used and the nature of their use (e.g., brainstorming, grammatical correction, variant generation, etc.).

Communication Policy

Emails will be sent by the instructors to your msstate.edu email account. Messages may also be posted on and sent from Canvas.

University Policies

The Mississippi State University Syllabus contains all policies and procedures that are applicable to every course on campus and online. The policies in the University Syllabus describe the official policies of the University and will take precedence over those found elsewhere. It is the student's responsibility to read and be familiar with every policy.
The University Syllabus may be accessed at any time on the Provost website under Faculty and Student Resources and at: https://www.provost.msstate.edu/faculty-student-resources/university- syllabus

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Student Honor Code

Mississippi State has an approved Honor Code that applies to all students. The code is as follows: "As a Mississippi State University student, I will conduct myself with honor and integrity at all times. I will not lie, cheat, or steal, nor will I accept the actions of those who do." Upon accepting admission to Mississippi State University, a student immediately assumes a commitment to uphold the Honor Code, to accept responsibility for learning, and to follow the philosophy and rules of the Honor Code. Students will be required to state their commitment on examinations, research papers, and other academic work. Ignorance of the rules does not exclude any member of the MSU community from the requirements or the processes of the Honor Code. For additional information, please visit: http://honorcode.msstate.edu/policy.

Syllabus Revision Log

Revision	Changes
2025.10.15.01	Initial Spring 2026 version.
2026.01.09.01	Updated classroom location, course sections, office hours.
2026.01.13.01	Updated office hours, course website
2026.01.14.01	Updated AI Policy, Added tentative checkpoint dates