

## Jelena Tešić: Teaching Narrative

Jelena Tešić's objective in teaching @ CS TXST has been to provide a more *inclusive* and *supportive* environment for all students, specifically underrepresented groups, as stated in her service narrative. She has promoted inclusivity, encouraged confidence to speak up in class, and provided constructive feedback. Tešić has directly addressed implicit biases in the classroom and with individual students to foster a safe environment. Tešić has offered flexible learning options such as online resources on Canvas and git, encourages study groups in class, meets students in person during student hours, and answers their questions 24/7 on MS Teams.

**Data-Driven Computational Methods and Infrastructure (CS 7311)** Tešić taught the course from its inception, and it is the first state-of-the-art Ph.D. level Data Science course taught at TXST. The course is geared toward *any* Ph.D. and master students willing to work hard and want to learn data science. Tešić designed the class for the students learn to adapt and evaluate state-of-the-art methods for their research and what infrastructure to use to support computational requirements. There is a lot of 1-1 work with her as the expected outcome is to upskill students in the relevant direction of data science. In the first seven weeks, Tešić teaches students how to do an exploratory data analysis, data aggregation, cleanup, and analysis; feature selection to implement ML modeling; and how to visualize results using *python* and *sklearn* package. Their knowledge is assessed through real-life Kaggle competition challenges as assignments. In the second half of the semester, more intense 1-1 work begins with students formulating the project, selecting the data, and the problem the project tries to solve. We expand the data science learning to model selection, dimensionality reduction, deep learning, and supporting infrastructures. The course concludes with the Data Ethics and Explainability Module, an important assessment metric of students' final project published as a GitHub repository. As part of the class, the student gets feedback on their paper presentation, project presentation, tool implementation, code review, and how active they are. Tešić updates the syllabus annually to include the latest in data science. She encourages students to continue working on the project as part of the independent research study course and then thesis or dissertation work. The research focus of the course resulted in novel research directions, master theses, dissertation chapters, a data science system winning the benchmark competition and recognition as one of the top 10% teams [16], and presentation at international conferences and workshops of **ten** peer-reviewed publications [1,3,8,10,11,13,15,16,19] referenced in Tešić's CV.

**Object Oriented Design and Programming (CS 3354)** Tešić has been a course lead from 2018 to 2023 and taught the course numerous times. She focused on scaling the course syllabus and material while keeping the quality and currency of the material with a steady CS enrollment increase in that period, large variations of background knowledge of students taking the class, and modes of teaching. Tešić supported returning the Data Structures course as a pre-requisite and shifted emphasis on homework and programming projects over midterm and final exams. Large variations in student preparedness for the class have always posed a great challenge for the instructor of this class. To this end, Tešić attended an NSF CS University teaching workshop in the Summer of 2018 to bring the course to the state-of-the-art level. Her teaching has evolved based on peer and student feedback to include more active learning. She continually implemented cooperative and flipped classroom blended learning approach elements into the syllabus and lecture organization. She introduced successful teamwork topics as a part of the project and participation in this course, as students have no formal training in teamwork. Tešić has championed the use of interactive online textbooks (zyBook) as complementary material for students with little confidence and/or experience in programming pre-pandemic. During the

pandemic, student microaggression surfaced. They made it clear they would make it as difficult as possible as they were made to take the class. Tešić handled the situation by informing the department of inappropriate behavior, was mentored by Faculty Development on handling the situation, and integrated clearer guidelines of what behavior is unacceptable in the class. She transitioned into a hybrid mode when it was allowed to help students re-integrate. She synchronized Canvas modules with zyBook, and recorded lectures for more accessible remote learning. She introduced a concept of short videos, a 20-minute logical lesson unit with open-ended discussion at the end. This approach resulted in a slight recovery in student performance but failed to re-engage students who were already falling behind in the online mode. Discussion-based lessons on Zoom engaged students that are already thriving in the class but failed to engage the students who were falling behind, so Tešić moved to 1-1 instructor-initiated meetings to help them pass the class. Tešić has built a self-sufficient Java code base on [git.txstate.edu](https://git.txstate.edu) to support course material and examples; she built an extensive quiz bank on Canvas with Java interview questions for in-class or online quizzes; she developed multiple assignments that reflect real job requirements for CS majors, from formulation, discussion, usage of existing libraries, code structure, code versioning, code review, compiling, and delivery. One of the assignment examples is a simple statistical recommender system students were supposed to develop in Java for Amazon ratings to access what they have learned in class. The result is a fully built teaching material database on Canvas, git, and zyBook that multiple sections can easily use and adapt for in-person, hybrid, or online teaching models that over six instructors have used since. Tešić recruited numerous students to work on research in DataLab and that resulted in two peer-reviewed publications, references [20] and [22] in her CV, and 5+ independent study research projects presented at TXST undergraduate research and REU/SURE poster sessions.

**Machine Learning Introduction (CS 4347) and Applications (CS 5369L)** Tešić have taught and updated the course since 2021. Tešić introduced to pause lecturing at least twice in 80 minutes and ask students to turn to someone next to them and discuss the last section of the lecture for two minutes, have a break, or ask questions, depending on the day. This helps re-engage students in the classroom. She supported the Statistics class as a prerequisite in this stacked class and focused more on practical and implementation challenges in machine learning. As students struggled with circumstances, isolation, and lack of social contact during a pandemic, their course engagement and performance degraded. Dr. Tešić has offered multiple learning modes to foster different styles, and engagement in the classroom has improved. She recruited a Ph.D. student, two Master's students, an Honor's thesis student, and several undergraduate students from this class to join Data Lab, resulting in three research papers [1,24,28].

**Summary** Tešić is has developed and taught Introduction to Recommender Systems (CS4379Q) course for the first time in Fall 2023. 20+ engaging students are taking the data science pipeline development for recommendation to the next level in precision medicine, e-commerce, and industry. Overall, Tešić focuses on teaching marketable skills in all her classes: source versioning, software project management tools, data science pipeline, development, and presentation, and encourages students to use the class projects in their job or graduate student applications and interviews. She teaches state-of-the-art topics such as data ethics, model fairness, data science/deep learning packages, and teamwork success as part of every class curriculum. Soft skills are as relevant for our students as the hard skills they acquire. Her efforts increased student diversity in her class at every level, as documented by the highlighted examples in teaching evaluations. She continues contributing to their academic, research, and industrial careers, as highlighted in the supplemental documents.