Statement of Teaching Philosophy  
Deepti Joshi  
djoshi@citadel.edu

“Education is the most powerful weapon which you can use to change the world.” — Nelson Mandela.

In our world today, the only constant is change. Education is the only way we can secure ourselves and get ready for what lies before us. The biggest agent of this change is the rise of technology. Computer Science as the umbrella for the diverse domains of informatics, software engineering, robotics, machine learning, and others is the leader of our future. I am fortunate to have found my way to this field of study, and even more privileged to lead others down the same path.

1 TEACHING PHILOSOPHY

Reflecting upon the dynamic integration of pedagogy and personality, my teaching style is student-centric, driven by active learning to create an environment conducive for student comprehension and retention. While the specific learning goals for a class are dependent upon the nature of the course, I have three overarching goals for my students in any class that I teach:

- To foster critical thinking so that the students are able to develop solutions to any problem that they may encounter throughout their careers in the field of Computer Science.
- To develop expertise over the course content so that they may add to their knowledge base at every step of their education.
- To encourage the application of computer science principles and techniques in order to solve real world problems.

This is accomplished by maintaining an active learning environment in the classroom. The key for this is to ask a lot of questions during lecture to keep the students engaged, and also have them reflect on the topics being discussed. In addition, making the classes as hands-on as possible. My favorite class is when I have my students out of their seats and working out problems together on the white board or programming in pairs on a computer with many constructive discussions happening around the room.

Finally, bringing research into the classroom is another key strategy. I add research to my classes in two ways – 1) students have assignments to research and present various topics discussed in class, and 2) sharing examples relevant to the class from my own research of big data analytics, data collection, etc. Additionally, when I attend conferences, I take my experiences, thoughts, and lessons learned back to my classes. This makes the students feel more engaged with the faculty, and thus prompts them to make a better effort in the class.

2 COURSES TAUGHT AT THE CITADEL

In the past 7.5 years at The Citadel I have taught a variety of classes at both undergraduate and graduate level. Table 1 gives a summary of the courses I have taught at The Citadel at 200 level and above, along with the average student evaluation scores.

- Total number of unique classroom-based courses taught: 16
- Research project based unique classes offered: 3
<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>Semesters Offered/Evaluation</th>
<th>Programming Language Taught</th>
<th>New Course Designed/ Major Changes?</th>
<th>For Non-Majors?</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSCI 201</td>
<td>Introduction to Computer Science I</td>
<td>Spring – 2012/4.3/5.0</td>
<td>Java</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>CSCI 205</td>
<td>Programming for Non-Majors</td>
<td>Spring – 2017, 2018/4.9/5.0</td>
<td>Python</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>CSCI 217</td>
<td>Web Resources and Design</td>
<td>Spring - 2014, 2015, 2016/4.7/5.0</td>
<td>HTML/CSS/JavaScript/PHP</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>CSCI 320</td>
<td>Database Design</td>
<td>Fall - 2011, 2012 Spring - 2014, 2015, 2016, 2018/4.6/5.0</td>
<td>SQL/ Oracle and MySQL</td>
<td>Yes</td>
<td>Both</td>
</tr>
<tr>
<td>CSCI 405</td>
<td>Operating Systems</td>
<td>Fall - 2014, 2016, 2018/4.8/5.0</td>
<td>C</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>CSCI 420</td>
<td>Software Engineering</td>
<td>Fall 2012/4.3/5.0</td>
<td>Java</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>CSCI 490</td>
<td>CS Special Topics: Data Warehousing</td>
<td>Fall 2015/5.0</td>
<td>SQL</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>CSCI 490</td>
<td>CS Special Topics: Data Mining</td>
<td>Fall 2017/4.8/5.0</td>
<td>Python (NLTK), SQL, Weka, RapidMiner</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>CSCI 601</td>
<td>Data Modeling and Database Design</td>
<td>Spring - 2013, 2015/3.6/5.0</td>
<td>SQL</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>CSCI 603</td>
<td>Object-Oriented Design Patterns</td>
<td>Fall 2013/4.1/5.0</td>
<td>-</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>CSCI 638</td>
<td>Advanced Topics in Database Systems</td>
<td>Summer 2013, 2015/4.5/5.0</td>
<td>SQL and R</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>CSCI 663</td>
<td>Programming for STEM Educators [Online Only]</td>
<td>Summer 2014, Spring 2017/4.3/5.0</td>
<td>Visual Basic / Python</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
3 UNDERGRADUATE STUDENT RESEARCH

In order to facilitate undergraduate student research, and give the students an opportunity to work on real research projects, I have offered CSCI 399 for Juniors, and CSCI 499 for Seniors over the past 3 years. As a part of this, I have formulated problems for students to work based of my National Geospatial-Intelligence Agency grant – “Anticipating Social Unrest using Web-based Data-Driven Techniques”.

CSCI 399 – Junior Research Project. I have offered this class twice and have directed four juniors in their research projects. The students worked on writing code to scrape the newspaper website and collect news articles which is not a trivial problem in itself. Next, they implemented a topic modeling algorithm, and applied it to the newspaper articles to discover trends of topic evolution over the years. Furthermore, the students are now working with natural language processing techniques using Python package – nltk, to parse the news articles to geocode and find actor information.

CSCI 499 – Senior Research Project. I have offered this class at least three times, and have directed six seniors in their research projects. Over the years, the vision for one of the projects is to develop a system called TWIG – The Web Information Gatherer, which on the backend has several different APIs implemented and collects public data from sites such as Twitter, Flickr and YouTube. Additionally, students have also worked on implementing/developing algorithms for topic modeling and geocoding the datasets. Each time the course was offered, the corresponding work was presented at ACM club meetings and the Citadel Student Research Conference.

All the students who worked with me either on CSCI 399 or CSCI 499, submitted a poster to Citadel Student Research Conference. In 2015 my students got the first award under SIGMA-XI STEM category, and in 2016, my students received the third award.

The work done as a part of this was published in:


4 GRADUATE STUDENT RESEARCH

As a part of the joint MS-program with College of Charleston, I have offered the independent study class for students to work on small research projects. In particular, in an effort to combine aspects of cybersecurity with data mining, I had two students work on data mining algorithms and their application to intrusion detection.
The work done as a part of this was published in:


5 Cybersecurity Education

Our world today is changing rapidly with the advent of smartphones, self-driving cars, smart meters, and even smart houses, where everything is connected to the Internet. In this new world of Internet of Things (IoTs), cybersecurity has become a very important concern in public, private, and government sectors. Cybersecurity focuses on protecting computers, networks, programs, and data from unintended or unauthorized access, change, or destruction, where unauthorized access can be in the form of cyber-terrorism, cyber-warfare, or cyber-espionage [https://www.paloaltonetworks.com/documentation/glossary/what-is-cyber-security]. Strong actions need to be taken to protect ourselves from these massive threats.

Under the NICE framework and other CNAP educational initiatives, it is clear that the strongest action of all is the right education for the users and developers of the technology that can potentially come under attack. It is important to change the mindset of future generations with respect to cybersecurity, and make it an integral part of their education. The vision behind this goal is to avoid security being an afterthought, and to work towards producing cybersecurity-aware generations. Thus it is critical to invent creative ways to provide the correct education to our students at all levels.

For this huge and very important task, I am working with Dr. Shankar Banik and others to revise our CS curriculum to embed cybersecurity principles and concepts in all our CS courses required for the major. We have already develop a proposal for both our beginning programming classes – CSCI 201 and CSCI 202. The results are published in the following:


In addition, I have modified my Database Design to include a heavy emphasis on database security by including in-depth discussions on SQL Injections, Database Administration, and User roles and privileges, and database security models.

6 Teaching as part of CS Education and Related Grants

Over the past 5 and a half years, I have gained significant experience of working with and teaching middle and high school teachers various technologies and programming paradigms. I have conducted workshops on secure coding using Python, learning to program using Ozobots, App development using MIT App Inventor, and website designing using Google sites and basic HTML/CSS.
Currently as a Co-PI for the NSF STEM+C grant, I (along with a team of faculty members at The Citadel and NC-State) am working with a group of teachers from different content areas (Math, Science, ELA and Social Studies) from Laing Middle School, South Carolina to develop pilot lessons plans incorporating computing in their existing lesson plans. The programming language used will primarily be Snap, but also be extended to include MIT App Inventor and Scratch. The lessons plans developed will be rolled out in the summer over 2 weeks where 120 teachers will be trained.

7 Teaching Innovations and Activities

In order to achieve my goals for my students, I practice the following:

**Collaborative projects:** Having students work together on class projects helps them in developing the skills necessary to work in a team environment and learn to understand and/or tolerate conflicting ideas/opinions. I especially try to group students with complementary skills and diverse backgrounds (race, ethnicity, gender, technical skill, learning styles, etc.), and encourage them to take on different roles (leader, report writer, programmer) throughout the course of the project. In all my database classes, I have my students work on a semester long project where they can choose a domain of their choice, and are required to design and implement as business. At the end of the semester the students present their project to the entire class and submit a formal project report. In addition, in my programming-based classes, on some of the programming assignments the students are allowed to work with a part where they follow extreme programming principles taking on the role of a driver and a navigator.

**Student presentations:** A key aspect in developing self-confidence in to be able to present a topic or give a talk in front of a group of people. Having the students prepare and present a topic to the class not only increases student participation and help boost self-confidence, but also allows the students to master the topic of their choice. Moreover, it also provides an effective means of exploring different ideas which would not be possible from a didactic lecture. In all my upper level classes, the students have at least one assignment where they are required to prepare a topic and present to the class.

**Assignments:** Designing innovative and interesting assignments also plays a key role in retaining the students’ interest in the subject being taught. In addition, I like to have a mix of relatively simple and more complicated problems for the students to solve. In my computer programming II class, I have my students implement a web crawler, and process the data collected. In my web design class, I have my students develop personal portfolios, giving them a chance to have something to take away from the class that will help them in their future careers.

**Frequent Assessments:** Many studies have revealed that frequent exams lead to better results. I like to give frequent quizzes, and have 3 to 4 exams spread across the duration of the semester depending on the type of the course. In my exams I like to ask questions that would test the student’s understanding, and force them to think about the topics they have studied.

**Immediate Feedback:** Replying to student’s questions within 24 hours is a priority for me. I also like to grade their papers as soon as possible, and give appropriate feedback wherever necessary.
Equally important is the feedback where the students get to evaluate the lectures and this provides valuable input for improvements in course content and teaching methods. I have found this very useful and aim to incorporate any changes suggested by students that would enhance their experience of the lecture.

8 MENTORING

As educators it is our prime responsibility to secure our future by ensuring that our students are doing well, and becoming successful in their lives. To achieve this goal, I believe in following an open door policy for my students and encourage them to ask for advice or share their opinions whenever suitable- meeting me in person or contacting me by mail to set up a meeting.

I meet with my advisees/students at least once a semester, and ensure that they are registering for the correct courses that will allow them to graduate on time. With my research students, I have weekly meetings where we discuss their progress, and new ideas to carry their research to the next step. I believe in having a close relationship with the students working on research projects with me. It is a very satisfying experience for me to work with the undergraduate students on their first research paper perhaps while having pizza and working late into the night.

9 COURSES THAT I WOULD LIKE TO TEACH

Given an opportunity to come to University of Nebraska – Lincoln in an effort to further increase its emphasis on national security, I would potentially like to teach an informatics seminar on Spatial Thinking with applications of spatio-temporal data mining that will be open to all majors, but of particular interest to sociology and computer science majors with interest in national security domains.

Furthermore, I will also like to offer classes in Secure Coding/Introduction to programming using Python or Java, Database Security, Big Data Analytics, Introduction to Data Mining, and Advanced Data Mining with emphasis on natural language processing combined with spatio-temporal data mining techniques to include topics such as geocoding of news articles, spatio-temporal topic detection, sentiment analysis, and prediction. In these courses I will have my students work on small projects complementing my own research. Furthermore, bringing research into the classroom will benefit the students as we share ideas and develop their researching skills.
APPENDIX A

STUDENT EVALUATIONS

She was very helpful and always tried to help in any way.

1. She understands the material she is presenting.
2. She knew a lot about the subject.
3. She was very down to earth and came into class prepared and didn’t just read from the slides but explained the subject to us.
4. Great Teacher

<table>
<thead>
<tr>
<th>Faculty:</th>
<th>Joshi, Deepti</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question:</td>
<td>What did you like most about this professor?</td>
</tr>
<tr>
<td>Response Rate:</td>
<td>20.00% (1 of 5)</td>
</tr>
</tbody>
</table>

1. Her teaching style is very hands on and not a lecture. She deserves a raise.
APPENDIX B

TENURE AND PROMOTION RECOMMENDATION AND BALLOT

BALLOT

Candidate: Deepti Joshi

Personnel Action: Tenure

Vote (type an X to the right of the option you endorse):

In favor X  Not in favor  Abstain

Support for Decision:

Dr. Joshi was recommended for both tenure and promotion by her faculty peers. In addition, she was enthusiastically supported by her Dean for both. Specifically, I note that:

Her student and peer evaluations of teaching have been excellent, and she has received Exceptional ratings in her annual review in each of the past five years. This is particularly noteworthy in that she has taught a variety of courses, requiring separate preps. In addition, she has been very productive in research, producing seven peer-reviewed papers and four conference presentations. She also obtained a grant for $283,263 from the National Geospatial-intelligence Agency. Her colleagues also noted that her service meets all the requirements for tenure and promotion.

In summary, I concur that Dr. Joshi has met the departmental and college requirements for tenure.
THE CITADEL

FACULTY TENURE AND PROMOTION COMMITTEE

2016-2017

BALLOT

Candidate: Deepti Joshi

Academic Action: Promotion

Vote (type an X to the right of the option you endorse):

In favor  X  Not in favor  _____  Abstain  _____

Support for Decision:

Dr. Joshi has received the unanimous and enthusiastic support of her colleagues, the department head, and the dean of her school. All of the ballots indicate that she is an enthusiastic teacher who enlivens all of the courses she teaches. She has an active research program through which she has exceeded all of the standards needed for promotion. Her service to the department, school, and college also meets or exceeds departmental standards. I agree with the positive recommendation.
Department of Mathematics and Computer Science

Date: December 1, 2016

To: Dr. John Weinstein, Dean, School of Science and Mathematics

From: Dr. Mei Qin Chen, Professor and Head, Department of Mathematics and Computer Science

Subject: Promotion Recommendation for Dr. Deepti Joshi

Summary of Findings

The Committee has voted unanimously in favor of Dr. Joshi’s promotion to the rank of Associate Professor (9 in favor, 0 opposed, and 0 abstentions). I am pleased to concur with the Committee’s recommendation.

Teaching:

Dr. Joshi is a dedicated and effective teacher. Since joining the Citadel faculty, Dr. Joshi has taught a broad range of courses at both undergraduate and graduate levels: 12 different undergraduate courses and 5 different graduate courses. In addition, she gives one or two sections of junior and/or senior research project courses every semester. She has kept her courses updated to reflect the changes in computer science software programs and technology. Some of the courses she has taught are not in her fields of expertise but she has always stepped up without hesitation to teach such a new course whenever it is needed in the department. She collaborates with colleagues in computer science and work closely with colleagues in Business, Education and English to improve her teaching and/or to develop new courses.

Over the past five years, Dr. Joshi’s annual evaluation ratings for teaching have been Exceptional, thus meeting the departmental and college-wide standards for promotion to the rank of Associate Professor in the area of teaching.

Scholarly Activity:

Dr. Joshi is a productive scholar. Since joining The Citadel, she has had seven peer-reviewed publications to report results from her research projects. Three of her publications were submitted jointly with her students. In addition, she has two papers currently under review and three papers in preparation. She has also given four conference presentations. Dr. Joshi’s research grant proposal entitled “Anticipating Social Unrest using Web-Based Spatio-Temporal Data-Driven Techniques” has been funded of $283,263.00 for two years by the National
Geospatial-intelligence Agency. She has another three external grant proposals that currently are under review. More publications are expected from these projects.

Dr. Joshi’s outstanding research record has clearly shown that she has met the departmental and college-wide standards for promotion to the rank of Associate Professor in the area of scholarly activity.

Service:

Dr. Joshi has provided outstanding service to the college, the department, and her professional communities. She has served on college-wide committees: the Undergraduate Curriculum since 2011 and Financial Affairs from 2011 to the spring of 2016. She has chaired the departmental awards committee since it was created in 2013. She has led the committee from scratch and drafted the awards criteria and procedures, and annually selected awardees among computer science and mathematics majors and graduate students.

Dr. Joshi has devoted her time and expertise in computer science and data science to STEM education. She has designed and taught an online course on programming for high school teachers to support the online program for the MAEd in STEM Education. She was the co-director of the STEM Ambassadors program (funded by the State) for the past four years and has stepped up to serve as the program director this fall. Under her leadership, this program will provide many middle and high school teachers with many high quality professional enhancement workshops.

Dr. Joshi’s excellent service record proves that she has met the departmental and college-wide standards for promotion to the rank of Associate Professor in the area of service.

Recommendation

Dr. Joshi has been a valuable member to the department and to the college. She has met all standards for promotion to the rank of Associate Professor given in both Memorandum 3-601 and the departmental 2016 standards. Based on the unanimous committee vote and my own consideration of Dr. Joshi’s performance in the areas of teaching, scholarly activity and service, I strongly recommend that Dr. Deepti Joshi receive promotion to the rank of Associate Professor.