

San José State University
College of Engineering/Electrical Engineering Department
EE258, Neural Networks, 01, Fall, 2017

Course and Contact Information

Instructor:	Birsen Sirkeci
Office Location:	ENGR 359
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Email:	birsen.sirkeci@sjsu.edu
Office Hours:	MW 1.45pm-2.45pm or (by appointment)
Class Days/Time:	TTh 3.00pm-4.15pm
Classroom:	Dudley Moorhead Hall 357
Prerequisites:	EE112 (undergraduate-level linear systems) & EE102 (undergraduate-level probability & statistics)

Faculty Web Page and MYSJSU Messaging

Copies of the course materials such as the syllabus, assignments, handouts, etc. may be found on the course web page hosted by SJSU Canvas, accessible through your account on <http://www.sjsu.edu/at/ec/canvas/>. Only officially registered students can access the website. You are responsible for regularly checking with the messaging system through MySJSU or SJSU Canvas.

Course Description

This course is about fundamentals of neural networks and learning process. In particular, the following topics will be covered. Principles of neural networks. Models of a neuron. Learning process. Perceptrons. Model building through regression. Linear Mean Square Algorithm. Multi layer perceptrons. Back Propagation. Radial basis function networks. Deep feedforward networks, Regularization for deep learning, Optimization for deep models, convolutional networks, recurrent and recursive networks, and finally applications.

Learning Outcomes (Required) and Course Goals (Optional)

Upon successful completion of this course, students will be able to:

LO1 Demonstrate an understanding of the fundamentals of Electrical Engineering, including its mathematical and scientific principles, analysis and design.

LO2 Demonstrate the ability to apply the practice of Engineering in real-world problems.

Course Learning Outcomes (CLO)

Upon successful completion of this course, students will be able to:

1. *CLO1 Define neural networks, learning process & algorithms, least-mean-squares algorithm, back propagation algorithm, radial basis function.*
2. *CLO2 Verify and validate neural network models fit*
3. *CLO3 Analyze the trade-off between prediction accuracy and model complexity*
4. *CLO4 Apply simple neural networks to engineering application problems using Python*
5. *CLO5 Describe, design, and optimize multi-layer perceptrons*
6. *CLO6 Describe, design, and optimize convolutional neural networks*
7. *CLO7 Describe, design, and optimize recurrent neural networks*

Required Texts/Readings

Textbooks

- *Deep Learning (Adaptive Computation and Machine Learning Series) by Ian Goodfellow and Yoshua Bengio, Nov 2016. ISBN-10: 0262035618 ISBN-13: 978-0262035613*
Online version: <http://www.deeplearningbook.org>
- *Neural Networks and Learning Machines (3rd Edition) by Simon O. Haykin. ISBN-10: 0131471392 ISBN-13: 9780131471399*
- *Hands-On Machine Learning with Scikit-Learn & TensorFlow by Aurelien Geron, O'Reilly Media, April 2017. ISBN-10: 1491962291 ISBN-13: 978-1491962299*

Other equipment / material requirements (optional)

Handouts posted on the webpage.

Course Requirements and Assignments

SJSU classes are designed such that in order to be successful, it is expected that students will spend a minimum of forty-five hours for each unit of credit (normally three hours per unit per week), including preparing for class, participating in course activities, completing assignments, and so on. More details about student workload can be found in [University Policy S12-3](http://www.sjsu.edu/senate/docs/S12-3.pdf) at <http://www.sjsu.edu/senate/docs/S12-3.pdf>.

There will be one midterm exam and a final exam. Exams cover the assigned reading materials and class lecture notes. There will be no make-up exams. Exam solutions will be posted on the web site of the course.

Assignments will be given regularly and will be due one week from the assigned date. Late submissions will not be accepted. Two projects, which can be done using Python programming, will be assigned. Python is available freely : <https://www.python.org/about/gettingstarted/>

NOTE that [University policy F69-24](http://www.sjsu.edu/senate/docs/F69-24.pdf) at <http://www.sjsu.edu/senate/docs/F69-24.pdf> states that “Students should attend all meetings of their classes, not only because they are responsible for material discussed therein, but because active participation is frequently essential to insure maximum benefit for all members of the class. Attendance per se shall not be used as a criterion for grading.”

Grading Policy

GRADES:

Midterm (October 19)	15 %
Project 1 (Due Nov 7)	25 %
Project 2 (Due Dec 11)	25 %
Final exam	25 %
Assignments	5 %
Online Quizzes	5 %

Total	100 %

Grading Percentage Breakdown (tentative):

90% and above	A	89% - 85%	A-
84% - 82%	B+	81% - 79%	B
78% - 75%	B-	74% - 72%	C+
71% - 69%	C	68% - 65%	C-
64% - 62%	D+	61% - 59%	D
58% - 55%	D-	below 55%	F

Classroom Protocol

Students should turn their cell phones off or put them on vibrate mode while in class. Students are expected to participate in class discussions as well as online discussion in the class website. Asking questions during class-time related to the lectures is encouraged.

University Policies

Dropping and Adding

Students are responsible for understanding the policies and procedures about add/drop, grade forgiveness, etc. Refer to the current semester’s [Catalog Policies](http://info.sjsu.edu/static/catalog/policies.html) section at <http://info.sjsu.edu/static/catalog/policies.html>. Add/drop deadlines can be found on the current academic year calendars document on the [Academic Calendars webpage](http://www.sjsu.edu/provost/services/academic_calendars/) at http://www.sjsu.edu/provost/services/academic_calendars/. The [Late Drop Policy](http://www.sjsu.edu/aars/policies/latedrops/policy/) is available at <http://www.sjsu.edu/aars/policies/latedrops/policy/>. Students should be aware of the current deadlines and penalties for dropping classes.

Information about the latest changes and news is available at the [Advising Hub](http://www.sjsu.edu/advising/) at <http://www.sjsu.edu/advising/>.

Consent for Recording of Class and Public Sharing of Instructor Material

[University Policy S12-7](http://www.sjsu.edu/senate/docs/S12-7.pdf), <http://www.sjsu.edu/senate/docs/S12-7.pdf>, requires students to obtain instructor's permission to record the course:

- “Common courtesy and professional behavior dictate that you notify someone when you are recording him/her. You must obtain the instructor's permission to make audio or video recordings in this class. Such permission allows the recordings to be used for your private, study purposes only. The recordings are the intellectual property of the instructor; you have not been given any rights to reproduce or distribute the material.”
- “Course material developed by the instructor is the intellectual property of the instructor and cannot be shared publicly without his/her approval. You may not publicly share or upload instructor generated material for this course such as exam questions, lecture notes, or homework solutions without instructor consent.”

Academic integrity

Your commitment, as a student, to learning is evidenced by your enrollment at San Jose State University. The [University Academic Integrity Policy S07-2](http://www.sjsu.edu/senate/docs/S07-2.pdf) at <http://www.sjsu.edu/senate/docs/S07-2.pdf> requires you to be honest in all your academic course work. Faculty members are required to report all infractions to the office of Student Conduct and Ethical Development. The [Student Conduct and Ethical Development website](http://www.sjsu.edu/studentconduct/) is available at <http://www.sjsu.edu/studentconduct/>.

Campus Policy in Compliance with the American Disabilities Act

If you need course adaptations or accommodations because of a disability, or if you need to make special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. [Presidential Directive 97-03](http://www.sjsu.edu/president/docs/directives/PD_1997-03.pdf) at http://www.sjsu.edu/president/docs/directives/PD_1997-03.pdf requires that students with disabilities requesting accommodations must register with the [Accessible Education Center](http://www.sjsu.edu/aec) (AEC) at <http://www.sjsu.edu/aec> to establish a record of their disability.

Accommodation to Students' Religious Holidays

San José State University shall provide accommodation on any graded class work or activities for students wishing to observe religious holidays when such observances require students to be absent from class. It is the responsibility of the student to inform the instructor, in writing, about such holidays before the add deadline at the start of each semester. If such holidays occur before the add deadline, the student must notify the instructor, in writing, at least three days before the date that he/she will be absent. It is the responsibility of the instructor to make every reasonable effort to honor the student request without penalty, and of the student to make up the work missed. See [University Policy S14-7](http://www.sjsu.edu/senate/docs/S14-7.pdf) at <http://www.sjsu.edu/senate/docs/S14-7.pdf>.

SJSU Counseling Services

The SJSU Counseling Services is located on the corner of 7th Street and San Fernando Street, in Room 201, Administration Building. Professional psychologists, social workers, and counselors are available to provide consultations on issues of student mental health, campus climate or psychological and academic issues on an individual, couple, or group basis. To schedule an appointment or learn more information, visit [Counseling Services website](http://www.sjsu.edu/counseling) at <http://www.sjsu.edu/counseling>.

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Course Schedule *The schedule is subject to change with fair notice and the changes will be announced in class.*

Week	Date	Topics, Readings, Assignments, Deadlines
1	Aug 24	Introduction & Linear Algebra
2	Aug 29	Probability Review & Numerical Computation
2	Aug 31	Machine Learning Basics
3	Sep 5	Models of a Neuron & Network Architectures
3	Sep 7	Learning Process
4	Sep 12	Perceptrons
4	Sep 14	Model Building Through Regression
5	Sep 19	Gradient-based Learning
5	Sep 21	Multi-layer Perceptrons
6	Sep 26	Multi-layer Perceptrons
6	Sep 28	Back Propagation
7	Oct 3	Back Propagation - PROJECT 1 is assigned
7	Oct 5	Cross-Validation
8	Oct 10	Radial Basis Function Networks -
8	Oct 12	Support Vector Machines
9	Oct 17	Regularization for Deep Learning
9	Oct 19	MIDTERM
10	Oct 24	Regularization for Deep Learning
10	Oct 26	Regularization for Deep Learning
11	Oct 31	Optimization for Training Deep Models
11	Nov 2	Convolutional Networks
12	Nov 7	Convolutional Networks - PROJECT 1 is due & PROJECT 2 is assigned
12	Nov 9	Convolutional Networks
13	Nov 14	Sequence Modelling: Recurrent and Recursive Nets
13	Nov 16	Sequence Modelling: Recurrent and Recursive Nets
14	Nov 21	Sequence Modelling: Recurrent and Recursive Nets
14	Nov 23	THANKSGIVING HOLIDAY - Campus Closed
15	Nov 28	Practical Methodology
15	Nov 30	Practical Methodology
16	Dec 5	Application
16	Dec 7	Application
17	Dec 11	No-class - PROJECT 2 is due
Final Exam		Thursday, December 14, 14:45-17:00

San Jose State University
Electrical Engineering Department

EE Department Honor Code

The Electrical Engineering Department will enforce the following Honor Code that must be read and accepted by all students.

“I have read the Honor Code and agree with its provisions. My continued enrollment in this course constitutes full acceptance of this code. I will NOT:

- *Take an exam in place of someone else, or have someone take an exam in my place*
- *Give information or receive information from another person during an exam*
- *Use more reference material during an exam than is allowed by the instructor*
- *Obtain a copy of an exam prior to the time it is given*
- *Alter an exam after it has been graded and then return it to the instructor for re-grading*
- *Leave the exam room without returning the exam to the instructor.”*

Measures Dealing with Occurrences of Cheating

- *Department policy mandates that the student or students involved in cheating will receive an “F” on that evaluation instrument (paper, exam, project, homework, etc.) and will be reported to the Department and the University.*
- *A student’s second offense in any course will result in a Department recommendation of suspension from the University.*