FACULTY AND COURSE INFORMATION

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Class Location and Meeting Times:

http://ksuweb.kennesaw.edu/~mkang9/?menu=CS7267

Course Communication and Office Hours- Office hour is at 2-4:30pm on Mondays and Tuesdays, or students can ask questions and discuss with the instructor by appointment.

Electronic Communications - The instructor will ONLY reply to e-mails that are sent from KSU student email accounts and list the course number in the subject line of the e-mail (CS 7267). E-mails with other subject lines or from an account rather than KSU student account may not reach the instructor's mailbox. You are required to check your KSU email account on a daily basis. The instructor will reply email within 24 hours.

Required Texts or Other Resources –

Textbook webpage: http://www.deeplearningbook.org/

GENERAL EXPECTATIONS FOR COURSEWORK IN GRADUATE PROGRAMS

Graduate study is markedly different from undergraduate study. This graduate course syllabus serves as a general description of goals and expectations in the course, as well as providing logistical and organizational information. It has been approved by the Faculty of your Academic Department to meet objectives in your discipline, as well as the University’s Graduate Faculty standards for graduate study. It contains a number of resources for and expectations of you as a student. Instructionally, it is a general “plan” for the course and not a contract - please know that the course instructor is permitted some departures from it. If you have questions regarding this, please contact the Chair of your Academic Department.

1. Roles and Responsibilities. A graduate student should always remember that he or she is taking a particular graduate course to learn advanced content in an academic discipline. While graduate students are expected to think critically and ultimately be able to demonstrate mastery of advanced disciplinary knowledge, his or her instructor has already earned at least one – if not multiple – advanced degrees in the discipline, and spent (in some cases) decades studying it. A Graduate Faculty member may be regarded as a state or national authority in some aspect of the discipline being studied. Moreover, the instructor has an equal instructional obligation to all graduate students engaged in a particular learning activity. Consequently, the graduate instructor exercises
discretion in framing instructional interactions about the discipline with graduate students, which may include decisions to terminate discussions or move the discussion to another topic.

2. Responsibility for Demonstrating Mastery of Advanced Content. Admission to a graduate program is both elective and selective. In graduate study, a graduate student bears primary responsibility for acquiring knowledge about the discipline he or she is studying. The primary role of a graduate instructor is to assist the student in appropriately applying that knowledge at an advanced level in the discipline. Ultimately, a graduate course provides a graduate student with the opportunity to demonstrate that she or he can master and apply advanced knowledge in an academic discipline. The burden of demonstrating this mastery and application to the satisfaction of the Graduate Faculty lies solely with the graduate student.

3. Availability of Graduate Faculty Members. Members of the Graduate Faculty are expected to be authorities in their academic disciplines. In addition to teaching, graduate faculty members serve in significant research, professional, and academic roles. Graduate students should be aware that, in any given semester, these other responsibilities may constitute between forty (40) and eighty (80) percent of a professor’s workload. Consequently, graduate students are advised to schedule meetings with their instructors well in advance, knowing that a Graduate Faculty member’s research and service obligations may result in him or her not being able to respond to the student for up to two (2) days during the academic week (M-F).

4. Interactions with Graduate Faculty Members. A graduate student should ensure that his or her interactions with her or his instructors are professional and appropriate. It is a relationship that is far more analogous to an employment relationship than a social friendship.

Within the Classroom (or Analogous) Environment. While graduate student thinking and discussion is expected to be far deeper, more challenging, and more critical about the advanced topic being studied than in undergraduate coursework, the context in which these discussions are framed should remain academically detached and appropriate. An element of graduate education – and particularly the application of advanced content – may require a graduate student to demonstrate the ability to think and analyze advanced knowledge in the discipline in a detached and clinical fashion.

This can be challenging when the topic under discussion relates to assumptions the student has never challenged previously. Neither graduate students nor members of the Graduate Faculty should “personalize” these discussions. A graduate student does not have the right to disrupt instruction in a learning activity. If a graduate student believes he or she cannot continue to engage in the discussion with appropriate academic detachment, she or he should disengage from the activity until the time that he or she believes he or she can appropriately resume. Simply put, in graduate study, thinking should be disruptive – conduct should never be.

Outside the Traditional Classroom Environment. While graduate students and their faculty members may have richer and less formal interactions outside of the classroom environment than those in undergraduate programming (for example, having coffee together to discuss a particular aspect of a study the student wishes to conduct or jointly working on research), it is important for both the faculty member and graduate student to remember that the “formal” instructor/student relationship that undergirds these interactions, and act consistently with that. If a graduate student believes that the faculty member’s interactions with him or her are inappropriate, the graduate student should contact the Department Chair of her or his academic department, or the appropriate University official.

5. Intellectual Property Issues. More than any other part of the University enterprise, graduate study may result in the creation of ideas and thinking that are legally recognized and protected as intellectual property. Consequently, graduate students should carefully monitor their conduct to ensure that they do not inadvertently misappropriate the intellectual property of a member of the Graduate Faculty or another graduate student. The Graduate College has prepared an overview of intellectual property issues.
6. **Electronic Recording.** While graduate students may wish to electronically record a class session as a study aid, in graduate school, this requires a careful balancing of the interests of the student, her or his fellow students, and the graduate instructor. Consequently, a graduate student may not disseminate any electronically recorded class discussion unless given explicit permission by the graduate instructor in writing. Irrespective of whether the student disseminates it, a graduate student should ask permission of his or her graduate instructor before electronically recording the instructor’s lectures.

A University generates ideas, and ideas can become intellectual property irrespective of whether they are written in a book or paper. As a recognized authority in her or his academic discipline who has spent years studying, synthesizing, and expanding advanced knowledge in the academic discipline to which he or she has devoted his or her life’s work, a graduate instructor has a legally-recognized property interest in her or his thinking about that work, which may include the graduate instructor’s lectures. Kennesaw State University prohibits the misappropriation of intellectual property (which is a form of theft), which can result in discipline for a graduate student, up to and including dismissal from the University. If the graduate student is also a member of a profession with an applied code of ethics, it may additionally result in professional discipline, as well as subjecting the student to any civil legal remedies protecting intellectual property. Graduate students should recognize the rights of their fellow graduate students to engage in free exchange of ideas in their graduate coursework, asking questions or making observations that they might not make if they believed those observations could be publicly disseminated without their knowledge or permission.

If a student needs to electronically record a course as a result of a recognized disability or other exceptionality, the student should contact the University’s Disabled Student Support Services to develop an appropriate reasonable accommodation.

**COURSE DESCRIPTION, CREDIT HOURS, AND PREREQUISITES**

**CS 7267- Machine Learning**
3 Class Hours 0 Laboratory Hours 3 Credit Hours
**Prerequisite:** CS 6045
This course covers the-state-of-the-art machine learning techniques. Focuses will be put on deep learning, kernel methods and ensemble learning. Students will learn applying advanced machine learning techniques to solve challenging problems, especially big data problems.

**COURSE LEARNING OUTCOMES**
At the end of the course students will be able to:
1. Explain how different deep learning techniques work
2. Explain the concept of kernel function
3. Explain how different kernel methods work
4. Apply proper machine learning techniques to solve challenging problems
5. Research and critique computing literature, and utilize it for proposing solutions

**TEACHING PHILOSOPHY AND INSTRUCTION METHODS**
In this course, the instructor aims to introduce a wide range of machine learning algorithm, focusing on theoretical and mathematical aspects as well as practical implementation. All homework assignments will be implementation of machine learning algorithm. All course materials and lectures (recordings) will be posted in the public (the course web page) so that every lecture can be revisited.
## COURSE CONTENT AND REQUIREMENTS/GRADING SCALE

### Course Topics and Outline (Table of Contents)

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<thead>
<tr>
<th>Week</th>
<th>Lecture Topic</th>
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| 1    | - Discussion of course syllabus and policies, Course webpage  
      | - Introduction Machine Learning and Research  
      | - Data representation in Machine Learning  
      | - Introduction to Python |
| 2    | - Holiday |
| 3    | - K-Nearest Neighbor (KNN)  
      | - Evaluation |
| 4    | - Linear Regression and Optimization |
| 5    | - Logistic Regression and Softmax |
| 6    | - Exam 1 |
| 7    | - Feedforward Artificial Neural Network I |
| 8    | - Feedforward Artificial Neural Network II |
| 9    | - Convolutional Neural Networks (CNN) |
| 10   | - Frameworks for Deep Learning |
| 11   | - Support Vector Machine (SVM) and Kernels |
| 12   | - Hierarchical Clustering |
| 13   | - Ensemble Learning |
| 14   | - Exam II |
| 15   | - Fall Break |
| 16   | - Presentation |

Disclaimer: This syllabus represents my current plans and objectives. As we go through the semester, those plans may need to change to enhance the class learning opportunity. Such changes, communicated clearly, are not unusual and should be expected.

### Grading Scale and Course Policies

**Grading Scale:**
Successfully completed programs must satisfy their requirements outlined in the programming assignments. The assignment grade depends on the quality of the program. All assignments are individual work. You are encouraged to discuss assignments with other students and tutors as long as the following rules are followed:

1. You may provide assistance on how to use any of the software used by this course.
2. You view another student's code only for the purpose of offering debugging assistance. Students can only give advice on what to look for, but they cannot debug your code for you. All changes to your code must be made by you.
3. Your discussion is subject to the empty hands policy, which means that you leave the discussion without any record (electronic or physical) of the discussion.
4. Submissions that show identical code or slightly modified code will be considered plagiarism and are a violation of the Student Code of Conduct.

For all homework assignments, if a student consults any resource (other than the text and class notes) including another individual, this consultation must be documented on the submission. This documentation must include what (or who) was consulted and what information was obtained. Copying or paraphrasing code from another source or failure to provide this documentation will be considered a violation of the Student Code of Conduct.

Due dates for homework assignments will be specified on the assignments themselves. Late assignments
will be accepted up to 24 hours after the due date for 50% credit. Assignments submitted more than 24 hours late will not be accepted for credit. Again, an assignment will not be graded if its corresponding assignment is not completed.

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<td>Project</td>
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<td>Presentation</td>
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**Grade Evaluation**

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<td>B</td>
<td>[70% - 85%)</td>
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<tr>
<td>C</td>
<td>[55% - 70%)</td>
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<tr>
<td>D</td>
<td>[40% - 55%)</td>
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<tr>
<td>F</td>
<td>[0% - 40%)</td>
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**Course Policies:**

**Attendance Policy:** Class attendance is required and very important for successful completion of the course. Students are expected to attend and participate in every class which is interpreted as the entire class period. If a student misses more than 4 sessions (class meetings), the student's final grade for the course will be reduced by 5% (that is half letter grade). Excused absences must be planned for, when possible, and justified with documentation. The student is responsible for making up missed class sessions. Late arrival that causes disruption, early departure that causes disruption, excessive conversation among students (a disruption in its own right), inappropriate use of electronic devices that cause disruptions and other actions that disrupt the classroom are unacceptable.

**Quiz/Exam Policy:** An exam is planned for this course. The estimated dates are shown in the Weekly Course Schedule table above.

**Make-up Policy:**
No make-up exams and homework assignments are allowed.

**Electronic Devices and Classroom Behavior Policy:**
In order to minimize the level of distraction, all beepers and cellular phones must be on quiet mode during class meeting times. Students who wish to use a computer/PDA for note taking need prior approval of the instructor since key clicks and other noises can distract other students. Recording of lectures by any method requires prior approval of the instructor. Students using a laptop in class should not check their email, browse the web, or in other way detract from the focus of the class.

**Tutoring:**
The College of Computing and Software Engineering offers some tutoring services for certain courses. If this applies to your course, you may want to include this resource for your students. Tutoring info can be found here: [http://ccse.kennesaw.edu/ccselabs/ccse-tutoring.php](http://ccse.kennesaw.edu/ccselabs/ccse-tutoring.php)

Do you have other resources where students can get extra help with practicing concepts or assignments?
**COURSE WITHDRAWAL**

See below for commentary on withdrawals from the 2018-2019 Graduate Catalog:

Students may withdraw from one or more courses up to one week prior to the last day of class. To completely or partially withdraw from classes at KSU, a student must withdraw online at www.kennesaw.edu, under Owl Express, Registration and Student Records. Students who officially withdraw from courses before mid-semester will receive a "W" in those courses and receive no credit. They will not, however, suffer any academic penalty. Students who officially withdraw after mid-semester one week prior to the last day of class will receive a "WF," which will be counted as an "F" in the calculation of their grade point average. Exact withdrawal dates will be published in the official academic calendar and are subject to approval by the Board of Regents.

The only exceptions to these withdrawal regulations will be for instances involving unusual circumstances that are fully documented.

Students will receive refunds only when they withdraw from all their classes and only by the schedule outlined in the University System refund policy.

**GRADE APPEALS AND STUDENT COMPLAINTS**

See below for commentary on Grade Appeals in the 2018-2019 Graduate Catalog:

Grade appeal will follow the level of the course. Students' rights to grade appeals are defined in the university catalog. A key element in the grade appeal procedure is the faculty member's responsibility to publish a specific grading policy for each of his/her classes. Specifically, the grade appeal procedure states: "Each faculty member must specify his/her grading policy, at the first of the semester. He/she may change his/her grading policy for cause after that time, but he/she must do so uniformly, with ample notification to students, if at all possible."

Note that failure to publish the grading policy would mean that a faculty member would have great difficulty in sustaining his/her assigned grade if a student appealed with anything but a frivolous or irresponsible basis for his/her charge. The grading policy should be quite specific and should be distributed to each class in written form. Some departments may also require faculty members to file grading policy statements in the departmental office. Because the student can submit a grade appeal to the Department Chair within 20 business days after the first day of classes of the next academic term after the academic term in which the final grade was awarded to the student (see Grade Appeals Procedure, section B), it is strongly recommended that instructors retain any student papers, tests, projects, or other materials not returned to the student for 70 days after the end of a semester or if an appeal is filed until the appeal is resolved. Refer to the following section for specific grade appeal procedures.

Students can find more details regarding the appeal process here:
http://catalog.kennesaw.edu/content.php?catoid=39&navoid=3087

**ACADEMIC INTEGRITY**

Every KSU student is responsible for upholding all provisions of the Student Code of Conduct, as published in the Undergraduate and Graduate Catalogs. The Code of Conduct includes the following:

- Section II of the Student Code of Conduct addresses the University’s policy on academic honesty, including provisions regarding plagiarism and cheating, unauthorized access to University materials, misrepresentation/falsification of University records or academic work, malicious removal, retention, or destruction of library materials, malicious/intentional misuse of computer facilities and/or services, and misuse of student identification cards. Incidents of alleged academic misconduct will be handled through the established procedures of the University Judiciary Program, which includes either an “informal” resolution by a faculty member, resulting in a grade adjustment, or a formal hearing procedure, which
may subject a student to the Code of Conduct’s minimum one semester suspension requirement.

- Students involved in off-campus activities shall not act in a disorderly or disruptive fashion, nor shall they conduct any dangerous activity.
- Students involved in off-campus activities shall not take, damage or destroy or attempt to take, damage or destroy property of another.

**ADDITIONAL STUDENT RESOURCES**

For CCSE Student resources:
http://ccse.kennesaw.edu/student-resources.php

KSU Service Desk:
The KSU Service Desk is your portal to getting assistance or access to University IT Services. Students call: 470-578-3555 or email studenthelpdesk@kennesaw.edu

Information and links to Resources for Graduate Students:
http://graduate.kennesaw.edu/students/

Links to frequently used and helpful services:
http://www.kennesaw.edu/myksu/