ST: Data Analytics with Wearable and IoT Device
CS 49995 / 006
CS 59995 / 006
CS 79995 / 010
Spring 2021

3 credit hours

Instructor’s Name: Jungyoon Kim

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Contact Information: 330-672 9064 jykim2 AT kent.edu

Office Hours: office hours are to be held on blackboard for the remote teaching class T R 2:15 pm - 3:30 pm or by appointment.

No Textbook is required, but selected textbook sections and conference/journal articles will be assigned and read as part of this course. Reading and responses to reading questions as well as discussing and reporting of the topic/papers are definitely significant parts of the course requirement to be completed.

(Other Supplemental Material)
[Recommended texts for your references]

  • ISBN: 9781492052043

  • ISBN-10: 9780470519233

− Data Mining: Concepts and Techniques (The Morgan Kaufmann Series in Data Management Systems) 3rd Edition
  • ISBN-10: 9780123814791

Course Content: Prerequisites or co-requisites: special approval. Required, elective, or selected elective

Goals: This course educates and trains students with several intelligent learning methodologies that can interpret, detect, or predict problems of elderly or patients, such as their activities, sleep quality, depression, heart attack, sleep apnea, and so on. In the real project work, students will learn diverse techniques of physiological signal processing and fusion methodologies, including sampling, filtering (both linear and non-linear; hardware and software), scaling, segmentation, feature extraction/selection, information fusion, detection, prediction, and classification, etc.
This course covers the physiological signal processing aspects of biomedical fundamentals, processes, methodologies and tools of physiological signal analysis. In addition, the course can be considered as an important guide in applying machine learning algorithms to biomedical design, sensing and analysis.

This course will also provide hands-on-lab projects. Initially, students will select the target health problem and design the related wearable devices. Students will work on open-datasets with experts’ annotations, and apply the diverse data analysis methodologies studied in this course.

**Topics:**

A. Wearable Devices  
1. Low Powered embedded and connected system design  
2. Sensing Devices (H/W): ECG, EMG, EEG, Acc and so on.  
3. Embedded Programming for Physiological Signal Capturing

B. Data Analytics  
1. Preprocessing  
2. Feature Extraction  
3. Feature Selection  
4. Classification and Clustering  
5. Real-time Event Detection

**Course Learning Outcomes**

By the end of the course, you will be able to:

1. Explain the interaction between a program and the hardware of a wearable or IoT system.
2. Articulate the basics of data analytics with wearable or IoT devices.
3. Convert data between capturing systems and perform arithmetic within these numbering systems.
4. Code in C and python languages using an embedded system and data analytics (machine learning).
5. Examine the performance of the classification of the machine learning.
6. Explain the functions and interconnection of basic components of a wearable or IoT device.

The official registration deadline for this course is Aug. 28, 2019. University policy requires all students to be officially registered in each class they are attending. Students who are not officially registered for a course by published deadlines should not be attending classes and will not receive credit or a grade for the course. Each student must confirm enrollment by checking his/her class schedule (using Student Tools in FlashLine) prior to the deadline indicated. Registration errors must be corrected prior to the deadline.

The course withdrawal deadline is Feb. 1, 2021. (Last day to withdraw from any or all courses that meet the full semester before grade of "W" is assigned.)

**Course Schedule**

Projects TBD
Midterm TBD

Attendance Policy

Attendance is measured both by online presence in the collaborative ultra and student interaction with course learning materials and assignments.

Students who anticipate an absence from the course due to technical or medical reasons should consult with the instructor individually. An absence due to illness or injury requires verification from a medical professional and should be presented to the instructor.

Late and Make-up Work Policy

Late projects, homework and quizzes are not accepted. Make-up exams are only given under rare circumstances and require a professionally, documented reason that can be verified (an example such as an operation where you are in the hospital requires documentation from the physician, this information will be verified). If such an incident occurs, the instructor must be notified before the exam, if possible.

Grading and Feedback

Typically, exams and coding assignments are graded within ten days. The grades are available in Blackboard.

Assignment Distribution and Grading Scale

<table>
<thead>
<tr>
<th>Attendance</th>
<th>50 points</th>
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<tbody>
<tr>
<td>Projects</td>
<td>100 points</td>
</tr>
<tr>
<td>Midterm Exam</td>
<td>100 points</td>
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<tr>
<td>Final Report</td>
<td>80 points</td>
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<tr>
<td>Final Presentation</td>
<td>80 points</td>
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<tr>
<td>Total Possible Points</td>
<td>410 points</td>
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<table>
<thead>
<tr>
<th>Percentage of Earned Points</th>
<th>Earned Points</th>
<th>Grade</th>
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<tbody>
<tr>
<td>93% -100%</td>
<td>386-410</td>
<td>A</td>
</tr>
<tr>
<td>90% to less than 93%</td>
<td>375 to less than 385</td>
<td>A-</td>
</tr>
<tr>
<td>88% to less than 90%</td>
<td>368 to less than 374</td>
<td>B+</td>
</tr>
<tr>
<td>83% to less than 88%</td>
<td>345 to less than 367</td>
<td>B</td>
</tr>
<tr>
<td>80% to less than 83%</td>
<td>335 to less than 344</td>
<td>B-</td>
</tr>
<tr>
<td>78% to less than 80%</td>
<td>325 to less than 334</td>
<td>C+</td>
</tr>
<tr>
<td>73% to less than 78%</td>
<td>315 to less than 324</td>
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<tr>
<td>70% to less than 73%</td>
<td>304 to less than 314</td>
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<td>68% to less than 70%</td>
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<td>D+</td>
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<tr>
<td>60% to less than 68%</td>
<td>257 to less than 274</td>
<td>D</td>
</tr>
<tr>
<td>Under 60%</td>
<td>Less than 207</td>
<td>F</td>
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University Policies

Students are required to be aware of and follow all general and academic policies established by Kent State University. A list of the general academic policies is listed on the Kent State
University Policy Register, which can be found in the University policies section of the Getting Started in Your Online Course link within the Start Here folder. Specific policies related to the successful completion of this online course can be located and reviewed in your Blackboard Learn course.

University policies are located in the University policies section of the Getting Started in Your Online Course link within the Start Here folder in your Blackboard Learn course.

**Students with Disabilities**

University policy 3342-3-01.3 requires that students with disabilities be provided reasonable accommodations to ensure their equal access to course content. If you have a documented disability and require accommodations, please contact the instructor at the beginning of the semester to make arrangements for necessary classroom adjustments. Please note, you must first verify your eligibility for these through Student Accessibility Services (contact 330-672-3391 or visit www.kent.edu/sas for more information on registration procedures). The Blackboard accessibility statement can be found in the University policies section of the Getting Started in Your Online Course link within the Start Here folder.

**Course Enrollment and Withdrawal**

University policy requires all students to be officially registered in each class they are attending. Students who are not officially registered for a course by published deadlines should not be attending classes and will not receive credit or a grade for the course. Each student must confirm enrollment by checking his/her class schedule (using Student Tools in FlashLine) prior to the deadline indicated.

If registration errors are not corrected by this date and you continue to attend and participate in classes for which you are not officially enrolled, you are advised now that you will not receive a grade at the conclusion of the semester for any class in which you are not properly registered. Also, it is your responsibility to check the withdrawal dates for each semester.

Every class has its own schedule of deadlines and considerations. To view the add/drop schedule and other important dates for this class, go to Student > Resources > Courses and Registration in FlashLine. Choose View or Print Course Schedule and Purchase Textbooks. To see the deadlines for this course, click on the CRN. The add/drop schedule and important dates may also be found on the Drop or Add a Course link. Click on the green clock next to the course under Registration Deadlines.

**Plagiarism and Academic Integrity**

Students enrolled in the university, at all its campuses, are to perform their academic work according to standards set by faculty members, departments, schools and colleges of the university; and cheating and plagiarism constitute fraudulent misrepresentation for which no credit can be given and for which appropriate sanctions are warranted and will be applied.

Note:
1. I have the option of penalizing cheating in this course with an “F” in the course.
2. University regulations require me to notify Student Conduct in case of violations.
3. Cooperation is just as bad as the deed itself: so, deciding which of two students accomplished the work is a non-issue: both are equally guilty. This means that if you do not guard your work, you may be guilty of plagiarism.
For more information, see the Kent State policy on plagiarism in the University policies section of the Getting Started in Your Online Course link within the Start Here folder.

**Subject to Change Statement**
The syllabus and course schedule may be subject to change. Changes will be communicated via email or the Blackboard Learn announcement tool. It is the responsibility of students to check email messages and course announcements to stay current in their online courses.