

# COURSE SYLLABUS: CPSC 6985 - Research & Thesis - Spring 2016

## INSTRUCTOR INFORMATION

INSTRUCTOR: Dr. Dana Eckart  
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OFFICE HOURS: by email or appointment  
OFFICE LOCATION: CCT 434  
COURSE LOCATION: on-line  
COURSE MEETING TIME: asynchronous

## COURSE INFORMATION

COURSE CRN: 23397  
COURSE NUMBER: CPSC 6985  
COURSE TITLE: Research & Thesis  
CREDIT HOURS: 3-0-3  
PREREQUISITES: Graduate standing  
DESCRIPTION:

This course is required by all students completing the thesis option of the MS in Applied Computer Science. It involves completion of a research project and defense of the project thesis in adherence to the School of Computer Science MS thesis policy. The project is to be designed in consultation with a thesis advisor who is a member of the graduate faculty of the School of Computer Science. May not be taken more than twice for credit.

COURSE TEXTBOOKS(s):

1. None

OTHER COURSE MATERIALS:

1. [Weka 3](#)
2. [OpenCL](#)
3. [CUDA Parallel Computing Platform](#)
4. Additional materials as necessary.

## LEARNING OUTCOMES

### DESCRIPTION

This course builds upon the concepts that students have mastered from their previous Computer Science graduate courses, putting those together in practice for the purpose of expanding upon or improving

previous work, or creating something entirely new. Students will perform literature searches, create a summary of the current state of research in their proposed research area, identify a problem within the area of study, and describe a solution strategy and approach that addresses the problem. When feasible, students will create a proof-of-concept illustrating their solution approach on a restricted version of the problem.

## MAJOR TOPICS

1. Application of GPU techniques to 3 of Weka's classification algorithms: Linear Regression, C4.5 Decision Tree, and Support Vector Machine.
2. Application of GPU techniques to 1 of Weka's association algorithms: Apriori.
3. Application of GPU techniques to 2 of Weka's clustering algorithms: k-Means and Expectation-Maximization.
4. Application of GPU techniques to Weka's cross-validation process.
5. Comparison of the GPU enhanced algorithms/processes with the original unenhanced versions.
6. Prepare a final report (master's thesis), detailing the problem, the implemented solutions, and performance comparisons.
7. Prepare and present/defend the key elements of the work to the thesis committee along with other interested faculty and students.

## ACADEMIC OBJECTIVES

1. Students will demonstrate their ability to identify a research problem topic.
2. Students will be able to conduct literature searches and summarize the published relevant research related to the chosen research topic.
3. Students will be able to develop and analyze potential solution strategies for the identified research problem.
4. Students will demonstrate their ability to integrate these elements into a well written paper and to present their proposal to an audience of faculty and their peers.
5. ABET criteria covered: A, B, C, E, G, H, I, J, K
6. Program objectives covered: 1, 2, 3

Where the ABET criteria are defined as:

- A. An ability to apply knowledge of computing and mathematics appropriate to the discipline.
- B. An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.
- C. An ability to design, implement and evaluate a computer-based system, process, component, or program to meet desired needs.
- D. An ability to function effectively on teams to accomplish a common goal.
- E. An understanding of professional, ethical, legal, security, and social issues and responsibilities.
- F. An ability to communicate effectively with a range of audiences.
- G. An ability to analyze the local and global impact of computing on individuals, organizations, and society.
- H. Recognition of the need for, and an ability to engage in, continuing professional development.
- I. An ability to use current techniques, skills, and tools necessary for computing practice.
- J. An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.
- K. An ability to apply design and development principles in the construction of software systems of

varying complexity.

## **COURSE ASSESSMENT**

The final grade for the course is based on an equal weighting of these items:

1. Final Thesis Write-up
2. Thesis Presentation and Defense

Letter grades will be assigned as follows: A [90-100%], B [80-90%), C [70-80%), D [60-70%), F [0-60%).

## **ADMINISTRATIVE POLICIES AND ACADEMIC RESOURCES**

### **CSU DISABILITY POLICY**

If you have a documented disability as described by the Americans with Disabilities Act (ADA) and the Rehabilitation Act of 1973, Section 504, you may be eligible to receive accommodations to assist in programmatic and/or physical accessibility. We recommend that you contact the Office of Disability Services located in Schuster Student Success Center, Room 221, 706-507-8755 as soon as possible. Students taking online courses can contact the Office of Disability services at <http://disability.columbusstate.edu/>. The Office of Disability Services can assist you in formulating a reasonable accommodation plan and in providing support. Course requirements will not be waived but accommodations may be able to assist you to meet the requirements. Technical support may also be available to meet your specific need. If you have a documented disability as described by the Americans with Disabilities Act (ADA) and the Rehabilitation Act of 1973, Section 504, you may be eligible to receive accommodations to assist in programmatic and/or physical accessibility. We recommend that you contact the Office of Disability Services located in Schuster Student Success Center, Room 221, 706-507-8755 as soon as possible. Students taking online courses can contact the Office of Disability services at <http://disability.columbusstate.edu/>. The Office of Disability Services can assist you in formulating a reasonable accommodation plan and in providing support. Course requirements will not be waived but accommodations may be able to assist you to meet the requirements. Technical support may also be available to meet your specific need.

### **ACADEMIC INTEGRITY**

All students are expected to recognize and uphold standards of intellectual and academic integrity. As a basic and minimum standard of conduct in academic matters that students be honest and that they submit for credit only the products of their own efforts. Both the ideals of scholarship and the need for fairness require that all dishonest work be rejected as a basis for academic credit. They also require that students refrain from any and all forms of dishonorable or unethical conduct related to their academic work.

Students are expected to comply with the provisions of Section III, "Student Responsibilities," of the Columbus State University Student Handbook. This specifically includes the sections on "Academic Irregularity," and "Conduct Irregularity." In particular, the Columbus State University Student Handbook states:

"No student shall give or receive assistance in the preparation of any assignment, essay, laboratory report, or examination to be submitted as a requirement for any academic course in such a way that the submitted work can no longer be considered the personal effort of the student submitting the work."

Examples of Academic Dishonesty include but are not limited to: Plagiarism (see definition below), giving or receiving unauthorized assistance on exams, quizzes, class assignments or projects, unauthorized collaboration, multiple submissions (in whole or part) of work that has been previously submitted for credit.

Plagiarism is any attempt to represent the work or ideas of someone else as your own. This includes purchasing or obtaining papers from any person and turning them in as your own. It also includes the use of paraphrases or quotes from a published source without properly citing the source. All written assignments may be submitted for textual similarity review to [Turnitin.com](https://turnitin.com) for the detection of plagiarism.

For assignments, access to notes, textbook, books and other publications is allowed. Stealing, giving or receiving any code, diagrams, drawings, text, or designs from another person (CSU or non-CSU) is **not allowed**. Having access to another person's work on the system or giving access to your work to another person is **not allowed**. It is your responsibility to keep your work confidential.

**No cheating in any form will be tolerated.** Please be aware that anyone caught cheating or plagiarizing in this class will receive a "0" for the assignment/exam and may receive a "0" for the course. A second instance of Academic Dishonesty may result in immediate dismissal from the Computer Science programs and expulsion from Columbus State University. See <https://cs.columbusstate.edu/resources/academic-dishonesty-policy.php> for more details.

## STUDENT COMPLAINT PROCESS

Information and resources concerning student complaints and academic appeals can be found on the Columbus State University website: <http://aa.columbusstate.edu/appeals>

## ATTENDANCE POLICY

Although attendance is not required, it is *strongly* urged (provided the course is not an on-line course) and may be taken so as to determine your involvement in the course in order to satisfy certain Columbus State University reporting requirements. Be aware that I am less likely to help those who have not availed themselves of the class time (or in the case of on-line classes, the discussion group). Remember, you are still responsible for all the covered material, regardless of your attendance. Refer to the [Attendance Policy](#) in the CSU Catalog for more information on class attendance and withdrawal.

**Warning:** Failure to submit the signed non-repudiability portion of this syllabus *or* to join the Yahoo discussion group for this class (as indicated in the class notes) by *noon of the first Friday after classes have started*, will be understood by the instructor as an indication that the student is not interested in continuing in the class and may result in the student being **dropped from the class**.

**Caution:** In addition to the applicable portions of any textbook(s) for this class, lectures will likely include material not presented in the book. Unless otherwise noted, you are responsible to know and understand all materials covered in class (and in the discussion group), assigned from the text, or indicated on the course web site regardless of your own attendance.

## ELECTRONIC DEVICES AND ACADEMIC INTEGRITY

All cell phones and pagers must be turned off prior to entering the classroom or lab. The use of any electronic device during a test or quiz is prohibited unless otherwise indicated by the instructor. This includes handheld calculators, cell phones and smart phones, personal digital assistants, tablets, laptops, and similar devices. Any unauthorized use of such a device during a test or quiz will be considered a breach of academic integrity.

## LEARNING ASSISTANCE RESOURCES

Free academic tutoring is available from the following CSU programs:

### Computer Science Tutoring

Tutoring for lower-division computer science courses is available in CCT450 (MTWRF 9am-10pm). See [https://cs.columbusstate.edu/students/lab\\_schedule.php](https://cs.columbusstate.edu/students/lab_schedule.php) for details.

### Academic Center for Tutoring (ACT)

ACT offers tutoring services to help enrolled CSU students succeed in math, science, writing, and the humanities. Visit <https://act.columbusstate.edu/> for more information or to make an appointment.

### University Writing Center (UWC)

Students can receive academic support from the University Writing Center (UWC). UWC offers peer consultations on writing across the curriculum. For more information, call 706-568-2483, visit <http://writingcenter.columbusstate.edu/index.php>, or visit <https://ace.columbusstate.edu/tutorialservices.php>.

## GRADING POLICY

### GENERAL

For your own protection, all graded material returned to you should be kept until after you have received your letter grade from the University. If you have any question about your final letter grade, you *must* present the graded material in question to the professor before any adjustment will be made. So keep these items in a safe place!

Most students find that this course requires a great deal of work. For some students, studying the recommended three (3) hours out of class for every one (1) hour in class may be sufficient, while other students may need to spend significantly more time to master the material. In either case please remember that grades are based on your ability to demonstrate your mastery of the material. In short, results, **NOT** effort, determine the grade you earn.

### EXAMS

If you **must** miss a scheduled exam, then you will be allowed to take a makeup exam at an alternate time (provided you have sufficient reason for the request as determined by the Instructor). To do this you must

notify and make prior arrangements with the Instructor as soon as you anticipate the need. Note, however, that the makeup exam may differ in both scope and difficulty from the exam it replaces. Be aware that non-emergency personal travel is insufficient reason to makeup a missed scheduled exam.

## ASSIGNMENTS

Programming assignments will be graded not only for the extent to which the programs produce the required results, but also for programming "style". In particular, the programs should be well designed and self-documented with meaningful and informative comments and identifier names. In addition they should also make proper use of the ideas discussed in class. The grading criteria for assignments will vary somewhat between assignments, however the following are basic guidelines which will always apply to programming assignments:

1. Late programs (or any other assignments) will receive a grade of 0.
2. Programs with "compilation" errors will receive a grade of 0.
3. Programs with run-time errors will receive a grade no greater than 75.
4. Programs which run "to completion" but give incorrect results will receive a grade no greater than 90.

A special word of caution about the deadlines for programming assignments: The assignments will generally require more time for completion than you might assume at first glance. In fact, some assignments may seem down right easy, but you will find it even easier to underestimate the time required to complete them. Since the penalty for being late is rather severe, you should begin working on each assignment as soon as it is distributed. Remember to allow time for unexpected problems and difficulties; such as minor computer (or network) downtime.

A final note regarding assignments: **PLEASE** compile and run your programs immediately before submitting them. Never make a change to the code file(s) and turn it in without compiling and running first. It is *very* easy to make last minute mistakes that introduce syntax or other errors, so checking before submitting can save you an unnecessary grade of 0.

## TECHNICAL RESOURCES

### HARDWARE REQUIREMENTS

#### GENERAL

To ensure that your hardware (and software) can support access to [CougarView](https://d2lhelp.view.usg.edu/knowledge.do?sysparm_document_key=kb_knowledge.80d6f09a94e3a000e6eb9ad8fcab2105), check out the following link to test your system: [https://d2lhelp.view.usg.edu/knowledge.do?sysparm\\_document\\_key=kb\\_knowledge.80d6f09a94e3a000e6eb9ad8fcab2105](https://d2lhelp.view.usg.edu/knowledge.do?sysparm_document_key=kb_knowledge.80d6f09a94e3a000e6eb9ad8fcab2105)

#### COURSE SPECIFIC

If you plan on using your own hardware to support yourself in using the course specific software ([see below](#)), then it is recommended that you have a hardware system with the following *minimum* configuration:

1. CPU: core i3 or equivalent
2. RAM: 4GB (6GB preferred)

3. HDD/SSD: 32GB free disk space
4. OS: Linux (Recent release of Ubuntu, Red Hat, or similar); Windows 7/8/8.1; OS X ( $\geq 10.8$ )

## SOFTWARE REQUIREMENTS

### GENERAL

In order to access materials generally available to CSU students regardless of the specific course in which you might be enrolled, it is expected that you have access to:

1. An office suite such as Microsoft Office or Open Office
2. Acrobat Reader
3. A web browser, such as one of the following:
  1. [Google Chrome](#)
  2. [Firefox](#)
  3. Safari
  4. Internet Explorer (Caution: IE is often problematic for D2L-CougarVIEW)
4. Browser plugins appropriate for the display of pdf files, QuickTime movie files, mp4 movie files, and others as needed. Plugins can be usually be obtained via your browser's manufacturer's website.

If you need technical support or assistance configuring your computer, you can refer to the link located in the "Support Resources" widget located on your "My Home" and your "Course Home" pages. If you cannot solve your problem after reviewing the knowledge base help pages, you can call Help Center 24x7 and talk to a Help Center agent. The number is 1-855-772-0423.

### COURSE SPECIFIC

If you will be using a computer other than those in the Computer Lab (located in room 450 of the CCT building on the CSU main campus), the following describes the software you should ensure that you are able to install and operate on the computing resources that you'll be using. Don't wait until the last minute (e.g., several days before an assignment is due) before checking on these.

Variable, as per the needs of the specific proposal and whether or not a proof-of-concept is conducted.

## EXPECTATIONS

### CLASS CONDUCT

CSU is committed to open, frank, and insightful dialogue in all of its courses. Diversity has many manifestations, including diversity of thought, opinion, and values. Students are encouraged to be respectful of that diversity and to refrain from inappropriate commentary. Should such inappropriate comments occur, I will intervene as I monitor the dialogue in the discussions. I will request that inappropriate content be removed from the discussion and will recommend university disciplinary action if deemed appropriate. Students as well as faculty should be guided by common sense and basic etiquette. The following are good guidelines to follow:

1. Never post, transmit, promote, or distribute content that is known to be illegal.
2. Never post harassing, threatening, or embarrassing comments.



3. If you disagree with someone, respond to the subject, not the person.
4. Never post content that is harmful, abusive; racially, ethnically, or religiously offensive; vulgar; sexually explicit; or otherwise potentially offensive.

## INSTRUCTOR RESPONSIBILITIES

1. I will arrive on time and be prepared to give a thoughtful and well organized lecture.
2. If I must miss a class, I will arrange for a substitute to cover the scheduled material.
3. Graded work will be evaluated and returned to you in a timely fashion, usually within 3 working days.
4. Graded work will be evaluated in a uniform and consistent manner.
5. On work days, I will check my electronic mail frequently throughout the day.
6. If you come to me with a question, I will ask you questions to determine any misunderstandings you might have of the material as well as to guide you in discovering the answer for yourself. Do not expect me to *just give you* the answer to questions. If I do, you should feel cheated!
7. Do not expect this to be an easy course. *It isn't!*

## STUDENT RESPONSIBILITIES

1. You will attend virtually every scheduled class meeting.
2. You will arrive on time and prepared to listen attentively, taking notes as necessary.
3. I expect you to have read over the appropriate materials and to have considered questions put to you before coming to class.
4. Graded work should be neat and turned in on time.
5. All graded work should be your own, with any questions concerning such work directed to the Professor only.
6. At least once every weekday, you should check your electronic mail and the WWW pages associated with this course.
7. When you come to me with a question, you should have made an attempt to find the answer on your own first.
8. If you have questions about the material or are having difficulty understanding it, please come by and ask me about it as soon as practical. Since the material builds on itself, later material will not make sense until you understand the previous material.
9. I expect you to work hard, keep up, and master the material covered during the semester.

## Course Schedule

Week	Work Items	Deliverables
11 - 15 Jan	Linear Regression Implementation	Draft thesis write-up for classification and association algorithm implementations and comparisons.  Due: 13 March
18 - 22 Jan		
25 - 20 Jan	C4.5 Decision Tree Implementation	
1 - 5 Feb		



8 - 12 Feb	Support Vector Machine Implementation	
15 - 19 Feb		
22 - 26 Feb	Apriori Implementation	
29 Feb - 4 Mar		
7 - 11 Mar	k-Means Implementation	
14 - 18 Mar		
21 - 25 Mar	Expectation-Maximization Implementation	Draft thesis write-up for clustering and cross-validation algorithm implementations and comparisons.  Due: 17 April
28 Mar - 1 Apr		
4 - 8 Apr	Cross-Validation Implementation	
11 - 15 Apr		
18 - 22 Apr	Make final edits to thesis based on committee's feedback. Prepare thesis oral presentation/defense.	
25 - 29 Apr		
2 - 6 May		

## Non-Repudiability

Please print this syllabus, fill out the below information, and return it to me (either in hardcopy or email a scanned copy to me at [eckart\\_dana@columbusstate.edu](mailto:eckart_dana@columbusstate.edu)) by noon on Friday of the first week of classes:

Student's name: \_\_\_\_\_  
(please print)

[Optional] Where can I reach you in case it becomes necessary?

Email address that you use regularly: \_\_\_\_\_

Phone number(s): \_\_\_\_\_

**Declaration:** I have read, understood and agree to abide by the policies mentioned in the syllabus pertaining to the course. In particular, I agree to abide by the assignment policy/late work policy, attendance policy, academic dishonesty policy, website policy, and exam policy.

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

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