

CprE 4300/5300 Fall Syllabus

Instructor

Doug Jacobson

dougj@iastate.edu

Objectives

Detailed examination of networking standards, protocols, and their implementation. TCP/IP protocol suite, network application protocols, IP routing, and network security issues. Emphasis on laboratory experiments.

The information in this syllabus is subject to change in extenuating circumstances. Any changes to the course syllabus will be provided in writing and announced via course-wide announcements.

Pre-Requisites

This course requires basic computer concepts, operating systems, and virtualization knowledge. Additionally, students are expected to know how to employ critical thinking skills to communicate ideas and complex topics through academic writing skills.

Course Format

This course is a blended course. Students in 430/530 Section 1 are the in-person, face-to-face sections with face-to-face lectures, which are recorded as Echo360 Lecture Videos for the online students in 430/530 Section 2. In-person students are encouraged to attend class in person but may choose to watch the lecture videos online. If the class cannot meet in person, all students will watch the videos online - more details will be announced if this happens.

The course is comprised of several modules. Each module has a corresponding Module Overview that tells you how to complete the lecture videos, assignments, labs, and quizzes, and in what order. Though the course has set deadlines, students are encouraged to work ahead on course materials as much as possible.

In a field of cutting-edge technological engineering, students will be required to be creators of knowledge and inventors of processes, not simply users of information. This requirement will make students move beyond being knowledgeable about the content and into the higher realms of analyzing situations, designing systems, and evaluating results. To accomplish these cognitive goals, the emphasis in the classroom will be on the student. Student-centered classrooms will enhance student learning by helping them understand the content based on real-world experiences, engaging them in interactive learning situations, and providing problem-based projects from which they will learn.

Course Website

Canvas and additional materials can be found at www.dougj.net/530

Required Textbook

Introduction to Network Security by Douglas W. Jacobson
1st edition (Nov 18, 2008) Publisher: Chapman & Hall/CRC/
ISBN-10: 1584885432
ISBN-13: 978-1584885436

If you do not want to obtain your own copy, you may be able to borrow one from the ISU University Library temporarily. As of 1/2024, [Parks Library had the following copies](#):

- One hard copy is available in Special Collections (you cannot check out special Collections copies)
- Two online copies are available in General Collection
- Online copies are available through [EBSCOhost Ebooks](#)
- Search for "Introduction to Network Security by Douglas W. Jacobson." When signing in, use the "Sign in with Google" option and your iastate email (it will take you to Okta to complete the sign-in process). Please note that in the past only so many students could look at the textbook simultaneously, so we cannot guarantee it will be available via EBSCOhost to you during quizzes or exams. [If you notice the above borrowing information has changed, please contact your TA(s) so this information can be updated to reflect the current options.]

We will **not** be using Immediate Access this semester, but we are working on linking Canvas to the library's eBook for more convenient access.

Learning Objectives

Upon completing this course, a student will:

- Describe networking components and explain the relationships between network layers, services, and functions.
- Evaluate the design trade-offs inherent in network protocol architecture.
- Analyze common TCP/IP network protocols, including their functions and communication processes, and assess their impact on network security at each TCP/IP layer.
- Identify potential risks to network security and assess possible countermeasures for mitigation.
- Interpret routing tables for IP networks, demonstrating an understanding of routing processes and packet traversal across networks.
- Use architectural register diagrams to extract protocol information from hexadecimal packet headers.

- Explore the diverse functionality of the application layer, including email, web services, and remote access, to gain insight into their distinct characteristics and security considerations.

Major Topics

Major topics studied in this course include:

- Fundamentals of Networking and Layered Architectures
- Protocol Specifications and Addressing
- Data Transmission and Routing
- Physical Network Layer
- Network Layer Protocols: IP Version 4 & 6
- Transport Layer Protocols: TCP and UDP
- Application Layer Security: Email, Web, and Remote Access
- Networking Vulnerabilities and Attacks
- Attack Countermeasures and Mitigation Strategies

Module Overviews

The content for this course is grouped into modules, and each module has a Module Overview containing all the details you need to know about the module, including the order to complete the reading, videos, and assignments, and a list of any important textbook errata. If an assignment is planned but has yet to be released or is not visible within the module or on the Canvas calendar, it should still be listed on the Module Overview page and likely will have information on an anticipated due date.

Module overviews are a communication tool for knowing how to complete the module and what to expect. **Read through the Module Overview page details before beginning a new module, and review the information provided regularly.**

Learning Activities and Assessments

Regular assignments and assessments are presented to accomplish the course objectives and goals. Students should anticipate and plan to complete at least one weekly assignment and assessment. Per [ISU policies](#), the minimum amount of weekly effort students should anticipate spending on learning materials, completing assignments, and studying (beyond the time spent on lectures) is 6 hours. Occasionally, it is necessary to modify due dates and push assignments back, and when this happens, regular weekly work may be due during Prep Week.

To complete this course, students will do the following:

- Read assigned chapters.
- Read assigned reading journals.
- Watch recorded lectures.
- Watch additional media.
- Participate in discussion topics.
- Complete homework, labs, quizzes, and exams.

Homework Assignments

Although homework assignments may appear as "quizzes" on Canvas, they're just homework assignments. Canvas requires them to be classified as quizzes for grading purposes.

Some assignments are auto-graded, some are semi-auto-graded, and some are entirely graded by hand. Semi-auto-graded assignments will only show a partial score until the TA(s) thoroughly grades them. Some assignments offer multiple attempts and state so in the directions. If you need help, please reach out to your professor or TA(s) before completing the last submission. If an auto-graded assignment counts something such as a simple misspelling as incorrect, please let your TA(s) know; we generally give credit for these mistakes.

Homework assignment answers are not displayed after submission for a few reasons, but they are still available to students. The main reason solutions are not readily available is that we want you to contact us if you are struggling with a topic. If you have questions about anything being taught in the course, always ask us - we are here for you and want to see you succeed! Feedback directly from instructors is the best way to learn. We can spot misconceptions and correct them. If you want to know what you missed on a multiple-part problem or need help understanding why a question has been marked as incorrect on a homework assignment, please email your TA(s).

Labs

Several labs will help you gain a better hands-on experience with the course material. Each lab will have instructions on the required technology and how to access it. Please note that for labs requiring VMs, VMs generally run slower closer to the lab due date from heavier concurrent usage by students.

Online Discussions

Discussions will be based on questions from the instructor relevant to the learning objectives, lectures, and videos. Students will answer instructor questions and then discuss the questions with classmates. More information on discussions will be available as needed in Canvas.

Quizzes

Quizzes are used as an assessment tool with the expectation that students have already completed the learning requirements before taking the quiz. Online quizzes will cover material from the lectures, textbook, and assignments. Each quiz may consist of the typical multiple-choice, true/false, matching, and short-answer questions.

Quizzes are timed, and the time will go quickly, so students are discouraged from relying on their notes or textbook to complete the quiz. Quiz times are continuously monitored and audited each semester; the time limit assigned to a quiz is always well above the average time students spend on the quiz. If you feel the amount of time given for the quizzes is too

short, you are not adequately preparing and learning the appropriate materials before beginning the quizzes.

530-Specific Coursework

Graduate-level students will have a few more assignments than students taking the 430 course. Additionally, all graduate students must submit a project by the end of the semester. Further details will be posted on Canvas.

Anything assigned only to 530 students will not qualify for a dropped score.

Exams

There will be a midterm exam and a cumulative final exam. Like quizzes, exams are timed and assess students' understanding of the course materials. Exams may consist of the typical multiple-choice, true/false, matching, and short-answer type questions.

Late Assignments & Extensions

Late Policy

If a due date is missed, you have 24 hours to submit the assignment, lab, or quiz to receive 50% of the resulting score. After 24 hours, the assignments will close, and submissions will no longer be allowed. This late policy does not apply to exams or 530-specific coursework.

Dropped Scores

It is not advisable to begin working on any assignment the day it is due, and you should strive to submit your assignments before their due date in the off chance that you experience internet connectivity issues or become ill. This course has built-in drops for one assignment, quiz, and lab to accommodate unexpected things in life (e.g., illness) or any technical difficulties experienced (e.g., computer crashes or Canvas glitches). Exceptions: Exams, the Course Policies Quiz, and anything assigned only to 530 students will not qualify for a dropped score.

Dropped scores are intended to help account for unforeseen situations, so please refrain from pre-planning when to use them (e.g., not wanting to complete a specific assignment one week) in case a situation arises later where a drop is genuinely needed. Additional dropped scores beyond those listed above will not be granted. If you have familial, work, or other course obligations, please plan ahead to schedule your 430/530 coursework accordingly. Students are still responsible for learning concepts and information presented in missed or dropped assignments.

Extensions

Assignment extensions are not generally granted and will only be allowed in extenuating circumstances (exceptional, unexpected situations, such as a death in the family). Contact your professor if you believe you may qualify for an extension. The course TA(s) cannot grant assignment extensions, but please Cc them on your request so they are aware of the situation. Requests should be communicated as far in advance as possible.

This course does not curve final grades and does not offer extra credit.

Grading Schema

Weighted Categories

Coursework	Homework, Discussions, 530 Assignments	20%
	Labs	20%
	Quizzes	25%
Exams	Midterm	15%
	Final	20%

Grading Scale

430/530 Letter Grades

Score	Grade
A	100% to 93%
A-	< 93% to 90%
B+	< 90% to 87%
B	< 87% to 83%
B-	< 83% to 80%
C+	< 80% to 77%
C	< 77% to 73%
C-	< 73% to 70%

430/530 Letter Grades

Score	Grade
D+	< 70% to 67%
D	< 67% to 63%
D-	< 63% to 60%
F	< 60% to 0%

Grading Appeal Process

If you believe your grade has been incorrectly recorded, please contact your TA(s). If you feel uncomfortable speaking with your TA(s), please contact your instructor.

If you become concerned about your instructor's class management, please communicate your concerns with your instructor. For example, concerns sometimes relate to grading methods, paper turnaround time, and course policies. If you feel uncomfortable speaking with your instructor, contact Joe Zambreno, ECpE Associate Chair, at (515) 294-3312 or email zambreno@iastate.edu. Before you decide to appeal, check out [ISU's academic appeal process](#).

Appealing Your Final Grade

If you feel that your final grade does not reflect the quality of your work throughout the semester, please first discuss the issue with your instructor. If, after talking with your instructor, you still feel that your grade does not reflect the quality of your work, you can file a grade appeal with Joe Zambreno, ECpE Associate Chair, at (515) 294-3312 or email zambreno@iastate.edu. For a grade appeal, you will need to submit the following materials:

1. A memo explaining why your final grade does not reflect the quality of work you produced
2. All the work you completed during the semester (including major assignments and weekly assignments like discussions and workshops)
3. The course policies with grade breakdown

A panel of instructors will review your materials blindly and assign a grade based on the quality of the work. If the grade the panel assigns is higher than the grade you received, your grade will be changed accordingly. If the grade assigned by the panel is lower than the grade you received, your grade will remain the same.