ECE 60850: Datacenter and Cloud Networks Spring 2026

1 Course Information

Course Number and Title: ECE 60850, Datacenter and Cloud Networks.

CRNs: 40251, 41106

Sections: 004, EPE

Campus: West Lafayette

Instructional Modality: Section 004: In-person; Section EPE: Asynchronous Online.

Lecture Time: Tue, Thu, 1:30–2:45pm in BHEE 224.

Course Credit Hours: 3

Prerequisites: Proficiency in Python programming language.

Course Web Page: https://engineering.purdue.edu/~vshriva/courses/ece60850sp26/index.html

Course Brightspace Page: https://purdue.brightspace.com/d2l/home/1489398

Course Piazza Page: https://piazza.com/purdue/spring2026/ece60850/home

2 Instructor(s) Contact Information

Instructor

Vishal Shrivastav
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Email: vshriva@purdue.edu
Office Hours: By Appointment

3 Course Description

The modern datacenter and the cloud has emerged as the dominant computing platform that powers most of world's consumer online services, financial, military, and scientific application domains. The goal of this course is to introduce students to the design, implementation, and management of modern datacenter and cloud networks. Lectures will cover a wide-range of topics, including datacenter architecture and topology, datacenter routing and load balancing, datacenter transport, software-defined networking, programmable data plane, in-network computing, multi-tenancy in the cloud, datacenter network for ML training and RDMA, resource disaggregation, and optical switching inside datacenters.

4 Prerequisites

Proficiency in Python programming language. A prior undergraduate course in computer networking will be useful but not essential. The first few weeks of the course will cover all the necessary background needed for this class.

5 Course Topics

1. Datacenter Architecture and Topology
2. Datacenter Routing and Load balancing
3. Datacenter Transport
4. Software-defined Networking
5. Programmable Data Plane
6. In-Network Computing
7. Multi-tenancy in the Cloud
8. Datacenter Network for RDMA
9. Resource Disaggregation inside Datacenter
10. Optics inside Datacenter
11. Datacenter Network for ML Training

6 Learning Resources, Technology, and Texts

Required Material: Lecture slides and lecture videos on Brightspace.

Additional Reading: Research papers from the syllabus.

7 Learning Outcomes

A student who successfully fulfills the course requirements will have demonstrated an understanding of the design, implementation, and management of datacenter and cloud networks and familiarity with the state-of-the-art technologies in these areas.

8 Assessments

50% grade — Project
For the project, students will implement a full datacenter network stack on top of a bare-bones network simulator (in Python) provided to them. The project must be completed individually with no collaboration and no use of AI tools allowed. The overall grading will be broken into four milestones:
15% – Milestone 1: Datacenter Topology and Routing
15% – Milestone 2: Datacenter Transport
10% – Milestone 3: Load Balancing in Datacenters
10% – Milestone 4: Priority Scheduling in Datacenters

10% grade — Preliminary Exam
Preliminary exam will be closed-book with no collaboration and no use of AI tools allowed. The syllabus will only include topics from the course background.

20% grade — Midterm Exam
Midterm exam will be closed-book with no collaboration and no use of AI tools allowed. The syllabus will include the first five course topics.

20% grade — Final Exam
Final exam will be closed-book with no collaboration and no use of AI tools allowed. The syllabus will include the last six course topics.

Policy for Late Submissions

Each student will get a total of 5 slip days for the entire semester to use towards no-penalty late submissions for project milestones. Students may divide the 5 slip days across the four project milestones whichever way they want, subject to following three constraints:

1. Each 24-hour window (12am–11:59pm) following a project milestone deadline counts as a separate slip day. A submission made anytime during a 24-hour slip day window will increment the used slip day count by 1.
2. A student may use **at most 2 slip days** towards a single project milestone.
3. A student who has used all the five slip days (or has hit the slip day limit for a single project milestone) and fails to make the submission on time will receive 0 credit for that milestone.

9 Course Schedule

Week	Dates	Topic
1	Jan 12 – Jan 16	Course Introduction
2	Jan 19 – Jan 23	Course Background I
3	Jan 26 – Jan 30	Course Background II
4	Feb 2 – Feb 6	Datacenter Architecture and Topology **Preliminary Exam**
5	Feb 9 – Feb 13	Datacenter Routing and Load balancing
6	Feb 16 – Feb 20	Datacenter Transport **Project Milestone 1 due**
7	Feb 23 – Feb 27	Software-defined Networking
8	Mar 2 – Mar 6	Programmable Data Plane **Project Milestone 2 due**
9	Mar 9 – Mar 13	In-Network Computing **Midterm Exam**
10	Mar 16 – Mar 20	**Spring Break**
11	Mar 23 – Mar 27	Multi-tenancy in the Cloud
12	Mar 30 – Apr 3	Datacenter Network for RDMA **Project Milestone 3 due**
13	Apr 6 – Apr 10	Resource Disaggregation inside Datacenter
14	Apr 13 – Apr 17	Optics inside Datacenter **Project Milestone 4 due**
15	Apr 20 – Apr 24	Datacenter Network for ML Training
16	Apr 27 – May 1	**Final Exam**

10 Grading Scale

The breakpoints for letter grades are shown below. The final letter grade will be based on each student's raw cumulative score at the end of the semester (normalized to 100 while accounting for the weight of each assessment). It may be possible that the raw cumulative score is "curved up" to adjust for the difficulty level of assessments, potentially resulting in a better final letter grade. For example,

a student's raw cumulative score of 74 (B–) may be curved up to 78 (B) to adjust for the difficulty level. The adjustment factor will be decided by the instructor at the end of the semester, and will be applied uniformly to every student's raw cumulative score. Raw scores will never be "curved down".

Letter Grade	A+	A	A–	B+	B	B–	C+	C	C–	D+	D	D–	F
Score (out of 100)	95+	90+	85+	80+	75+	70+	65+	60+	55+	50+	45+	40+	$\leq$40

11 Attendance Policy

This course follows the University Academic Regulations regarding class attendance, which state that students are expected to be present for every meeting of the classes in which they are enrolled. Attendance may be taken at the beginning of a class and lateness may be noted. When conflicts or absences can be anticipated, such as for many University-sponsored activities and religious observations, the student should inform the instructor of the situation as far in advance as possible. For unanticipated or emergency absences when advance notification is not possible, the student should contact the instructor as soon as possible by email. For absences that do not fall under excused absence regulations (see below), this course follows the following procedures:

1. Student should not come to class if they are feeling ill, but they MUST email the instructor with the subject line: [course code] absence. The instructor does not need details about the student's symptoms. The student should just let the instructor know that they are feeling ill and cannot come to class. If it is an emergency situation, the student should follow the University regulations on emergent medical care (see below).
2. Unless it falls under the University excused absence regulations (see below), any work due should be submitted on time via the course Brightspace.
3. If that day's class involves assessed work such as a test or presentation, student and the instructor will plan if and how the student can make up the work, following the assignment guidelines. This plan must be done before the next class period, so again, the student should email the instructor immediately when they know that they will miss class.
4. The most important consideration in any absence is how it will affect the student's achievement of the assignment objectives and the course learning outcomes.

For cases that fall under excused absence regulations, the student or their representative should contact or go to the Office of the Dean of Students (ODOS) website to complete appropriate forms for instructor notification. Under academic regulations, excused absences may be granted by ODOS for cases of grief/bereavement, military service, jury duty, parenting leave, or emergent medical care. The processes are detailed, so the student should plan ahead.

12 Academic Integrity

Unless expressly allowed, students are expected to complete the project and exams by themselves, **without use of any AI tools**. A student is considered in violation of the academic honesty policy regardless of whether they are the one "copying" or the one "being copied from". Academic integrity is one of the highest values that Purdue University holds. Individuals are encouraged to alert university officials to potential breaches of this value by either emailing integrity@purdue.edu or by calling 765-494-8778. While information may be submitted anonymously, the more information is submitted the greater the opportunity for the university to investigate the concern. Punishments for academic dishonesty are severe, including receiving a failing grade in the course or being expelled from the university. By departmental rules, all instances of cheating will be reported to the Dean of Students.

On the first instance of cheating, students involved will receive a 0 on the assignment; the second instance of cheating will result in a failing grade in the course.

Use of Copyrighted Materials: All course materials, including lecture slides, project, exams, and solutions are subject to Purdue's copyright policies. Students must not share, distribute, or post any material on an online web site without checking with the instructor.

13 Accessibility

Every member of this course should be able to access, use, and learn from the materials shared as part of this course. This includes all course related digital content that students and instructor share in the course. This approach helps promote equal access for everyone at Purdue and is mandated federally by Title II of the Americans with Disabilities Act (ADA). The instructor and students will work together to provide this access within the Brightspace course webpage.

1. Instructor's part is to make sure all course materials shared to Brightspace, such as documents, slides, videos and audio, and images, meet accessibility guidelines and to assist students in making sure anything the instructor shares is accessible.
2. Student's role is to make sure anything they post for other students to engage with is also accessible, such as peer grading, peer feedback, and discussion board posts. This expectation is built into all course assignments that require students to post to Brightspace.
3. A good starting place for students is to bookmark and review the Innovative Learning Accessibility Checklist for guidance on creating accessible materials.
4. When selecting materials to share on Brightspace from Purdue Libraries catalog or databases, best practices include choosing items that:
   (a) Can be downloaded in full
   (b) Are available in EPUB or HTML formats
   (c) Include alternative text for written materials or captions for audio/visual content

Purdue University strives to make learning experiences accessible to all participants. If a student anticipates or experiences physical or academic barriers based on disability, they are encouraged to contact the Disability Resource Center at: drc@purdue.edu or by phone: 765-494-1247, as soon as possible. If the Disability Resource Center (DRC) has determined reasonable accommodations that the student would like to utilize in the class, the student must send the instructor their Course Accommodation Letter. Instructions on sharing the Course Accommodation Letter can be found by visiting: https://www.purdue.edu/drc/students/course-accommodation-letter.php. Additionally, the student is strongly encouraged to contact the instructor as soon as possible to discuss implementation of their accommodations.

13.1 Accommodated Testing

The instructor, or his department, will arrange to provide test accommodation for those who have them as a part of their DRC Course Accommodation Letter (CAL). It is imperative that students release their CALs to the instructor as soon as they are available so that arrangements can be made well in advance of exams. The instructor or department may be unable to implement test accommodations if they do not have access to student's CAL.

14 Nondiscrimination Statement

Purdue University is committed to maintaining a community that recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her potential. A hyperlink to Purdue's full Nondiscrimination Policy Statement is included in the Academic Resources table on your Brightspace homepage.

15 Mental Health/Wellness Statement

If a student finds themselves beginning to feel some stress, anxiety and/or feeling slightly overwhelmed, they should try Therapy Assistance Online (TAO), a web and app-based mental health resource available courtesy of Purdue Counseling and Psychological Services (CAPS). TAO is available to all students at any time by creating an account on the TAO Connect website, or downloading the app from the App Store or Google Play. It offers free, confidential well-being resources through a self-guided program informed by psychotherapy research and strategies that may aid in overcoming anxiety, depression and other concerns. It provides accessible and effective resources including short videos, brief exercises, and self-reflection tools.

If a student needs support and information about options and resources, they should contact or see the Office of the Dean of Students (ODOS). Call 765-494-1747. Hours of operation are M-F, 8am–5pm.

If a student finds themselves struggling to find a healthy balance between academics, social life, stress, etc., they should sign up for free one-on-one virtual or in-person sessions with a Purdue Wellness Coach at RecWell. Student coaches can help students navigate through barriers and challenges toward their goals throughout the session. Sign up is free and can be done on BoilerConnect. Students in Indianapolis will find support services curated on the Vice Provost for Student Life website.

If a student is struggling and needs mental health services: Purdue University is committed to advancing the mental health and well-being of its students. If a student or someone they know is feeling overwhelmed, depressed, and/or in need of mental health support, services are available. For help, such individuals should contact Counseling and Psychological Services (CAPS) at 765-494-6995 during and after hours, on weekends and holidays, or by going to the CAPS offices in West Lafayette or Indianapolis.

16 Basic Needs Security

If a student is facing challenges securing basic needs such as food, housing, transportation, health services, or access to technology or childcare resources and believe this may affect their performance in the course, they should contact the Office of the Dean of Students (ODOS) to help coordinate with community resources. These services vary by location. In **West Lafayette**, see the Basic Needs Program website, or email basicneeds@purdue.edu. To connect with a Student Support Generalist on the **Indianapolis** campus, contact them by phone at 765-495-7797 or email studentlifeindy@purdue.edu.

17 Emergency Preparedness

In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor's control. Relevant changes to this course will be posted onto the course web page and Piazza or can be obtained by contacting the instructor via email. Students are expected to

check the course web page and Piazza, and read their @purdue.edu email on a frequent basis.

See Purdue's Information on Emergency Preparation and Planning. This website covers topics such as Severe Weather Guidance, Emergency Plans, and a place to sign up for the Emergency Warning Notification System. The instructor encourages students to download and review the Emergency Preparedness for Classrooms document.

The first day of class, the instructor will review the **Emergency Preparedness plan for the specific classroom**. Students are advised to make note of the following items:

1. The location to where one will proceed after evacuating the building if one hears a fire alarm.
2. The location of the Shelter in Place in the event of a tornado warning.
3. The location of the Shelter in Place in the event of an active threat such as a shooting.

18 Course Evaluation

Toward the end of this semester, students will be provided with an opportunity to give feedback on this course and the instructor. Purdue uses an online course evaluation system, and the instructor will not have access to this anonymous feedback until after final grades are submitted. Students will receive an official email from evaluation administrators with a link to the online evaluation site and will receive a prompt to complete the survey when they login to Brightspace. The subject line will be: Please take 2-5 minutes to complete the survey. Students should check their "Junk E-mail" folder occasionally to be sure the evaluation emails were not accidentally routed there. Student participation is an integral part of this course, and their feedback is vital to improving education at Purdue University. The instructor strongly urges students to participate in the evaluation system.