CS 772/872: **Advanced**

Computer and Network Security

Fall 2025

Course Link:

https://shhaos.github.io/courses/CS872/netsec-fall25.html

Instructor: Shuai Hao

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OLD DOMINION
UNIVERSITY

Instructor – Shuai Hao

- **Ph.D.,** 2018.1 -- College of William and Mary, Williamsburg, VA
- **Postdoc,** 2018 – 2019 – CAIDA, UC San Diego, La Jolla, CA
- **Research -** *Empirical Security for Cyberinfrastructure and Systems*
  - Applying measurement, empirical study, and data-driven approach to (1) understand Internet underlying Infrastructure and (2) to develop enhancement to improve Internet performance, robustness, and security
    - Internet Topology
    - Internet Routing System
    - Domain Name System
    - Content Delivery Networks
    - Web Security and Privacy
    - Online Fraud
    - Underground E-Commerce
    - Cybercrime

What this course is …

- **Fundamental Background will be introduced**
- **Graduate-level course**
- **Study classical and latest relevant research problems**
  - Reading Research Papers
    - Reviewing/ Presenting papers
  - Writing Technical Report

What this course is NOT …

- **Listening-and-learning**
- **Textbook knowledge**
- **Knowledge-based Exam**

Why CS 772/872?

- **Credits / Requirements**
- **Advanced Topics**
  - Sitting on the frontier of popular research areas

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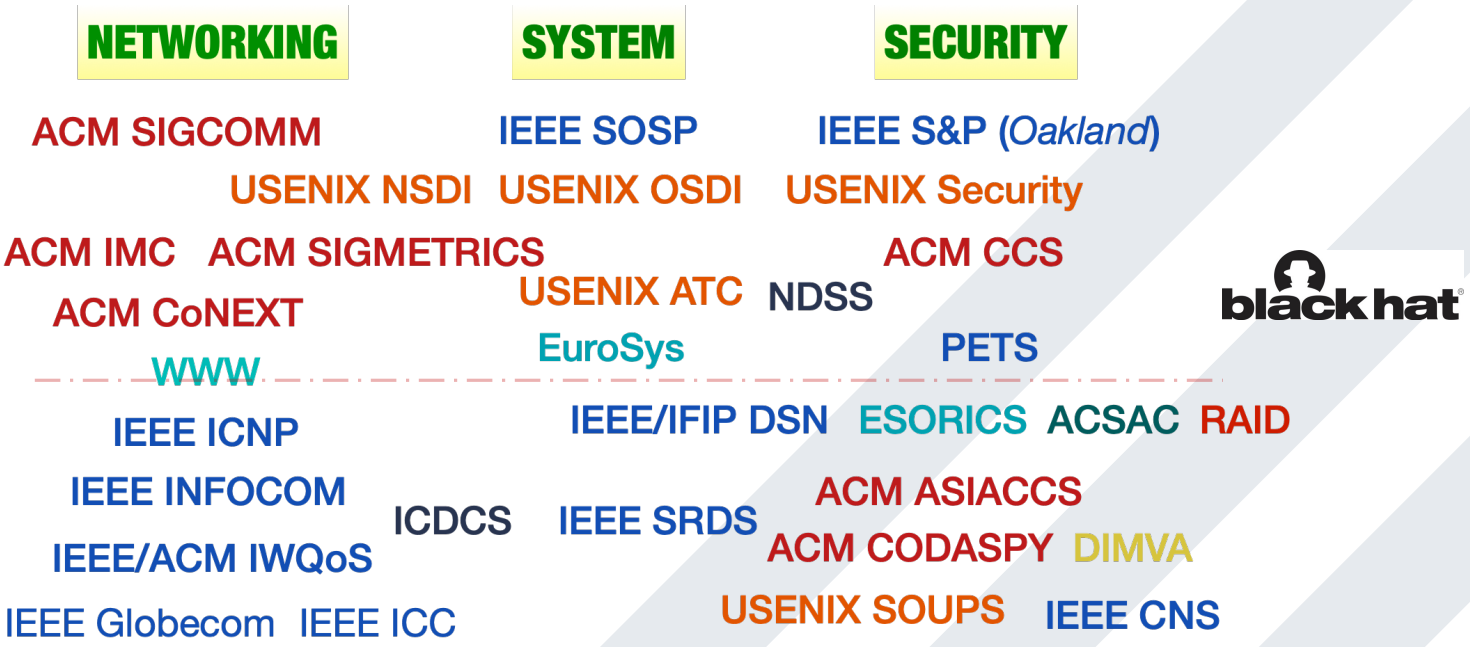
- **Credits / Requirements**
- **Advanced Topics**
  - Sitting on the frontier of popular research area
- **Computer and Network Security**
  - *Classical* & *Emerging* Research areas and topics
  - *Fundamental* & *practical* problems that are related to most areas of networking- and security-related software system development

Resources

- **Premier Conferences in Networking & Security**



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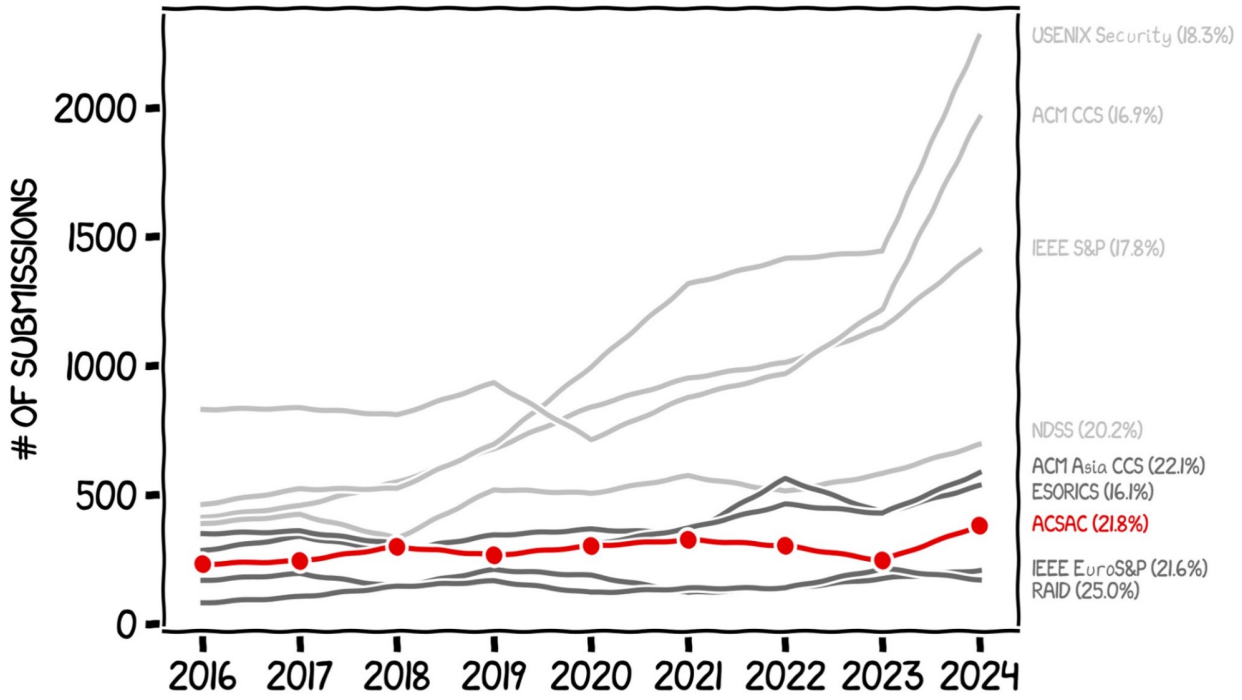

Resources

- **Premier Conferences**

  CSRankings.org

CSRankings: Computer Science Rankings

CSRankings is a metrics-based ranking of top computer science institutions around the world. **Click on a triangle** (▶) to expand areas or institutions. **Click on a name** to go to a faculty member's home page. **Click on a chart icon** (the after a name or institution) to see the distribution of their publication areas as a bar chart. **Click on a Google Scholar icon** () to see publications, and **click on the DBLP logo** () to go to a DBLP entry. *Applying to grad school? Read this first.* For info on grad stipends, check out CSStipendRankings.org. For publication statistics on CSrankings conferences, see CSconferences.org. **If you find CSrankings useful, consider sponsoring CSrankings.**

Rank institutions in USA by publications from 2015 to 2025

All Areas [off | on]

AI [off | on]

- ▶ Artificial intelligence
- ▶ Computer vision
- ▶ Machine learning
- ▶ Natural language processing
- ▶ The Web & information retrieval

Systems [off | on]

- ▶ Computer architecture
- ▼ Computer networks

ACM SIGCOMM

- SIGCOMM
- NSDI

- ▼ Computer security

ACM SIGSAC, IEEE S&P, USENIX

- CCS
- IEEE S&P ("Oakland")
- USENIX Security

- NDSS

- ▶ Databases
- ▶ Design automation
- ▶ Embedded & real-time systems
- ▶ High-performance computing
- ▶ Mobile computing
- ▶ Measurement & perf. analysis
- ▶ Operating systems
- ▶ Programming languages
- ▶ Software engineering

#	Institution	Count	Faculty
1	▶ Georgia Institute of Technology	69.4	28
2	▶ Purdue University	60.0	23
3	▶ Univ. of Illinois at Urbana-Champaign	41.2	22
4	▶ Carnegie Mellon University	39.7	31
5	▶ Northeastern University	38.3	25
6	▶ University of Maryland - College Park	36.4	18
7	▶ Indiana University	35.8	14
8	▶ Univ. of California - Riverside	35.6	13
9	▶ Arizona State University	31.7	15
10	▶ Stony Brook University	30.5	15
11	▶ Duke University	30.1	14
12	▶ Univ. of California - San Diego	29.8	30
13	▶ Univ. of California - Berkeley	29.7	19
14	▶ Cornell University	28.3	16
15	▶ University of Michigan	28.1	20
16	▶ Pennsylvania State University	26.2	22
17	▶ Univ. of California - Santa Barbara	25.8	9
18	▶ George Mason University	23.7	13
19	▶ Univ. of California - Irvine	21.6	15
20	▶ Boston University	21.2	13
21	▶ University of Wisconsin - Madison	21.0	16
22	▶ University of Chicago	20.8	13

Course Workloads

- **Course Presentations**
  - Teach us
- **Paper Reviews**
  - Gain Insights & practice your duty
- **Final Report**
  - Write a paper/survey

Paper Review

- **Summarize the main idea**
  - Problem they solved
  - Approach they took (what's the novelty)
  - How did they evaluate
- **Pros & Cons:** Which parts you like & don't like
  - Methodology? Reasonable Experiment design? Solid results?
- **Any ways to improve the work**

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- **Review Samples**

  Sample1, Sample2, Sample3

Presentation

- **Basic Presentation Structure**
  - Motivation of the work
  - Technical background
  - Proposed approaches/Major contribution
  - Evaluation results/discussion
  - Conclusion and Extension
- **You could do more**
  - History/evolution of relevant techniques
  - Comparison/complementary study
  - Following work

Presentation

- **Colloquium-style Presentations**
  - ~40-45 mins + discussion
  - **Using your own slides**
  - Including course information, original authors, and the presenter in your title page
- **Need to see more well-presented seminar talks?**
  - Stanford NetSeminar
    - https://www.youtube.com/channel/UCDjWhwewESyX335Rp6B1PEw
  - Cornell-Princeton Center for Network Programming
    - https://www.youtube.com/channel/UCCPScZgIFYxuuqj8IsPpgeQ

Final Report

- **A formal technical paper**
  - Using formal IEEE or ACM conference template
  - Writing with LaTex! (Suggested but not required for Ph.D. students)
- **Progress**
  - Define your topic: problem statement
  - Paper structure

  } First Due (10/13)
  - Preliminary results (if present)
  - Final report

  } Final Due
  - **A final presentation of your report at the last lectures (~10 min)**

Final Report

- **Do a research**
  - Analysis / Assessment
  - Measurement
  - Prototyping
  - Suggested: identifying a security-oriented topic related to your own research
  - Best: become part of your future publications
- **Optional: Pursue a joint project with other course**
  - Getting approval from the other instructor
  - Schedule a joint meeting with both instructors to present your idea

Final Report

- **Examples of projects**
  - UC Berkeley CS 261N: Internet/Network Security
    - http://www.icir.org/vern/cs261n/project.html
  - MIT 6.875: Computer and Network Security
    - http://courses.csail.mit.edu/6.857/2016/projects

Final Report

- **Survey Paper**
  - Comprehensive and thoughtful literature survey of a particular topic
  - Touching the State-of-the-art
  - Connecting to your potential research interests

Sample1, Sample2

Final Report

- **Survey Paper**
  - Comprehensive and thoughtful literature survey of a particular topic
  - Touching the State-of-the-art
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Systematization of Knowledge (SoK)

- Introduced by IEEE Security and Privacy since 2010
- Currently adopted by most of major security conferences
- Collection of SoK papers from IEEE Security and Privacy
  - https://oaklandsok.github.io/

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