

CS - 3700 - Networking and Distributed Computing

z08. UG Course Modification #2 (Substantive College/School)

Due Dates

Deadlines for curriculum can be found:

[Curriculum SharePoint](#)

[Curriculum Website](#)

[Procedural Calendar](#)

On your Curriculog dashboard under 'My Upcoming Events'

In order to meet the deadline, this proposal must be on the *Substantive College/School Level Review* step on or before the listed due date.

Directions for Form

Please read instructions and information below before you begin your curriculum proposal. You may also consult the following resources which can provide additional assistance in understanding this form and the curriculum process.

Originator How-To Guide

[Curriculum SharePoint](#)

[Example Proposal](#)

This form **SHOULD** be used for the following:

Modifying a course **without** a special designation (General Studies, Service Learning, Multicultural, or Senior Experience).

Converting an omnibus or individual variable topic course to a regular course.

This form **SHOULD NOT** be used for the following:

Modifying a course with a special designation (General Studies, Service Learning, Multicultural, or Senior Experience).

Creating a new course with or without a special designation (General Studies, Service Learning, Multicultural, or Senior Experience).

Changing a course prefix or changing the ownership of a course.

Modifying or creating graduate courses.

Instructions:

Import the course you wish to modify with the import button at the top of this page.

Fill in the required information in the following fields:

Originator Name and Email

Curriculum Proposal Justification and Resource Implication Subsection

Review for Conflict and Overlap (end of form)

Launch the Proposal

DO NOT MAKE CHANGES TO YOUR PROPOSAL UNTIL AFTER YOU LAUNCH THE PROPOSAL in order to track changes. Failure to use the track changes feature may cause a delay or denial of your proposal.

Modify course components as needed

Approve the proposal

Use the checkmark icon on the right of the screen to approve the proposal.

Additional Information

You may collapse individual sections of this form by clicking the arrow or "V" icon to the right of the section title.

All fields that are marked with an asterisk (*) are required.

Each section may have additional directions attached. Please follow instructions. Proposals that are incomplete or filled out incorrectly will be returned to the originator.

If you have questions or need assistance in filling out this proposal form, you may contact the [Director of Curriculum and Catalog](#).

Department and Originator Information

College/School:*

Department:*

Name of Proposal Originator* Weiying Zhu

Email of Proposal Originator* wzhu1@msudenver.edu

Curriculum Proposal Justification and Resource Implication

Justification and Rationale for Curriculum Proposal:*

This proposal is created mainly to modify this course to extend its contents to distributed computing and to update the contents on computer networks as part of our effort to improve the coverage on networking and distributed computing in our CS curriculum.

Additionally, this proposal also

1. change the course title to reflect the change on contents,
2. change the passing grade in "prerequisites" from C to C- to reflect what has been used via the "Banner Enforced Prerequisites".

Resource Implication Narrative:*

Not yet because this course will still be an elective in the coming school year, even though it will be changed into a required course in the next school year together with a CS program modification proposal.

Related Curriculum Proposals:*

N/A

Please select from the below list all of the course modifications you are making. If you wish to change something that is not listed, please refer to the other course modification forms in Curriculog. **Please do not make changes to fields you do not specify are being modified and make sure to list ALL fields that you modify.**

Note: This form CANNOT be used to change courses with special designations (Multicultural, Service Learning, Senior Experience, General Studies)

Course Modifications:*

Course description

Course title

Outline

Required reading

Student Behavioral Learning Objectives (SBLOs)

Transcript/Banner title

Evaluation of student

Grade mode

Prerequisites, corequisites, pre/corequisites

Course Equivalency

Impact Report Results:*

Impact Report for CS 3700

There are no results for this report.

*This course has been used to satisfy the "CS Upper-Division Electives" requirements in our CS major program and therefore it's not explicitly listed anywhere in the curriculum.

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Course Title Information

Prefix:*

CS

Course Number:* 3700

Course Title:* Networking and Distributed Computing

Transcript/Banner Course Title:* Networking & Distributed Comp

Course Type:*

Computer Science

CIP Code: 11.0701

Course Hours, Restrictions, and Repeat Information

Please check all that apply from the selections below. You may select more than one option if applicable.

- Check All that Apply:*
- Required for Major
 - Required for Minor
 - Required for Concentration
 - Required for Certificate
 - Elective
 - Specified Elective

To receive Title IV financial aid funds, all institutions of higher education must comply with the federal definition of a credit hour. The Higher Learning Commission requires institutions to maintain policies and procedures for verifying compliance with this definition.

Federal Credit Hour Definition: A credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally-established equivalency that reasonably approximates not less than:

(1) one hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work each week for approximately fifteen weeks for one semester or trimester hour of credit, or ten to twelve weeks for one quarter hour of credit, or the equivalent amount of work over a different amount of time; or (2) at least an equivalent amount of work as required in paragraph (1) of this definition for other activities as established by an institution, including laboratory work, internships, practica, studio work, and other academic work leading toward to the award of credit hours. 34CFR 600.2 (11/1/2010)

Credits:* 4

Distribution of Credits:* (4 + 0)

Schedule Type(s):*

Lecture

Grade Mode(s):*

Letter

Face-to-Face or Equivalent Hours per course

Consult Appendix B and C of the [Curriculum Manual](#) to determine the hours for the course

Lecture: 60

Lab:

Internship:

Practicum:

Other Hours:

Additional Student Work Hours: 120

Please answer yes or no to the below questions. If you answer yes to any of the questions, please fill out the related field on the right.

Is this course a specified repeatable course?*

No
 Yes

If yes, indicate specified repeatable number of credits and/or repeats allowed:

A specified repeatable course is a course that allows a student to repeat the course either in its entirety or for a certain identified total number of credit hours. If you decide to make your course repeatable, please specify either how many times a student can repeat the course for credit, or for the total number of credits they can receive.

Is this course a variable topics umbrella course?*

No
 Yes

If yes, indicate variable topic number of credits and/or repeats available:

Are there course

No

If yes, list all

equivalencies?* No Yes

equivalent courses:

A crosslisting is when a course is made available under additional prefixes for students in other programs.

An equivalency is when two courses are coded in Banner to be equal to each other.

Generally equivalencies are used when an old, archived course is needed to be equal to a new course.

Crosslistings are used for all active courses. Supporting documentation should be included to demonstrate approval for crosslistings.

Are there course crosslistings?* No Yes

If yes, list all crosslistings:

Registration Restrictions

Program:

Major:

Level:

Class:

Student Attribute:

Catalog Course Information

The following fields will allow you to attach prerequisites, corequisites, or prerequisites or corequisites to your course. Please specify if you want and of these prerequisites, corequisites, or prerequisites or corequisites Banner enforced.

Banner enforcement means that the requirement will be enforced when the student attempts to register for a course. If you do not Banner enforce the requirement, the system will not check the student's record for the requirement to be met.

Please also indicate the minimum passing grade. If you do not indicate a minimum passing grade, it will default to a "D-" and you will be required to complete another curriculum proposal to modify this minimum passing grade, even if your program has a different minimum passing grade.

Prerequisite(s): CS 1400 and CS 2050 both with grades of "C-" or better, or permission of instructor

Banner Enforced Prerequisite(s): CS 1400 and CS 2050

Minimum Passing Grade for Banner Enforced Prerequisite(s): C- or T

Corequisite(s):

Banner Enforced

Corequisite(s):

**Prerequisite(s) or
Corequisite(s):**

**Banner Enforced
Prerequisite(s) or
Corequisite(s):**

**Minimum Passing
Grade for Banner
Enforced
Prerequisite(s) or
Corequisite(s):**

Catalog Course Description:* This course covers the design, implementation, operation, and use of computer networks, with an emphasis on the most used protocols at the application, transport, and network layers. Aspects related to distributed applications and architectures are also discussed in detail.

The note field DOES show up in the course listing in the university catalog. A note should be made in specific instances where additional information about a course needs to be conveyed to students. The most common reasons for adding a note are:

The course is crosslisted Example: *(Note: Credit will be granted for only one prefix.)*

Variable credit courses Example: *(Note: Variable Credit)*

A course is repeatable Example: *(Note: This course may be repeated up to 3 times under different topics) OR (Note: This course is repeatable for a maximum of six semester hours)*

If a student cannot take two courses and earn credit for both Example: *(Note: Students cannot earn credit for XXX1234 and XXX2345)*

Note:

Lab Fees:

Field Trips:

Course Content

The following section is the course content. You must adhere to the following format for each section:

Required reading: Smith, J.R. (2014). *Book of Examples*. New York, NY: McGraw-Hill

List each material in this format. If there are multiple materials please format them in a bullet or list style

Specific Measurable Student Behavioral Learning Objectives: 1, a, i, ii, etc.

Detailed Outline of Course Content or Outline of Field Experience/Internship: I, A, 1, a, etc.

Evaluation of Student Performance: 1, a, i, ii, etc.

You must use the numbering list feature within the toolbar above each field. Right click on a number in the list and select "Numbered List Properties" to change the numbering style to adhere to the above formatting requirements.

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Required reading and other materials will be equivalent to:*

1. Kurose, J. & Ross, K. W. (2017). *Computer Networking: A Top-Down Approach*, 7th edition. Hoboken, New Jersey: Pearson. ISBN-13: 978-0133594140.

AND

2. Coulouris, G. Dollimore, J. Kindberg, T. & Blair G. (2012). *Distributed Systems: Concepts and Design*, Hoboken, New Jersey: Pearson. ISBN-13: 978-0132143011.

**Specific, Measurable
Student Behavioral
Learning Objectives:***

Upon completion of this course the student should be able to

1. Discuss the layered structure of typical network architecture and describe the general services offered by each layer.
2. Explain and discuss application-layer services and protocols with a focus on the most used ones such as the ones for web, email, and domain name services.
3. Implement and develop socket-based client/server applications.
4. Compare and contrast major transport-layer protocols and services.
5. Compare and contrast reliable data transfer approaches.
6. Compare and contrast direct and indirect communications.
7. Discuss various architecture options for distributed systems.
8. Explain selected major network-layer protocols and services.
9. Explain algorithms for packet routing.

**Detailed Outline of
Course Content
(Major Topics and
Subtopics) or Outline
of Field
Experience/Internship ***

1. Fundamentals of Networking

1. Packet-switched and circuit-switched networks
2. Performance metrics: delay, loss, and throughput in packet-switched networks
3. Internet architecture: layers, protocols, encapsulation, and core and edge networks

2. Application Layer

1. Protocols at the application layer
2. Client-server vs. peer-to-peer architectures
3. Transport-layer services available to applications and network sockets
4. Socket programming and client/server programming
5. The web: HTTP (Hypertext Transfer Protocol)
6. Email and SMTP
7. DNS (Domain Name System)

3. Transport Layer Services

1. UDP (User Datagram Protocol): connectionless transport
2. TCP (Transmission Control Protocol): connection-oriented transport, reliable data transfer, flow control, and congestion control
3. Direct communication
4. Indirect communication: queuing services, producer/consumer vs. publish/subscribe communication paradigms
5. Introduction to container-based architectures

4. Internetworking and Routing

1. The Internet Protocol, including addressing, routing, subnetting, and datagram formats
2. NAT (Network Address Translation)
3. ICMP (Internet Control Message Protocol)
4. Introduction to routing algorithms

**Evaluation of Student
Performance: ***

Below is a list of approaches that the instructor may choose from to evaluate student performance.

1. Homework and Programming Assignments
2. Quizzes and Examinations
3. Oral Presentations
4. Final Examination

Review for Conflict and Overlap

According to the Undergraduate Curriculum Manual, it is the responsibility of both the originator as well as each level of review to consider potential overlap and curriculum conflict. Any potential overlap or conflict with existing curriculum should be reviewed, and the impacted department(s) should be requested to provide a letter of notification or support, depending on the circumstances. Full information on overlap/conflict can be found [here](#).

Attach documentation that supports affected Departments were notified and/or provided support of the proposed changes in the Proposal Toolbox by clicking on the paperclip icon on the right side of the form.

Please Confirm That:* I, the originator of this proposal, have completed the necessary due diligence to review this proposal for any potential overlap and/or conflict with existing curriculum. Any departments identified as having potential overlap and/or conflicts have been contacted and a letter of notification and/or a letter of support has been obtained.

Academic Affairs and Registrar's Office Use Only

Notes Director added grade mode, course equivalency, prerequisites, and evaluation of student to the specify course modification field.

This course modification will be effective with the Summer 2022 catalog addendum for the University 2022-2023 Undergraduate Catalog and will be reflected in Banner beginning in Spring 2023.

Form Revised August 2021