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CSC 714/CSC 591 Course Syllabus

Real Time Computer Systems / Foundations of Real-Time Systems

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INSTRUCTOR INFORMATION

Name	Office Phone	Mobile Phone	Email	Office Location
Zhishan Guo	919-515-3962	n/a	zguo32@ncsu.edu	EB II 2262

Virtual Office Hours

By email appointment only.

Preferred Method of Communication

Email communication is preferred, with the course number in the subject line

Response Time

Typically I respond to emails within 2 business days, unless traveling. You may want to resend another email with fewer "spam-like" words to ensure the email successfully ends up in my normal inbox.

COURSE INFORMATION

Course Website: Moodle
Course Credit Hours: 3

Meeting Time and Tool Used

Mon 10:15 am - 11:30 pm, EB III 2213 or Zoom

Prerequisites/Corequisites

Algorithms (or comfortable with logic-proof)
&
Operating Systems or Embedded Systems

Please note that these pre-requisites are not hard requirements. Anyone with some basic knowledge in computer science and engineering should be able to handle the materials.

General Education Program (GEP) Information

none

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GEP Category Fulfilled

none

GEP Corequisites

none

COURSE OVERVIEW

Catalog Description

Introduction to real-time systems, with an emphasis on scheduling algorithms and proofs to achieve timing correctness in computer systems. Examples of such systems include airbags, emergency breaks, avionics, and also multi-media systems like video playback and QoS in web servers. The course also includes specification, analysis, design, and validation techniques for real-time systems; theory of deterministic scheduling and resource allocation; case studies, and a research project.

Structure

All lectures will be Zoomed online and recorded for both synchronous and asynchronous learning.

*This online course delivers all learning materials, activities, and assignments, through **Moodle**, a secure and easy-to-use online learning platform.*

Learning activities include reading assignments, homework, videos, presentations, discussion forums, and a research project.

This course consists of several modules. Most modules last one to two weeks. Assignments are due by midnight on the due dates given.

LEARNING OUTCOMES

Upon completion of this course, students will be able to:

1. understand classical uniprocessor scheduling algorithms;
2. be able to apply (791 only: prove) timing analysis results to show timing correctness for uniprocessor systems under classical schedulers;
3. be knowledgable on resource sharing protocols;
4. be knowledgable (791only: familiar) with multiprocessor schedulers and analysis;
5. be familiar with real-time OS;
6. be knowledgable (791 only: familiar) with general computer science/engineering research procedures.

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COURSE MATERIALS

Required Textbook and/or Software

Jane Liu, Real-Time Systems, Prentice Hall, 2000

Optional Materials

Please refer to the course website.

TECHNOLOGY REQUIREMENTS

Hardware

NC State's Online and Distance Education provides technology requirements and recommendations for computer hardware.

Software

- Moodle and Wolfware
  - Moodle Accessibility Statement
  - Moodle Privacy Policy
  - NC State Privacy Policy
- Adobe Reader (for reading PDF files)
  - Accessibility Statement
  - Adobe Privacy Policy
- Zoom:
  - Zoom Accessibility Statement
  - Zoom Privacy Policy
- Headsets with microphone (optional for synchronous events)

Minimum Computer and Digital Literacy Skills

- Obtain regular access to a reliable internet connection
- Proficient typing and word processing skills (MS Word, text editors, Google Docs)
- Ability to use online communication tools, such as email, discussion boards, chats, and messengers.
- Download and upload attachments
- Knowledge of copy/paste and use of spell check
- Use computer networks to locate and store files or data
- Internet skills and ability to perform online research using various search engines and library databases. Visit Distance Learning Services at NC State Libraries for more information.
- Properly cite information sources

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NETIQUETTE

Students should be aware that their behavior impacts other people, even online. I hope that we will all strive to develop a positive and supportive environment and will be courteous to fellow students and your instructor. Due to the nature of the online environment, there are some things to remember when taking an online course and engaging with others.

GRADING

Grading Policy

> 5 % - Class Participation and Discussion.
> 20 % - Assignments
> 50 % - two mid-term exams
> 25 % - Project
> (CSC591 students may choose to opt out of the second exam or the project)

Grading Scale

This course uses this grading scale:

Low	Letter	High
88 ≤	A	≤ 100
75 ≤	B	< 88
60 ≤	C	< 75
0 ≤	F	< 60

COURSE SCHEDULE

• *Introduction to real-time systems. (1 Week)*
• *Classic uniprocessor scheduling (3 Weeks)*
• *Resource sharing protocols (1.5 Weeks)*
• *Multiprocessor analysis (2 Weeks)*
• *Exams (1 week)*
• *Selected advanced topics and Projects (~4 Weeks)*
For this semester, the advanced topics will be focused on 1:10 scale autonomous driving and racing. One may choose this or define his/her own project.

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COURSE POLICIES

Late Assignments

- Late assignments will be accepted with 10% taken off for every day submitted late, up to 2 days. Assignments submitted later than 2 days passed the original due date will NOT be accepted.

Incomplete Grades

- We do not give “Incomplete” unless for medical/health reasons with written requests and evidence.

Attendance and Participation

- *NC State’s Attendance Policy: https://policies.ncsu.edu/regulation/reg-02-20-03-attendance-regulations/*
- *Withdrawl Process: https://studentservices.ncsu.edu/your-classes/withdrawal/process/*

UNIVERSITY POLICIES

Academic Integrity and Honesty

Students are required to comply with the university policy on academic integrity found in the Code of Student Conduct. Therefore, students are required to uphold the university pledge of honor and exercise honesty in completing any assignment.

Please refer to the Academic Integrity web page for a detailed explanation of the University’s policies on academic integrity and some of the common understandings related to those policies.

Students may be required to disclose personally identifiable information to other students in the course, via electronic tools like email or web-postings, where relevant to the course. Examples include online discussions of class topics and posting of student coursework. All students are expected to respect the privacy of each other by not sharing or using such information outside the course.

Students are responsible for reviewing the NC State University PRR’s which pertains to their course rights and responsibilities:

> Equal Opportunity and Non-Discrimination Policy Statement and additional references
> Code of Student Conduct
> Grades and Grade Point Average
> Credit-Only Courses
> Audits

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Students with Disabilities

Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with the Disability Resource Office at Holmes Hall, Suite 304, Campus Box 7509, 919-515-7653. For more information on NC State's policy on working with students with disabilities, please see the Academic Accommodations for Students with Disabilities Regulation (REG02.20.01)

Trans-Inclusive Statement

In an effort to affirm and respect the identities of transgender students in the classroom and beyond, please contact me if you wish to be referred to using a name and/or pronouns other than what is listed in the student directory.

Basic Needs Security

Any student who faces challenges securing their food or housing or has other severe adverse experiences and believes this may affect their performance in the course is encouraged to notify the professor if you are comfortable in doing so. Alternatively, you can contact the Division of Academic and Student Affairs to learn more about the Pack Essentials program https://dasa.ncsu.edu/pack-essentials/

COURSE EVALUATIONS

ClassEval is the end-of-semester survey for students to evaluate the instruction of all university classes. The current survey is administered online and includes 12 closed-ended questions and 3 open-ended questions. Deans, department heads, and instructors may add a limited number of their own questions to these 15 common-core questions.

Each semester students' responses are compiled into a ClassEval report for every instructor and class. Instructors use the evaluations to improve instruction and include them in their promotion and tenure dossiers, while department heads use them in annual reviews. The reports are included in instructors' personnel files and are considered confidential.

Online class evaluations will be available for students to complete during the last two weeks of the semester for full semester courses and the last week of shorter sessions. Students will receive an email directing them to a website to complete class evaluations. These become unavailable at 8 am on the first day of finals.

> Contact ClassEval Help Desk: classeval@ncsu.edu
> ClassEval website
> More information about ClassEval

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SYLLABUS MODIFICATION STATEMENT

Our syllabus represents a flexible agreement. It outlines the topics we will cover and the order we will cover them. Dates for assignments represent the earliest possible time they would be due. The pace of the class depends on students' mastery and interests. Thus minor changes in the syllabus can occur if we need to slow down or speed up the pace of instruction.