

ECE 310 – Design of Complex Digital Systems – Spring 2025

Sections 001, 602

Syllabus

Last Updated: 5 January 2025

Meet Times: Lecture: MW 08:30 – 09:45 in 2124 EB3 (or remote for section 602)
Lab: see below

Instructor: Dr. Mihail Cutitaru (Dr. C/Prof. C)
Associate Teaching Professor
mcutita@ncsu.edu

- The subject of each email should start with “ECE 310 – *Your Topic*” for a quicker response

- o For questions related to the course, please use the support email:
ece-310-001-sprg-2025-support@wolfware.ncsu.edu

Office Hours: 2076 EB2 – MW 10-11AM and 1:30-2:30PM, or by appointment (send email with a few options for times)

Asheville: Zoom-only office hours information TBD.

Teaching Assistants:

- Kenneth Addo (keaddo@ncsu.edu) and Sharath Pendyala (spendya@ncsu.edu)
- Office Hours: Lab time or by appointment
- Email: ece-310-001-sprg-2025-support@wolfware.ncsu.edu

Lab Sections (NCSU):

Section	Day	Time	Location
201	Mon	10:40AM-12:30 PM	1014 EB2
202	Mon	12:50PM-2:40 PM	1014 EB2
203	Tue	10:40AM-12:30 PM	1014 EB2
204	Tue	12:50PM-2:40 PM	1014 EB2

Asheville: see local facilitator for lab schedule and locations.

Course Description:

Design principles for complex digital systems. Decomposition of functional and interface specifications into block-diagrams and simulation with hardware description languages. Synthesis of gate-level descriptions from register-transfer level descriptions. Design and test of increasingly complex systems.

Course Website:

- Moodle: <https://moodle-courses2425.wolfware.ncsu.edu/course/view.php?id=7811>

Prerequisites

- Grade of C- or better in ECE 212.

Recommended Text

- *Advanced Digital Design with the Verilog HDL*, 2nd ed. by M.D. Ciletti

Learning Outcomes

By the end of this course, you should be able to:

1. Describe combinational and sequential circuits using the Verilog language both structurally and behaviorally,
2. Create test-benches and simulate your descriptions to verify their correctness,
3. Determine the function of a description by simulating it,
4. Use synthesis tools to generate hardware from your descriptions,
5. Design a complex system consisting of data-path and control logic, managing the complexity with hierarchy, and
6. Design systems with simple bus-protocols and interfaces.

GER Information

This course is not designated as a General Education Requirement.

Grading

Item	Weight	Comments
Homework (8-9)	16%	Drop 1 Lowest Grade, Weighted Equally
Lab Assignments (8)	16%	Weighted Equally
Projects (3)	38%	P1: 8%, P2: 12%, P3: 18%
Midterm Exam	15%	Tentatively March 19
Final Exam	15%	Comprehensive, April 30, 8:30-11:00AM

Letter Grades

97	≤	A+	≤	100
93	≤	A	<	97
90	≤	A-	<	93
87	≤	B+	<	90
83	≤	B	<	87
80	≤	B-	<	83
77	≤	C+	<	80
73	≤	C	<	77
70	≤	C-	<	73
67	≤	D+	<	70
63	≤	D	<	67
60	≤	D-	<	63
0	≤	F	<	60

Requirements for Credit-Only (S/U) Grading

In order to receive a grade of S, students are required to take all exams, complete all assignments, and earn a grade of C- or better. Conversion from letter grading to credit only (S/U) grading is subject to university deadlines. Refer to the Registration and Records calendar for deadlines related to grading. For more details refer to <http://policies.ncsu.edu/regulation/reg-02-20-15>.

Requirements for Auditors (AU)

Information about and requirements for auditing a course can be found at <https://policies.ncsu.edu/regulation/reg-02-20-04>. Auditing this course requires the approval of your adviser and the ECE department (see REG 02.20.04). Auditors will be expected to complete the midterm exam, the

final exam, and all projects with a cumulative grade of C- or better to satisfactorily complete the audit requirements and receive a grade of AU.

Policies on Incomplete Grades

If an extended deadline is not authorized by the instructor or department, an unfinished incomplete grade will automatically change to an F after either (a) the end of the next regular semester in which the student is enrolled (not including summer sessions), or (b) the end of 12 months if the student is not enrolled, whichever is shorter. Incompletes that change to F will count as an attempted course on transcripts. The burden of fulfilling an incomplete grade is the responsibility of the student. The university policy on incomplete grades is located at <http://policies.ncsu.edu/regulation/reg-02-50-3>.

Late Assignments

Homework

Homework will not be accepted late. Homework assignments are due by at the end of Lecture on the assigned due date. Homework assignments will be submitted through a combination of Gradescope and Moodle. No extensions will be given for misunderstanding the policies or descriptions.

Projects

Late projects will be accepted up to 72 hours following the due date and time of the assignment. This works out to be three (3) 24-hour days. Ten percent (10%) will be removed from the maximum possible score for each 24-hour period, or part thereof, that elapses following the due date and time. Following 3 days, and a reduction to a maximum of 30% attainable, the project will not be accepted.

Projects are due by the end of day (11:59PM) on the assigned due date. All projects will be submitted through a combination of Gradescope and Moodle.

Labs

Like homework above, labs will not be accepted late. Lab assignments are due at the end of the scheduled lab time for each student. All labs will be submitted through Moodle.

Attendance Policy

For complete attendance and excused absence policies, please see <https://policies.ncsu.edu/regulation/reg-02-20-03>

Attendance Policy

While there is no required attendance and the lectures are recorded allowing you to view them offline, I recommend that you attend to have the best opportunity to ask questions and receive feedback immediately instead of waiting for an email reply.

Absences Policy

Please refer to the university's definition of excused absences for detail about what constitutes an excused absence. Rather than decide the validity of an excused absence myself, all absences will be verified by absence-verification@ncsu.edu; if you are absent, please email any supporting information to this address and they will determine if the absence is excused. Please notify me as soon as possible and in advance if you have an excused absence for any date on which an assignment must be turned in or for a date on which there will be an exam.

Makeup Work Policy

Once an absence has been excused, I will contact you and we will negotiate how any missed work will be made up. Generally, exams will be made up with a proctor, labs will be made up with the TA, and homework will be submitted online.

Academic Integrity

Students are required to comply with the university policy on academic integrity found in the Code of Student Conduct found at <https://policies.ncsu.edu/policy/pol-11-35-01>

All the provisions of the Code of Student Conduct (Academic Integrity) apply to this course. In addition, it is my understanding and expectation that your signature on any test or assignment means that you neither gave nor received unauthorized aid.

This course is about design and I want to instill a team effort when it comes to understanding architectures that solve the problems identified for homework, labs, and projects. However, implementation is another matter entirely. Taking a design to an implementation in Verilog is an important skill and one that needs individual development. You may not leverage Verilog source that is not your own. To that end there are only three groups of people allowed to see your Verilog source: you, the TAs, and me.

Use of AI Tools

Recently, tools leveraging artificial intelligence (AI) have been made available. Stand-alone tools like ChatGPT have made it very easy to build templates as starting points for further development. As mentioned above, “taking a design to an implementation in Verilog is an important skill and one that needs individual development. You may not leverage Verilog source that is not your own.” This includes source code provided as the result of prompting any AI tool.

In addition to stand-alone tools there are many assistive tools that are able to dynamically inspect development and offer suggestions. The same rule applies – you may not leverage Verilog code that is not your own. You may, however, use these tools for dynamic syntax checking, linting, syntax highlighting, and similar supporting functions.

Accommodations for 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) (<https://policies.ncsu.edu/regulation/reg-02-20-01/>).

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/>

Non-Discrimination Policy

NC State provides equal opportunity and affirmative action efforts, and prohibits all forms of unlawful discrimination, harassment, and retaliation ("Prohibited Conduct") that are based upon a person's race, color, religion, sex (including pregnancy), national origin, age (40 or older), disability, gender identity, genetic information, sexual orientation, or veteran status (individually and collectively, "Protected Status"). Additional information as to each Protected Status is included in NCSU REG 04.25.02 (Discrimination, Harassment and Retaliation Complaint Procedure). NC State's policies and regulations covering discrimination, harassment, and retaliation may be accessed at <http://policies.ncsu.edu/policy/pol-04-25-05> or <https://oied.ncsu.edu/divweb/>. Any person who feels that he or she has been the subject of prohibited discrimination, harassment, or retaliation should contact the Office for Equal Opportunity (OEO) at 919-515-3148.