



CSCI 4160/5160: Compiler Design & Software Development 3 credit hours

INSTRUCTOR INFORMATION

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Office Hours: 9:45 – 12:00 on MW. Other time by appointment. Both in-person and virtual office hours are provided. Check D2L for instructions to attend virtual office hours.

COURSE INFORMATION

Description

This class will cover the various phases of a compiler along with grammars, finite automata, regular expressions, LR parsing, error recovery, and other related materials. A term project consisting of the design and construction of a functional compiler.

CSCI 4/5160 is a conventional course. All students are expected to attend lectures in the assigned classroom. For your convenience, lectures are expected to be recorded and should be available in D2L. However, recorded lectures may miss video and/or audio, and may have blur images for writing on the classroom whiteboard due to technical issues or even instructor's fault. Students should never use issues in recorded lectures as an excuse for performance in homework and exams.

During the semester, all course related information including topics covered in each lecture, links to slides, and project assignments are available in the course webpage: <http://www.cs.mtsu.edu/~zdong/4160>. D2L will be used for project submission, gradebook, and the Zoom link to office hours. For everything else, please use the course webpage.

Objectives

Upon successful completion of this course, a student will be able to

- develop an understanding of how to work in teams,
- develop an understanding how one can work on a project so large and complicated that one can't possibly fully understand the complete project (at the beginning) and in return how important design, debugging, and proper documentation are to a project,
- develop an understanding of how to analyze and design large projects,
- develop an understanding of compiler techniques (the theory),
- develop an understanding of how valuable software tools and libraries are to a project.

Topics Covered

Topics include regular expression and Flex (a scanner generator) for lexical analysis, context free grammar, various parsing techniques such as top-down parsing and bottom-up parsing, and Bison (a parser generator) for syntax analysis, symbol table and type checking for semantic analysis, and runtime environment.

Prerequisites and Co-requisites

prerequisite: CSCI 3080, CSCI 3110, and either CSCI 3130 or CSCI 3160.

COURSE MATERIALS**Reference book:**

- Compilers: Principles, Techniques, & Tools (2nd edition) by Alfred Aho etc.
- Modern Compiler Implementation in Java by Andrew Appel
- Compiler Construction: Principles and Practice by Kenneth Louden.
- A Practical Approach to Compiler Construction by Des Watson

Supplemental reading materials may be provided during the semester.

ASSESSMENT AND GRADING**Project**

This course will have a term-long project, which will be a mixture of individual projects and team projects where each team consists of three students. For each team project, only one copy per team will be turned in to be graded. Based upon this one copy and the audit trail found in the time log and the information found in the assignment hardcopy, grades will then be assigned to each of the individual team members. Efforts will be made to validate and verify any problems before assigning assignment grades. You must be aware at the beginning of the semester before forming teams that your course grade may be affected by others in your team since part of the learning environment is working in teams. Working in teams on the compiler project assignments is a course requirement. Each assignment will be graded based upon the following criteria: correctness of output and algorithm, efficiency of code, readability, documentation, and audit trail. This criterion is applied to the coded assignment as well as the time log for each compiler project assignment.

In addition to the team assignments, there will be individual assignments. These individual assignments are meant to be warm up exercises for the team assignment (to force each team member to learn the material regardless of their involvement in the project assignment). Each individual assignment is to be completed individually without collaboration from others.

Grading Procedure

A rubric will be provided for each assigned project. The rubric will take programming style, format, and correctness into consideration. A score of 70% (or C) is the minimum score to meet the learning outcomes outlined by the projects.

Grading Scale

Assignment	Percentage
Projects (6 - 7)	55%
Midterm Exams (3)	45%
Total	100%

Letter Grade	Range	Letter Grade	Range
A	90% - 100%		
B+	85% - 89%	B	80% - 84%
C+	75% - 79%	C	70% - 74%
D+	65% - 69%	D	60% - 64%
F	0% - 59%		

Your final grades will be calculated based on the above tables with the following exceptions:

- The project grade cannot raise the test grade more than two levels. For example, if your average grade of all exams is C, then the highest final letter grade you can get is B (i.e. C --> C++>B).
- Your final grade will NOT be C or above if one of the following occurs
 - the average of all exams is a F
 - the project average is a F

Exams: Examinations must be taken at the published times. No make-up exams will be offered unless there is an unavoidable extenuating circumstance (at the discretion of the instructor).

Grade: It is guaranteed that you will get at least 20% points for any homework or project you submit. Each homework/project has ONE deadline only. No submission will be accepted after the deadline.

Incomplete Grades

Incomplete grades are given rarely and only in extenuating circumstances. Page 56 of the [MTSU Undergraduate Catalog](#) states: “The grade I indicates that the student has not completed all course requirements because of illness or other uncontrollable circumstances, especially those which occur toward the end of the term. Mere failure to make up work or turn in required work on time does not provide the basis for the grade of “I” unless extenuating circumstances noted above are present for reasons acceptable to the instructor.” Please refer to the Undergraduate catalog for the complete Incomplete Grade Policy.

Feedback

- Project/exam feedback and grades will be posted usually within one week of the assignment submission.
- Assignments must be submitted with the specified approach of the course. Submission through other approaches like e-mail will not be accepted.
- If you think there are issues with the grading, you have a window of 5 business days to solve the issue with me. After that, the grade will be final and unchangeable. The first business day is defined as the day that the grade is published in D2L, or the day physical copy of projects/exams are returned to students, whichever happens later.

CLASS POLICY

ACCREDITATION

Samples of graded work and exam will be collected this semester for our ABET accreditation team. Identifying information will be removed from all collected work.

Attendance

- Participation is required. You are expected to attend each lecture. **Class attendance will be tracked.**
- Adhere to all due dates and deadlines as listed in your course calendar.
- Check the course homepage for important announcements from the instructor.
- A student may receive **up to 3 bonus points** based on tracked attendance and participation in the class discussion. These points will be applied to the final score after calculating exam and project scores.

Email

Per the [Family Educational Rights and Privacy Act \(FERPA\)](#) all course communication will be conducted using MTmail. Faculty will not respond to student emails via a non-institutional assigned email account, e.g., a gmail or yahoo account.

Academic Integrity/Misconduct

Academic integrity is a hallmark of Middle Tennessee State University. We expect students to complete academic exercises, i.e., assignments turned in for credit that are original and appropriately credit all sources used.

Academic misconduct includes, but is not limited to:

1. Plagiarism. Plagiarism includes, but is not limited to, the adoption or reproduction of ideas, words, statements, images, or works of another person as one's own without proper attribution. This includes self-plagiarism, which occurs when an author submits material or research from a previous academic exercise to satisfy the requirements of another academic exercise and uses it without proper citation of its reuse. The unauthorized use of paraphrasing tools or “text spinners” and artificial intelligence software can also be considered plagiarism.
2. Cheating. Cheating includes, but is not limited to, using or attempting to use unauthorized materials, information, or aids in any academic exercise or test/examination. Cheating also includes unapproved collaboration, which occurs when a student works with others on an individual academic exercise without the express permission of the faculty member. Working with others can include but is not limited to sharing of any physical or electronic papers, exams/quizzes, assignments, posting to an unauthorized website.
3. Fabrication. Fabrication includes, but is not limited to, unauthorized falsification or invention of any information or citation in an academic exercise.

Going online and using information without proper citation, copying parts of other students' work, creating information to establish credibility, or using someone else's thoughts or ideas without appropriate acknowledgment is academic misconduct. If you have a question about an assignment, please ask for clarification. All cases of academic misconduct will be reported to the Director of Academic Integrity and may result in failure on the test/assignment or for the course. When students participate in behavior that is considered to be academic misconduct, the value of their education and that of their classmates is reduced, and their academic careers are jeopardized.

Attendance Reporting

MTSU Administration requires that instructors complete an attendance report for each course at midterm and at the end of each semester. Regular class attendance is required and will be monitored by: tracked class attendance, timely submission of course assignments, and completion of required exams.

STUDENT RESOURCES

I am True Blue

As a member of this diverse community, I am a valuable contributor to its progress and success. I am engaged in the life of this community. I am a recipient and a giver. I am a listener and a speaker. I am honest in word and deed. I am committed to reason, not violence. I am a learner now and forever. I am a BLUE RAIDER. True Blue!

Lauren's Promise

Lauren McCluskey, a 21-year-old honors student athlete, was murdered on Oct. 22, 2018, by a man she briefly dated on the University of Utah campus. We must all take actions to ensure that this never happens again.

I will listen and believe you if someone is threatening you.

If you are in immediate danger, call 911.

If you are experiencing sexual assault, domestic violence, and/or stalking, I hope you will feel comfortable contacting me and letting me help you get connected to campus resources.

If you prefer to reach out to resources directly, you may contact these supports and services:

- MTSU Campus Police: 615-898-2424
- Murfreesboro Police: 615-893-1311
- MTSU Counseling Services: 615-898-2670
- After-hours mobile crisis: 800-704-2651 or go to the nearest emergency room
- MTSU Student Health: 615-898-2988

Any form of sexual harassment or violence will not be excused or tolerated and will be reported to MTSU's Title IX coordinators <https://www.mtsu.edu/titleix/> to assist you. For more information: <https://www.mtsu.edu/sexual-violence/>

Technical Support

[D2L Resources](#) are available to MTSU Online Students. You can also find help for the basic D2L functions used most often directly in your D2L course under the D2L Help for Students module.

Students with Disabilities

Middle Tennessee State University is committed to campus access in accordance with Title II of the Americans with Disabilities Act and Section 504 of the Vocational Rehabilitation Act of 1973. Any student interested in reasonable accommodations can consult the Disability & Access Center (DAC) website and/or contact the DAC for assistance at 615-898-2783 or dacemail@mtsu.edu.

Tutoring

MTSU Online supports multiple [Online Student Services](#).

Grade Appeals

[University Policy 313, Student Grade Appeals](#), provides an avenue for MTSU students to appeal a final course grade in cases in which the student alleges that unethical or unprofessional actions by the instructor and/or grading inequities improperly impacted the final grade.

Title IX

Students who believe they have been harassed, discriminated against or been the victim of sexual assault, dating violence, domestic violence or stalking should contact a Title IX/Deputy Coordinator at 615-898-2185 or 615-898-2750 for assistance or review [MTSU's Title IX website](#) for resources. MTSU faculty are concerned about the well-being and development of our students and are legally obligated to share

reports of sexual assault, dating violence, domestic violence and stalking with the University's Title IX coordinator to help ensure student's safety and welfare. Please refer to [MTSU's Title IX website](#) for contact information and details.

Hope (Lottery) Scholarship Information

Do you have a lottery scholarship? To retain the Tennessee Education Lottery Scholarship eligibility, you must earn a cumulative TELS GPA of 2.75 after 24 and 48 attempted hours and a cumulative TELS GPA of 3.0 thereafter. A grade of C, D, F, FA, or I in this class may negatively impact TELS eligibility.

If you drop this class, withdraw, or if you stop attending this class you may lose eligibility for your lottery scholarship, and you may not be able to regain eligibility.

For additional Lottery rules, please refer to your [Lottery Statement of Understanding form](#) or contact your [MT One Stop Enrollment Counselor](#).

Mental Health

As a college student, you may experience a range of challenges and issues that can interfere with your physical and mental well-being, hinder your academic experience, and negatively impact your daily life. Some of these experiences may include overwhelming depression/sadness, anxiety, high levels of stress, use of alcohol/drugs, difficulty sleeping, difficulty concentrating, and/or loss of motivation. These challenges and issues can lead to thoughts of self-harm and suicide. If you or any of your classmates are experiencing these issues, it is important to reach out and ask for help. Discuss your situation with a friend, a family member, your instructor, or an academic advisor. Remember: Everyone struggles. It's okay to talk about it. Ask for help. YOU ARE NOT ALONE!

This syllabus represents a general plan for the course and deviations from this plan may be necessary during the duration of the course. I reserve the right to modify course policies, the course calendar, assignment point values, and due dates.