CSCI 4160/5160: Compiler Design & Software Development

3 credit hours

INSTRUCTOR INFORMATION
Instructor: Dr. Zhijiang Dong
Office: KOM 355
Phone: 615-904-8428
Email: Zhijiang.Dong@mtsu.edu

Office Hours: 9:30 – 12:00 on MW. Other time by appointment. Due to COVID19, in person office hours will not be available for the semester. Check D2L for instructions to attend online 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 required.

The delivery method for this course is web-assisted. That means half of the students will be in the classroom on Monday and half the students will be in the classroom on Wednesday. You will be assigned the day that you must attend each week. For the days that you aren’t in the classroom, you will be expected to attend class online during the assigned class time. All exams will be conducted online and managed through D2L.

The delivery method for this course may be changed in the middle of the semester under certain public health emergency event.

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 analyse 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. Please visit course webpage: www.cs.mtsu.edu/~zdong/4160 to check topics covered in every lecture.

**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**
**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**

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projects (6 - 7)</td>
<td>70%</td>
</tr>
<tr>
<td>Midterm Exams(3)</td>
<td>30%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Range</th>
<th>Letter Grade</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>90% - 100%</td>
<td>B</td>
<td>80% - 84%</td>
</tr>
<tr>
<td>B+</td>
<td>85% - 89%</td>
<td>C</td>
<td>70% - 74%</td>
</tr>
<tr>
<td>C+</td>
<td>75% - 79%</td>
<td>D</td>
<td>60% - 64%</td>
</tr>
<tr>
<td>D+</td>
<td>65% - 69%</td>
<td>F</td>
<td>0% - 59%</td>
</tr>
<tr>
<td>F</td>
<td>0% - 59%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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 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.

**PARTICIPATION**

**Course Ground Rules**
The following are expected of all students in this course:

- learn how to navigate in the learning management system; refer to your D2L resources within the course for help;
- address technical problems immediately;
- be respectful to your instructor and peers; refrain from derogatory statements;
- for the safety of your classmates and faculty members, please wear your mask! If you refuse to do so, class will be dismissed and campus police will be called.

**Class Participation**
Student participation is required in all aspects of the course. Please adhere to the following:

- participation is required; you are expected to log into the course a *minimum* of 3 times per week;
- adhere to all due dates and deadlines as listed in your course calendar;
- utilize the ask the class discussion board when you have questions about course content
• communicate with the instructor as a learning resource;
• check the course homepage for important announcements from the instructor.

Students can earn up to 2 bonus points if they take the final exam and are "active" enough, i.e. asking and answering questions in class and D2L discussion board.

Academic Integrity/Misconduct
Please review the information on Academic Integrity and Misconduct. The instructor will be submitting materials to an online service (Turnitin.com) which will review the work for plagiarism. Students should also review the report generated for each assignment and self-check for plagiarism. Information on how to cite work correctly is provided within the course modules or through the University Writing Center. You may read more about how to avoid plagiarism from the Office of the University Provost.

Plagiarism, cheating, and other forms of academic dishonesty are prohibited. Such conduct includes, but is not limited to:

• Submitting as one’s own work, themes, reports, drawings, laboratory notes, computer programs, or other projects prepared by another person
• Knowingly assisting another student in obtaining or using unauthorized materials
• Submitting assignments previously used in other courses where you received credit for the work
• Improperly crediting or lack of crediting an original author’s work

Students guilty of academic misconduct are immediately responsible to the instructor of the class. In addition to other possible disciplinary sanctions (including expulsion from the university), which may be imposed through the regular institutional procedures as a result of academic misconduct, the instructor has the authority to assign an “F” or zero for an activity or to assign an “F” for the course. Students guilty of plagiarism will be immediately reported to the Vice Provost for Academic Affairs.

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!

Attendance Reporting
MTSU Administration requires that instructors complete an attendance report for each course each semester. Regular class attendance is required and will be monitored by: the D2L system report; participation in the discussion board; and timely submission of course assignments. If several class assignment submissions are missing, student attendance will be reported as “no longer attending.”

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
STUDENT RESOURCES

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 DAC Email

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 or 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 at a later time.

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

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.