

University of Texas at El Paso
EE 2372/ECE 2300: Software Design I ~TR 9:00AM-10:20AM
Fall 2023

CRN:10648, 16537

CRBL C205

Instructor Dr. Miroslava Barúa

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Office Engineering Building A-314 or virtually via Microsoft Teams

Office Hours Monday & Wednesdays 1:00PM-2:00PM,
Tuesdays 4:30PM- 5:30PM, or by appointment

COURSE MATERIALS

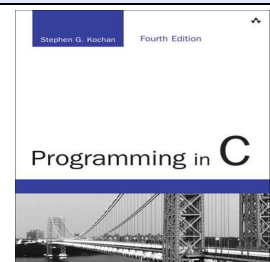
1. **Required Textbook:** "Programming in C"

Authors: Stephen Kochan.

Edition: 4th Edition

Publisher: Pearson

ISBN-10: 0321776410 **ISBN-13:** 978-0321776419



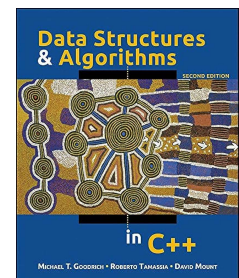
2. **Optional Textbook:** "Data Structures & Algorithms in C++"

Authors: Michael Goodrich, Roberto Tamassia, and David Mount

Edition: 2nd Edition

Publisher: Wiley

ISBN-10: 0470383275 **ISBN-13:** 978-0470383278





3. **Optional Reference Text:**

- **The C Programming Language** by Brian Kernighan and Dennis Ritchie
- **GNU/Linux Application Programming** by M. Tim Jones (2nd Edition)
- **Linux Pocket Guide** by Daniel J. Barret (2nd Edition)

4. **Technology Requirements**

- **Access to our Blackboard (BB) shell**- Some course content will be delivered via the Blackboard Learning Management System (LMS). Here you will find course resources, announcements, link to virtual office, links to submit/participate in assessment activities using integrated tools such as **Gradescope**, **iClicker** and **Lockdown Browser**
- Use of **@miners e-mail account** – all official class communication should be using this domain
- **In-class E-Exams** –We might be using Blackboard and Respondus Lockdown for in-class exams. A *practice exam* will be available ahead of time so students verify that they can use the software successfully.
 - **Respondus LockDown Browser and Monitor** -- Students can download Respondus Lockdown Browser/Monitor to their laptop for free. Follow the installation instructions by clicking on the following link: https://www.utep.edu/technologysupport/ServiceCatalog/BB_Students.html

- **If needed, you can check out equipment from Library Room 300** --Stop by early in the semester to learn about their options according to your needs. **Visit this link for more details:** https://www.utep.edu/technologysupport/TSCenter/tsc_eqcheckout.html

| | |
|---|---|
|  | <p>Semester Laptop Dell Latitude Loan Period: Semester Specifications: Windows OS, Microsoft Office Professional, Lockdown Browser and Monitor, Teams, and VPN. You can install software yourself or get help from Technology Support. • Semester laptop checkout is now available for currently enrolled fall students. No application required. Be sure to bring your UTEP ID.</p> |
|  | <p>Short-term Laptop Dell Inspiron Loan Period: 7 Days Specifications: Windows OS, Microsoft Office Professional, Lockdown Browser and Monitor, Teams, and VPN. You can install software yourself or get help from Technology Support.</p> |

- ✚ You must have access to these tools for content delivery, assignment submission, and to participate in assessment activities (quizzes and exams). **Detailed instructions for these tools can be found on the “How to...{instructions}” folder located on our course Blackboard shell.**

COURSE DESCRIPTION: What this class is about

Software design with a structured computer language that focuses on the construction of programs consisting of multiple functions residing in multiple files. Covers program creation and top-down-design, basic elements and operations, modular program construction, and the use of programming tools such as makefiles. Covers foundations of data structures and algorithms. These foundations include space and time complexity analysis, the use of data structures such as linked lists and binary trees, basic sorting and searching algorithms, and foundations of software testing/verification/validation. Introduces object-oriented programming techniques.

Prerequisite: CS 1320 with a grade of “C” or better.

Students successfully completing this course will be able to:

1. Become a proficient user of the Linux software development environment and GNU software development tool-chain [**CE-SWD-2**]
 - a. Linux software development environment
 - b. GNU software development tools – gcc, gdb, make, gprof, gcov
2. Understand C language programming constructs [**CE-SWD-3**]
 - a. Variables
 - b. Algebraic and logical expressions (including operator set)
 - c. Simple I/O
 - d. Decision statements
 - e. Iterative control statements
3. Understand and follow structured software design strategies [**CE-SWD-3**]
 - a. Programming paradigms: procedural/modular, object-oriented
 - b. Design for reuse using the procedural/modular paradigm
 - c. Utilizing standard libraries, focus on C standard library

4. Understand and utilize fundamental data structures [CE-SWD-5]
 - a. Arrays and structures
 - b. Strings and string processing
 - c. Pointers, linked lists, and binary trees
 - d. Storage allocation: static, stack and heap
5. Software testing, verification, and validation [CE-SWD-8]
 - a. Understand the differences between testing, verification, and validation.
 - b. Demonstrate an understanding of unit testing strategies and tradeoffs.
 - c. Ability to construct test vectors and use tools to automate their construction
6. Understand the foundations of algorithm analysis [CE-CAL-1, CE-CAL-2, CECAL-3]
 - a. History and the role of algorithms
 - b. Algorithms available in the C standard library
 - c. Determine time complexity of algorithms
 - d. Determine space complexity of algorithms
7. Understand and utilize fundamental algorithms [CE-CAL-5]
 - a. Sorting algorithms: bubble sort and insertion sort
 - b. Searching algorithms: linear search, binary search, and hash functions


Note: correlation to ACM curriculum standards in square brackets, knowledge units in bold should be covered in a pre-requisite course as well.

Grading & Course Assignments – How grade is calculated

Grading will be based on the standard scale:

- 90% >.....**A**
- 80% -89%.....**B**
- 70% -79%.....**C**
- 60% -69%.....**D**
- Below 59%.....**F**

**EE 2372 is part of the ECE BS Lower Division classes and requires a "C" grade or better in order to successfully complete the course.*

|  Course Grade Distribution | |
|--|-------------|
| Exam #1 | 15% |
| Exam #2 | 15% |
| Exam #3 (during Finals week) | 15% |
| Assignments | 25% |
| Class Participation/ Quizzes | 25% |
| Instructor Assessment | 5% |
| TOTAL | 100% |

Your final grade is earned by your active participation and performance in the following components:

✦ **Exams:** There will be **three partial exams** (1, 2 and 3, all equally weighted) to assess your knowledge of the software design concepts studied during each period of the course. You should use your own notes, homework problems, examples, quizzes and handouts as your study guide for the exams. **Refer to “Course Outline” section for estimated exam dates. Official exam dates will be announced on a timely manner.**



- Please notice this course might require the use of **Respondous LockDown Browser for in-class E-Exams** (for such exam dates, class will meet in a reserved UTEP computer laboratory where the exam will take place). You will be asked to provide your official UTEP ID and credentials to be allowed to take the exam. You will be able to take a **practice test** in advance to avoid technical difficulties at the time of the exams. Review the Test Proctoring Software Policy (located below, in the *Policies* section)
- **If** there is an **extenuating circumstance** that can cause a student to **miss one** examination, student must **notify instructor immediately before the exam takes place**. If the circumstance warrants an excused absence approved by the instructor, student will need to provide: proof of illness or emergency, a written and signed statement describing the reasons for missing an exam, and a petition for a make-up exam. Note that make-up exam may be in a different format than the original one. All the submitted documents will be kept under the student record. **If you miss an exam without having an approved excuse, it will be graded with a “zero” in that exam** with no make-up exam possible.

✦ **Assignments:** A portion of your content mastery depends on completion of homework assignments, so make sure you understand and can solve all the assignments by yourself. To be able to receive full credit, each assignment **must be submitted by the deadline and must have student’s Name, course name, assignment number and Due date**. Assignments may be submitted thru Blackboard / Gradescope and they will include:

- **Programs and Exercises**– Series of programs or smaller exercises will be assigned for you to practice your design and debugging skills. Program code **must be well documented and with meaningful comments**.
- **Reading assignments** → Read the assigned sections from the textbook and reference materials. You might be asked to participate in quizzes or polls based on the reading.

You must submit your own work. Any student suspected of cheating or copying will be submitted to the Office of Student Conduct and Conflict Resolution (OSCCR) and the report will become part of your permanent record at UTEP.

Assignments are due by the deadline. Late assignments will not be accepted. See make-up work policy.

- ✚ **Class Participation /Quizzes:** A portion of your grade may come from polls or quizzes so make sure to be well prepared for them on a timely manner. Quizzes will assess your completion and understanding of assignments as well as your basic understanding of the class material. Quizzes may or may not be announced ahead of time. The intention of the quizzes is to encourage you to stay on track with the class material. Please note that:
 - **No make-up quiz will be given;** however, your **lowest quiz score will be dropped.**
 - Polls and Quizzes will be **administered in-class** and they could be on paper or using **iClicker**, so make sure you know how to use this tool (refer to the '**How to...{instructions}**' folder) and how to access it using your electronic devices.
- ✚ **Instructor Assessment:** this assessment is based on your **active participation** in all the course activities: quizzes, assignments, polls, and in-class participation. Each of these activities will be given point values that add up to the total *instructor assessment* portion of your grade. Because these activities are designed to contribute to your learning each week, they **cannot be made up** after their due date has passed.
- ✚ **Extra credit: If needed,** extra credit may be assigned to the ENTIRE CLASS ONLY. No individual can request to present work for extra credit. When needed, optional questions/challenge problems will be added to assignments, quizzes or exams that will count as extra credit.

COURSE OUTLINE

This information highlights the topic sequence and important activities. **This tentative course outline sequence is subject to changes at the discretion of the instructor to adapt to the needs of the class.**

| Week # | Sequence of Topics |
|---------------------|--|
| Week 1: | Introduction |
| Weeks 1-2: | GNU/Linux software development environment |
| Week 2: | C language programming constructs: variables, algebraic expressions, simple I/O |
| Week 3-4: | C language programming constructs: decision statements and iterative control statements |
| Weeks 4-5: | Pointers and fundamental data structures: arrays and structures; basic data structures: linked list and binary trees |
| Week 5: | Fundamental data structures: strings and string processing |
| Week 5: | Exam I |
| Week 6: | C standard library: Console and File I/O |
| Weeks 7-8: | Debugging basics |
| Week 9: | Software testing/verification/validation |
| Weeks 10-11 | Recursion; Dynamic memory allocation |
| Weeks 11-12: | Multithreaded programming |
| Week 12: | Exam II |
| Week 13: | Fundamental algorithms: sorting and searching |
| Weeks 13: | Time and space complexity analysis of algorithms |
| Weeks 14-15: | Intro to C++ |
| Finals Week: | Exam III – Thursday, December 12th, 10:00am – 12:45pm |

COURSE COMMUNICATION and LEARNING ENVIRONMENT

Office Hours: You are highly encouraged to interact and talk one-on-one with me about your questions and comments related to the course. You can either stop by my physical office located at room **A-314** or connect via the virtual office conveniently accessible from anywhere using **Microsoft Teams** (all you need to do is click on the access link located on our home page on Blackboard). **I will be available during the posted times.** Please send me an email if you have schedule conflict and need to **make an appointment** to meet with me outside the posted office hours.



E-mail Communication: Send all your class related e-mails to mbarua@utep.edu. Due to high volume of emails received, please be patient and be certain that I will make every attempt to respond to your email within 24-48 hours of receipt (usually much sooner but do not wait until the last minute to send me a message about something that is due in a few hours or the next day because - due to response window- my response may not get back to you on time). **Make sure** the message's subject description has prefix "**EE2372:**" followed by the rest of the message's subject (Example: "**EE272: Question about homework**"). In body of email, clearly state your question. All this will **help receive a quicker response time!** Send all messages **from your Miners account** and **include your name**. Treat e-mail correspondence as a professional exchange of information.

Announcements: Check the Blackboard announcements for any updates, deadlines, or other important messages.

Classroom Etiquette/ Student Conduct: Remember that you must be courteous, respectful and professional in the way you address others. Therefore, please keep these guidelines in mind (*failure to observe them may result in disciplinary action*):

- Respect and courtesy must be provided to classmates and instructor at all times. No harassment will be tolerated.
- Blackboard is **not** a public internet venue. **Whatever is posted in these online spaces is intended for classmates and instructor only.** Please do not copy documents and paste them to a publicly accessible website, blog, or other space. If students wish to do so, they have the ethical obligation to first request the permission of the writer(s).

COURSE AND UNIVERSITY POLICIES:

COPYRIGHT STATEMENT FOR COURSE MATERIALS: All materials used in this course (such but not limited to assignments, exams, quizzes, handouts, etc) are protected by copyright law. The course materials are only for the use of students currently enrolled in this course and only for the purpose of this course. **You may not further disseminate (i.e., share, send or post) any class materials/resources outside of this course. Doing so may result in disciplinary action**

MAKE-UP WORK POLICY: Make-up work will be given only in the case of a documented emergency, so please contact me immediately. Note that make-up work may be in a different format than the original work and may carry a penalty for each day it is delayed. If you miss an assignment and the reason is not considered excusable, you will receive a zero. It is therefore important to reach out to me—in advance if at all possible—and explain why you missed a given course requirement. Once a deadline has been established for make-up work, no further extensions or exceptions will be granted.

COURSE DROP POLICY: According to UTEP Curriculum and Classroom Policies, “When, in the judgment of the instructor, a student has been inactive to such a degree as to impair his or her status relative to credit for the course, the instructor may drop the student from the class”. If you have a large number of missed assignments, you may be dropped from the course. The grade that you will receive will be a “W” before the **course drop deadline** and a grade of “F” **after the course drop deadline**. If you feel that you are unable to complete the course successfully and you need to **drop this class**, please contact the [Registrar's Office](#) to initiate the drop process before the **Drop Deadline on Nov 3rd**. If you cannot complete this course for whatever reason, please contact me. Disappearing without formally dropping a course or withdrawing from the University, will result in a zero on each assessment activity you miss thereafter and will ultimately result in you receiving a grade of “F” at the end of the semester.

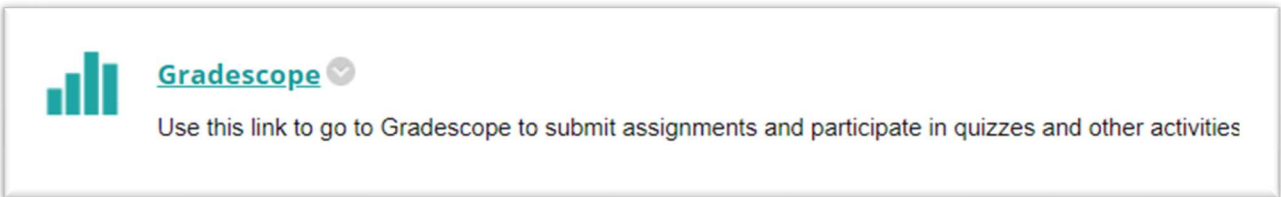
INCOMPLETE GRADE POLICY: Incomplete (I) grade may be requested only in exceptional circumstances after you have completed at **least half of the course requirements**. Talk to me immediately if you believe an incomplete is warranted. If granted, we will establish a contract of work to be completed with deadlines.

ELECTRONIC DEVICES POLICY: Use an internet connected device to access course resources, participate in assessment activities (such as submitting homework, quizzes, etc) using the appropriate tools within Blackboard.

TECHNICAL DIFFICULTIES POLICY: I strongly suggest that you submit your work with plenty of time to spare in the event that you have a technical issue with the course website, network, and/or your computer. I also suggest you save a copy of all submitted/uploaded work. If you are experiencing difficulties, please contact UTEP's technical support and email if necessary.

Technical Support: Please follow the link for [Blackboard Student Orientation](#) to review/learn how to submit assignments, review feedback/grades, etc. If you need technical support with Blackboard, please contact UTEP's Help Desk at (915)747-4357 (HELP), helpdesk@utep.edu. For help with equipment, internet access and tech support please visit <https://www.utep.edu/technologysupport/>

GRADESCOPE: For assessment activities, you will need to submit through [Gradescope](#). This tool will be accessible by clicking on the link located on our Blackboard home page (tool link is illustrated below).



iClicker : This Classroom Response System (CRS) technology enables instructor to ask questions, gather student responses, display those responses in real-time. Students use their own mobile device (laptop, tablet, or smartphone) to submit their responses. Visit this link to learn more:



https://www.utep.edu/technologysupport/ServiceCatalog/INST_ClassResponseSystem.html

SCHOLASTIC INTEGRITY/ACADEMIC HONESTY:

Academic dishonesty is prohibited and is considered a violation of the UTEP Handbook of Operating Procedures. Any form of academic dishonesty will not be tolerated. "Plagiarism" is the unattributed use of someone else's work – coming from a classmate's, a website's, even a teacher's from another course. In accordance with University regulations, scholastic dishonesty on a given assignment **will** be subject to disciplinary action and **will** be referred to the Office of Student Conduct and Conflict Resolution (OSCCR). **Dishonesty/cheating/plagiarizing may result in a zero on the assignment, an "F" in the course, or even suspension from the university.**

If you need assistance with your assignments, please consult authorized sources of help. For more information on Scholastic Dishonesty and/or Plagiarism, consult the Handbook of Operating Procedures: Student Affairs, which is available in the Office of Student Life or visit [HOOP: Student Conduct and Discipline](#).

ACCOMMODATIONS POLICY ~ Center for Accommodations and Support Services (CASS): The University is committed to providing reasonable accommodations and auxiliary services. Students requiring unique accommodations **must** contact and register with the **CASS** office and make sure to **talk to the instructor at the beginning of the semester to discuss necessary arrangements**. The CASS office may be contacted at 747-5148, cass@utep.edu or go to Room 106 Union East Building.

COVID-19 Precautions

Please stay at home if you have been diagnosed with COVID-19, and send me an **email as soon as possible**. If you are experiencing symptoms, it is recommended that you get tested immediately and wear a mask or face covering. COVID-19 testing options are available for free on campus for registered students. For updated information about **on-campus testing** visit: <https://www.utep.edu/chs/covid-testing/index.html>

COVID-19 Illness Reporting: For the safety of the campus community, it is very important to be informed. If you have any questions or concerns about COVID-19, you can contact UTEP EH&S at covidaction@utep.edu. For updated information about reporting visit: <https://www.utep.edu/ehs/covid/>

What you need to do to be successful in this course

Prepare in advance: In order to be successful, each student must be proactive in using the resources (textbook and optional reference material) related to the current and upcoming topics, understand and complete your assignments **BEFORE the deadline**.

Tips for Success in this class:

1. Be **organized**, keep your notes in order, stay on schedule and prioritize your time.
2. Visit the class Blackboard shell and read UTEP e-mail to avoid missing important announcements or deadlines.
3. **Read ahead** by following the topic sequence as denoted in the course outline. As you read, **take notes** and make summaries in your own handwriting (research shows handwriting has a better effect on your memory). All of this will help you study for assessment activities.
4. Be proactive and **meet all the deadlines**. Try to finish your **assignments early** (this will help in case something unexpected comes up). Make sure to understand how to solve these assignments as they are there to help you prepare!
5. Visit instructor during office hours if you need assistance, or set an appointment if necessary.
6. Start your success by not falling behind! You need to **be proactive** about meeting your education goals.
7. Remember that the grade you get is the grade you earn through your work. **It is up to you to monitor your own performance and adjust your efforts on a timely manner** if you find that you are falling behind on your grades.

Important Dates

| | |
|--|---|
| August 28 th | Fall classes begin |
| September 13 th | Census Day |
| Nov 3 rd | Drop/Withdrawal Deadline |
| Nov 23 rd -24 th | <i>Thanksgiving Holiday</i> – No Classes |
| Dec 7 th | Last day of classes |
| Dec 8 th | Dead Day |
| Dec 12 th | Exam #2 during finals week: Thursday, December 12th, 10:00am – 12:45pm |

UTEP Student Resources: Where to go for assistance

UTEP provides a variety of student services and support:

Technology Resources

- UTEP **Help Desk**: Students experiencing technological challenges (email, Blackboard, software, etc.) can submit a ticket to the UTEP Helpdesk for assistance. Contact the Helpdesk via phone at (915)747-4357 (HELP), email to helpdesk@utep.edu , go to their website, chat, or by visiting their offices.

Academic Resources

- **UTEP Library**: Access a wide range of resources including online, full-text access to thousands of journals and eBooks plus reference service and librarian assistance for enrolled students.
- **University Writing Center (UWC)**: Submit papers here for assistance with writing style and formatting, ask a tutor for help and explore other writing resources.
- **Math Tutoring Center (MaRCS)**: Ask a tutor for help and explore other available math resources.

Individual Resources

- **Military Student Success Center**: Assists personnel in any branch of service to reach their educational goals.
- **Center for Accommodations and Support Services**: Assists students with ADA-related accommodations for coursework, housing, and internships.
- **Counseling and Psychological Services**: Provides a variety of counseling services including individual, couples, and group sessions as well as career and disability assessments.

COVID-19 Resources

- UTEP COVID-19 website: <https://www.utep.edu/ehs/covid/>
- UTEP COVID-19 Testing: <https://www.utep.edu/chs/covid-testing/index.html>
- UTEP Counseling and Psychological Services: 747-5302 or CAPS@utep.edu
- UTEP Student Health and Wellness Center: <https://www.utep.edu/chs/shc/>
- El Paso Strong statistics website: <http://epstrong.org/>