Catalog Description

Introduces ideas of high-level program design and discrete structures. This course focuses on problem-solving, supporting both abstraction and modeling providing the foundation needed for programming.

Course Delivery

This course is offered in three different delivery modes (determined by the section student is registered.) No delivery mode allows for a self-paced course. There are set deadlines for all assessments. The in-seat sections meet once per week on campus, have 4-5 written quizzes and an in-person midterm and final exam. The synchronous online sections meet virtually (via Zoom, or Blackboard Collaborate) on the day and time indicated on PatriotWeb each week. These sections have assessments for each chapter, online quizzes and online midterm and final exams. The asynchronous online sections provide all material for students to complete within a set period, but not a set day/time each week to meet virtually. The assessments include quizzes and Peer Assessment assignments. The midterm and final exam will be conducted at a set day/time indicated on the course Blackboard site. NOTE: all online quizzes and exams require the use of Respondus Lockdown Browser with Webcam.

Prerequisites

MATH 108 (or MATH 113) is a prerequisite or a co-requisite. Prerequisite enforced by registration system.

This requirement will be strictly enforced. Any student who does not meet the requirement will be dropped from the course at the start of the semester and the student will be responsible for academic or financial consequences of being dropped.
Course Objectives

1. Students will be able to apply concepts of logic and truth tables to expressions and Digital Circuits. Students will apply Boolean Algebra concepts to create robust selection statements in programs. Students will be able to identify the domain and range of mathematical functions.

2. Students will define and use functions in programs and understand the concept of recursion. Students will implement pre-defined functions by investigating a current language API.

3. Students will be able to identify Arithmetic and Geometric Sequences and determine terms and/or sums of terms within those sequences. Students will select the correct repetition structure and implement iterations in programs.

4. Students will be able to calculate probabilities, permutations and combinations.

5. Students will be able to identify graphs of and plot basic trigonometric functions. Students will be able to simplify expressions using trigonometric identities.

Textbook

**Discrete Structures, 3rd Edition**

Author: Irene E. Bruno, PhD

Publisher: Pearson

ISBN: 978-1-323-91361-1

Availability: George Mason University Bookstore
Faculty and Staff

Instructor and Course Coordinator:

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Jonathan Hsu (jhsu@gmu.edu)

Contact and Office Hours: Please contact your instructor via email with any questions you have or to make an appointment. Office Hours are listed on your Blackboard site.

Administrative support:

Fairfax campus  
Engineering Building  
http://eagle.gmu.edu/map/buildings/engineering.php , Room 5400  
Phone: 703-993-3565

Science and Technology campus  
Bull Run Hall  
Bull Run Hall, Suite 102  
Phone: 703-993-3565
Grading

The grading scale for this course is based on a total of 1500 points:

<table>
<thead>
<tr>
<th>Score Range</th>
<th>Grade</th>
<th>Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1485 - 1500</td>
<td>A+</td>
<td>Passing</td>
</tr>
<tr>
<td>1380 - 1484</td>
<td>A</td>
<td>Passing</td>
</tr>
<tr>
<td>1350 - 1379</td>
<td>A-</td>
<td>Passing</td>
</tr>
<tr>
<td>1230 - 1319</td>
<td>B</td>
<td>Passing</td>
</tr>
<tr>
<td>1200 - 1229</td>
<td>B-</td>
<td>Passing</td>
</tr>
<tr>
<td>1170 - 1199</td>
<td>C+</td>
<td>Passing</td>
</tr>
<tr>
<td>1080 - 1169</td>
<td>C</td>
<td>Passing</td>
</tr>
<tr>
<td>1050 - 1079</td>
<td>C-</td>
<td>Passing*</td>
</tr>
<tr>
<td>900 - 1049</td>
<td>D</td>
<td>Passing*</td>
</tr>
<tr>
<td>0 – 899</td>
<td>F</td>
<td>Failing</td>
</tr>
</tbody>
</table>

* Grades of "C-" and "D" are considered passing grades for undergraduate courses. However, a minimum grade of "C" is required in the BSIT program for any course that is a prerequisite for one or more other courses. This course is a prerequisite for several courses in BSIT Program – see [https://catalog.gmu.edu/colleges-schools/engineering/information-sciences-technology/information-technology-bs/](https://catalog.gmu.edu/colleges-schools/engineering/information-sciences-technology/information-technology-bs/) for more information on those courses.

Raw scores may be adjusted by the Instructor to calculate final grades.

Final grades will be determined based on the following components:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Distribution</th>
<th>Total Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quizzes</td>
<td>20%</td>
<td>300</td>
</tr>
<tr>
<td>Peer Assessment Activities</td>
<td>20%</td>
<td>300</td>
</tr>
<tr>
<td>Midterm Exam</td>
<td>30%</td>
<td>450</td>
</tr>
<tr>
<td>Final Exam</td>
<td>30%</td>
<td>450</td>
</tr>
</tbody>
</table>

Notes:

- There are approximately 12 course content modules
- Late assignments are not accepted, for any reason
- Quizzes not taken as scheduled are scored at 0 points
- There are no extra credit opportunities
- Students are required to sit for the scheduled exams
- The GMU Honor Code is strictly enforced in this course. Anything submitted for a grade must be completed by the student without any assistance from any other person

NOTE: Students must have a working webcam on the computer they intend to use for their midterm and final exams for all synchronous and asynchronous online sections. There are no exceptions to this policy.
The grading components are outlined in the following sections. Note that not all assignments are given an equal weight.

**Quizzes**
Students will be required to complete either weekly or biweekly quizzes throughout the semester. Information on the content, format and availability will be provided by the instructor. Students are required to use **Respondus Lockdown Browser with Webcam**. All students must have a working webcam on the computer they will be taking their quizzes to facilitate working in the Respondus Monitor.

**Peer Assessment Assignments or other Assessment Activities**
Every unit has a Peer Assessment assignment and/or another assessment activity provided by the instructor. These activities are to be completed by the student, with the help of any materials desired (but not other people.) Students are prohibited by the Honor Code to post material that is not their own but not properly cited.

**Exams**
The midterm and final exam will be held as scheduled on the Blackboard site and are held using **Respondus Lockdown Browser with Webcam**. All students must have a working webcam on the computer they will be taking their exam to facilitate working in the Respondus Monitor. Note: students must sit for the exams at the designated time on the day of the exam.

Final grades will be posted to **PatriotWeb**, which is the only vehicle for students to obtain those grades. A student with a "hold" on his/her PatriotWeb account will be unable to access final grades until the hold has been removed by the Registrar.
Course Outline (See Blackboard Site for Course Schedule and dates)

*Please note: this is NOT a self-paced course. Every unit will have multiple assessment activities that will be due by a given date and time. No late assessments are permitted for any reason.*

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Class Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Introduction to Trigonometry, Trig Graphs and Identities</td>
</tr>
</tbody>
</table>
| 1       | Course introduction  
Boolean Algebra  
Logic/Digital Circuits |
| 2       | Truth Tables |
| 3       | Introduction to Programming and Python  
Variables  
Built-in Python Functions  
Algorithms |
| 4       | Set Theory  
Mathematical Functions |
| 5       | Selection: Boolean Expressions and if-elif-else statements in Python  
Iteration: Python while loops  
Algorithms |
| 6       | Counting Principles  
Permutations  
Combinations |
| 7       | Probability |
| 8       | Conditional Probability and Bayes Theorem |
| 9       | Sequences, Sums  
Iteration: Python for loops |
| 10      | Python Functions |
| 11      | Recurrence Relations, Recursion and Mathematical Induction  
Review |

The information provided by the instructor corresponding to the material covered in each lecture should be completed **prior to** that lecture. Please note: the chapters may not be covered in order and there is some material that will be provided by the instructor.

*This schedule is subject to revision before and throughout the course.  
Registered students should see  the Blackboard Learning System  for the latest class schedule.*

**Important Dates**

**Dates for adding, dropping the course, etc. are available via:**  registrar.gmu.edu
Religious Holidays

Mason values diversity and seeks to create and sustain inclusive learning environments where all are welcome. It is a student’s obligation, within the first two weeks of the semester, to provide the instructor the dates of major religious holidays on which they will be absent due to religious observances. Mason University Life religious holiday calendar.

Attendance Policy

Students are expected to participate as stipulated by the instructor in course activities for each chapter, to complete any required preparatory work (including assigned reading) and to participate actively in lectures, discussions and exercises. As members of the academic community, all students are expected to contribute regardless of their proficiency with the subject matter.

Students are expected to make prior arrangements with their instructor if they know in advance that they will miss any class material and to consult with the instructor as soon as possible if they miss any class without prior notice. Any student who expects to miss more than one course module is strongly advised to drop the course and take it in a later semester when he/she can attend every class.

Departmental policy requires students to take exams at the scheduled time, unless there are truly compelling circumstances supported by appropriate documentation. Except in such circumstances, failure to arrive to the exam site on time for a scheduled exam will result in a score of zero (0) for that exam, in accordance with Mason policy on final exams. Students should not make travel plans or other discretionary arrangements that conflict with scheduled classes and/or exams. If the University is closed due to weather or other unforeseen conditions, final exams may be rescheduled – students are strongly advised not to make plans that would prevent them from attending exams that may be rescheduled during the entire exam period.

Classroom conduct

Students are expected to conduct themselves in a manner that is conducive to learning, as directed by the Instructor. Any student who negatively impacts the opportunity for other students to learn will be warned – if disruptive behavior continues, the student will be asked to leave the course.

Discussion Board communication should be thoughtful and respectful.
Communications

Registered students will be given access to a section of the Blackboard Learning System (which can be accessed with your Mason login credentials) for this course. Blackboard will used as the primary mechanism (outside of lectures) to disseminate course information, including announcements, lecture slides, homework and other assignments, and scores for homework and exams.

Communication with the Instructor on issues relating to the individual student should be conducted using Blackboard Mail, GMU email, via telephone, or in person - not in the public forums on Blackboard. GMU Mail is the preferred method – for urgent messages, you should also attempt to contact the Instructor via telephone. Federal privacy law and GMU policy require that any communication with a student related in any way to a student's status be conducted using secure GMU systems – if you use email to communicate with the Instructor you MUST send messages from your GMU email account.

All course materials (lecture slides, assignment specifications, etc) are published on Blackboard in Adobe® Portable Document Format (PDF) or in a format for which a free reader is available (such as Microsoft PowerPoint). This allows users of most computing platforms to view and print these files. Microsoft® Word (or a compatible word processing application) is required for preparing assignments – it is available on computers in the Mason open labs.

Privacy

Instructors respect and protect the privacy of information related to individual students.

As described above, issues relating to an individual student will discussed via email, telephone or in person. Instructors will not discuss issues relating to an individual student with other students (or anyone without a need to know) without prior permission of the student.

Assessable work other than exams will be returned to individual students directly by the Instructor (or by a faculty or staff member or a Teaching Assistant designated by the Instructor, or via another secure method). Under no circumstances will a student's graded work be returned to another student.

Faculty and staff will take care to protect the privacy of each student's scores and grades.

All students are protected via federal regulations (FERPA): (registrar.gmu.edu/ferpa)
Disability Accommodations

Disability Services at George Mason University is committed to upholding the letter and spirit of the laws that ensure equal treatment of people with disabilities. Under the administration of University Life, Disability Services implements and coordinates reasonable accommodations and disability-related services that afford equal access to university programs and activities. Students can begin the registration process with Disability Services at any time during their enrollment at George Mason University. If you are seeking accommodations, please visit http://ds.gmu.edu/ for detailed information about the Disability Services registration process. Disability Services is located in Student Union Building I (SUB I), Suite 2500. Email: ods@gmu.edu | Phone: (703) 993-2474

Honor Code

All members of the Mason community are expected to uphold the principles of scholarly ethics. On admission to Mason, students agree to comply with the requirements of the Mason Honor Code. The Honor Code will be strictly enforced in this course. Honor Code cases are heard by a panel consisting of students – students who meet the requirements are encouraged to nominate themselves to serve on the Honor Committee.

For this course, the following requirements are specified:

- All assessable work is to be prepared by the individual student, unless the instructor explicitly directs otherwise. Submissions deemed by the instructor to be more than 50% identical to another student’s submission will be submitted to the George Mason University Honor Committee.

- The individual student for this course must newly create all work for this semester. Any usage of work developed for another course, or for this course in a prior semester, is strictly prohibited without prior approval from the instructor.

The integrity of the University community is affected by the individual choices made by each of us. Mason has an Honor Code with clear guidelines regarding academic integrity. Three fundamental and rather simple principles to follow at all times are that: (1) all work submitted be your own; (2) when using the work or ideas of others, including fellow students, give full credit through accurate citations; and (3) if you are uncertain about the ground rules on a particular assignment, ask for clarification. No grade is important enough to justify academic misconduct. Plagiarism means using the exact words, opinions, or factual information from another person without giving the person credit. Writers give credit through accepted documentation styles, such as parenthetical citation, footnotes, or endnotes. Paraphrased material must also be cited, using MLA or APA format. A simple listing of books or articles is not sufficient. Plagiarism is the equivalent of intellectual robbery and cannot be tolerated in the academic setting. If you have any doubts about what constitutes plagiarism, please see me.
Student Services:

Student Support Resources on Campus

Online Student Support Resources:
- Online Education Services, University Libraries (library.gmu.edu/for/online)
- Writing Center (writingcenter.gmu.edu)
- Counseling and Psychological Services (caps.gmu.edu)