Catalog Description  Introduces students to fundamental hardware and software concepts of information technology (IT) to understand the basics of modern computing environments. Students acquire a comprehensive understanding of a computer system’s essential components, component interdependence, and binary functions, factoring in performance, data communication models, telecommunication basics, and information security. Recent trends and advancements in mobile computing, telecommunications, and IT infrastructures are discussed.

Rationale  An understanding of the concepts underlying digital devices, computer hardware, software, telecommunications, and networking is an integral part of any IT curriculum. This course provides a comprehensive foundation on the basic theoretical and practical principles behind these technologies and discusses recent advances in cutting edge topics of interest, such as mobile computing and virtualization.

Course Outcomes  Upon successful completion of this course, the student will be able to:

1) Identify and describe the essential components of computer systems, their operation, and how they function together
2) Define and explain basic communication and infrastructure terminology, concepts, protocols, and standards, factoring in the performance and security
3) Define and explain IT infrastructure models including
4) Describe the architecture and operating principles of the Internet
5) Perform binary arithmetic and understand the applications of binary codes in computing environments, such as IP addressing
6) Articulate and explain current trends and advancements in mobile computing, telecommunications, and IT infrastructures

Textbook

**REQUIRED**

Computer Organization and Design Fundamentals
By: David Tarnoff

Publisher: turnoff
Publication Date: July 6 2007
ISBN-10: 1411636902

Supplementary Readings:

- Information Technology in Theory
  By: Pelin Aksoy and Laura DeNardis
  Publisher: Course Technology
  Publication Date: October 15, 2007

Administrative Support

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

Prince William campus
Bull Run Hall, Suite 102
Phone: 703-993-8461

Grading

Grades will be awarded in accordance with the GMU Grading System for undergraduate students. See the university catalog for policies: http://www.gmu.edu/catalog for more information.

The grading scale for this course is:

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>97 – 100%</td>
<td>A+</td>
<td>Passing</td>
</tr>
<tr>
<td>93 – 96%</td>
<td>A</td>
<td>Passing</td>
</tr>
<tr>
<td>90 – 92%</td>
<td>A-</td>
<td>Passing</td>
</tr>
<tr>
<td>87 – 89%</td>
<td>B+</td>
<td>Passing</td>
</tr>
<tr>
<td>83 – 86%</td>
<td>B</td>
<td>Passing</td>
</tr>
<tr>
<td>80 – 82%</td>
<td>B-</td>
<td>Passing</td>
</tr>
<tr>
<td>77 – 79%</td>
<td>C+</td>
<td>Passing</td>
</tr>
<tr>
<td>73 – 76%</td>
<td>C</td>
<td>Passing</td>
</tr>
<tr>
<td>70 – 72%</td>
<td>C-</td>
<td>Passing*</td>
</tr>
<tr>
<td>60 – 69%</td>
<td>D</td>
<td>Passing*</td>
</tr>
<tr>
<td>0 – 59%</td>
<td>F</td>
<td>Failing</td>
</tr>
</tbody>
</table>

Grades of "D" and C- are considered passing grades for undergraduate courses. However, a minimum grade of "C" is required in the BSAIT program for any course that is a prerequisite for one or more other courses. This course is a prerequisite for several courses in the AIT program. Please see http://ait.gmu.edu for additional information.

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>Graded Activity</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face-to-Face Sections: Individual Quizzes</td>
<td>5%</td>
</tr>
<tr>
<td>Online Sections: Discussion Board and/or Online Quizzes</td>
<td>5%</td>
</tr>
</tbody>
</table>

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IT News Report 5%
Homework Assignments 25%
Midterm Exam 30%
Final Exam 35%
Bonus 5%

**Extra Credit Opportunities.** Students may create and submit a 15 minutes animated video on a topic approved by the instructor.

**Late submissions will not be accepted for any graded activity,** unless there are truly compelling, severe circumstances supported by appropriate documentation.

The midterm and final exam will be conducted on-campus, in a classroom. The dates/times/locations will be posted on Blackboard as soon as possible.

**Exam Rules**

- All exams will be written and “closed book, closed notes, closed friends” – no reference materials other than those provided with the exam will be permitted. A standalone, basic, non-scientific, non-graphing calculator is permitted, but **calculator sharing will not be permitted during any exam. Calculators that are part of cell phones or contain graphing or programmable capabilities will not be permitted.**
- Students without proper identification (e.g. GMU ID, Driver’s License, etc.) will **not be admitted** to any exam
- No student may enter the classroom after the first student has left the room.
- Exams are retained by the AIT department and will not be returned to students.

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 Content

<table>
<thead>
<tr>
<th>Lecture</th>
<th>Topics</th>
<th>Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction, History of Computing, and an Overview of Computer System Components</td>
<td>Assignment 1</td>
</tr>
<tr>
<td>2</td>
<td>Number System- Binary Numbers, Binary Codes, ASCII, Hexadecimal Number Conversion</td>
<td>Assignment 2</td>
</tr>
<tr>
<td>3</td>
<td>Binary Arithmetic, Digital Logic Functions, 4-Bit Computer, and Machine Language</td>
<td>Assignment 3</td>
</tr>
<tr>
<td>4</td>
<td>Microchips, Semiconductors, Transistors, RAM, Microprocessors, Boolean Algebra, Gates, Half-Adder, Full-Adder, and ALU Functions, 8-Bit Computer</td>
<td>Assignment 4</td>
</tr>
<tr>
<td>5</td>
<td>32-Bit Computer, How CPU works, Assembly language, Interrupts and Traps; I/O-Peripheral Devices and Power Management</td>
<td>Assignment 5</td>
</tr>
<tr>
<td>6</td>
<td>IPO-Storage Model, Start-up, Layered OS, Software Interaction with Hardware, Registry, Dynamic Link Library (DLL), and Device Drivers</td>
<td>Assignment 6</td>
</tr>
<tr>
<td>7</td>
<td>Data Storage, RAM, ROM, Disk Drives, Optical Drives, Thumb Drives, Fixed vs. Removable Storage, Memory Organization, Addressing, Memory Architecture, Memory Controller, L1 and L2 Caches, and Direct Memory Access</td>
<td>Assignment 7</td>
</tr>
<tr>
<td>8</td>
<td>Open Systems Interconnection (OSI) and TCP/IP Models; IP addressing</td>
<td>Assignment 8</td>
</tr>
<tr>
<td>9</td>
<td>Basic Concepts of Telecommunication, Routing, Simplex, Half-Duplex, and Full Duplex, One-way and Two-way circuits, Network Topologies, Quality of Service</td>
<td>Assignment 9</td>
</tr>
<tr>
<td>10</td>
<td>LAN, WAN, and the Internet, PSTN, Cellular, Wi-Fi, WiMAX, and Satellite Communications</td>
<td>Assignment 10</td>
</tr>
<tr>
<td>11</td>
<td>Basic Concepts of Information Security and its Importance</td>
<td>Assignment 11</td>
</tr>
<tr>
<td>12</td>
<td>Firewalls, VPNs, Access Control, Encryption, Physical Security, and Policies</td>
<td>Assignment 12</td>
</tr>
<tr>
<td>13</td>
<td>VoIP, GPS, Smart Phones, Future of Computing, and Recent Developments (Optical, Biological, and Quantum Computing Hardware); Final Exam Review Session</td>
<td></td>
</tr>
</tbody>
</table>

### Important Dates

Dates for adding, dropping the course, etc. are available via: [http://registrar.gmu.edu](http://registrar.gmu.edu).

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Religious Holidays

A list of religious holidays is available on the University Life Calendar page. Any student whose religious observance conflicts with a scheduled course activity must contact the instructor at least 2 weeks in advance of the conflict date in order to make alternative arrangements.

Attendance Policy

Students are expected to attend each class, 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. The instructor reserves the right to issue pop quizzes if adequate attendance is not maintained.

Students are expected to make prior arrangements with their instructor if they know in advance that they will miss any class 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 class session 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 and place, unless there are truly compelling, severe 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

Whether the course is face-to-face or online, 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 removed from the course.

Communications

Registered students will be given access to a section of the Blackboard Learning System.
for this course. Blackboard will used as the primary mechanism (outside of lectures) to disseminate course information, including announcements, lecture slides, assignments, and grades.

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.

Graded 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.

**Disability Accommodations**

The Office of Disability Services (ODS) works with disabled students to arrange for appropriate accommodations to ensure equal access to university services. Any student with a disability of any kind is strongly encouraged to register with ODS as soon as possible and take advantage of the services offered.

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Accommodations for disabled students **must** be made in advance – ODS cannot assist students retroactively, and at least one week's notice is required for special accommodations related to exams. Any student who needs accommodation should contact the instructor during the first week of the semester so the sufficient time is allowed to make arrangements.

**Honor Code**

All members of the Mason community are expected to uphold the principles of scholarly ethics. Similarly, graduating students are bound by the ethical requirements of the professional communities they join. The ethics requirements for some of the communities relevant to Applied IT graduates are available via the following links:

- [ACM Code of Ethics and Professional Conduct](#)
- [IEEE Code of Ethics](#)
- [EC-Council Code of Ethics](#)

On admission to Mason, students agree to comply with the requirements of the [GMU Honor System and 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. Any use of the words or ideas of another person(s), without explicit attribution that clearly identifies the material used and its source in an appropriate manner, is **plagiarism** and will not be tolerated. Within [The Volgenau School](#) there is a mandated "zero tolerance" policy for plagiarism. The instructor reserves the right to use all manual and/or automated means (including, but not limited to such services as Safe Assign and MOSS – Measure of Software Similarity) to detect plagiarism in any work submitted by students for this course, and to direct teaching assistants and/or other faculty and/or staff members to do likewise in support of this course. Additional information on the enforcement of the George Mason University Honor Code policy can be found at: [academicintegrity.gmu.edu](#).

For this course, the following requirements are specified:

- All work that is to be submitted for a grade must be prepared by the individual student. Students are expressly prohibited from sharing any graded work for this course in any manner with anyone other than the instructor and teaching assistant(s) assigned to this course and the student's section). Specifically, students may not do the following, including but not limited to:
- Discussing the work specific to an assignment with anyone except the instructor and/or teaching assistant(s)

- Showing another student their work-in-progress, completed solution, or graded solution

- Having another person (i.e. current student, former student, tutor, friend, anyone) “walk them through” how to solve an assignment

- All work must be newly created by the individual student for this course 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.

- Posting or sharing course content (i.e. instructor provided lecture notes, assignment directions, assignment questions, or anything not created solely by the student), using any non-electronic or electronic medium (i.e. web site, FTP site, any location where it is accessible to someone other than the individual student, instructor and/or teaching assistant(s)) constitutes copyright infringement and is strictly prohibited without prior approval from the instructor.

Students may (and are encouraged to) seek assistance from others (i.e. other students, peer advisors, outside tutors, etc.) for CONTENT assistance ONLY that is not related to any work that is to be submitted for a grade. **Peer advisors may not assist a student with the completion of work that is to be submitted for a grade.**

If you have questions on these requirements, please discuss them with your instructor. Any deviation from these requirements is considered a violation of the Honor Code. All suspected violations of the Honor Code will be taken seriously and are required to be reported by the instructor.