Applied Information Technology Department

Course Syllabus

IT 206 - Object-Oriented Techniques for IT Problem Solving

revised 08.17.2014

Catalog Description
Introduces techniques for developing solutions to business problems using object-oriented programming as an IT resource/tool. Students apply problem solving concepts by analyzing problems and constructing, testing, and implementing object-oriented solutions using object-oriented analysis and design, data modeling, and object-oriented programming fundamentals. Topics include: Unified Modeling Language (UML), classes, inheritance, polymorphism, and exception handling.

Prerequisites
The prerequisites for this course are IT 106 and MATH 112 (or approved equivalent courses). A grade of "C" or better must be achieved in both prerequisite courses before a student is qualified to take this course. Both prerequisite courses must be completed prior to, not concurrently with, this course.

This requirement will be strictly enforced. Any student who does not meet the prerequisite requirements will be dropped from the course by the department at the start of the semester and the student will be responsible for any consequences of being dropped.

Rationale
Problem Solving and Programming are essential skills for all IT students and IT professionals. Understanding how a computer is instructed to accomplish tasks leads to an appreciation of the underlying concepts of the Information Technology discipline. Learning how to solve a problem using an object-oriented approach provides a strong foundation that will be used in higher level AIT courses.

Educational Objective
To introduce students to problem solving using a high-level, object-oriented programming language as a tool.

Course Outcomes
1. Design solutions to problems using object-oriented techniques.
2. Apply techniques of object-oriented programming effectively.
Supported Student Outcomes at the Program Level

(a) Apply knowledge of computing and mathematics
(c) Design, implement and evaluate a computer-based system, process, component, or program
(j) Ability to use and apply current technical concepts and practices in the core information technologies

Major Topics

On successful completion of this course, students will be able to:

- Describe the relationship between an object and its corresponding class.
- Describe how constructors and destructors relate to the life of an object.
- Apply the techniques of structured (functional) decomposition to break a program into smaller pieces.
- Discuss and identify the concepts of encapsulation, abstraction, and inheritance.
- Describe the relationship between the static structure of the class and the dynamic structure of the instances of the class.
- Design, implement, test, and debug programs in an object-oriented programming language.
- Describe how the class mechanism supports encapsulation and information hiding.
- Define the concept of inheritance and describe how it can be applied to encourage code reuse.
- Design an abstract class and use inheritance to create a class that extends the abstract class.
- Compare and contrast the differences between structured and object-oriented programming paradigms.
- Design, implement, and test the implementation of “is-a” relationships among object using a class hierarchy and inheritance.
- Design, develop, and test an application that uses an abstract class.
- Design solutions to problems using object-oriented techniques.
- Create and use simple and complex static data structures in an object-oriented environment.
- Compare and contrast the notions of overloading and overriding methods in an object-oriented language.
- Discuss the importance of algorithms in the problem solving process.
- Identify the necessary properties of good algorithms.
- Apply effective debugging strategies.
- Develop code that responds to exception conditions raised during execution.
- Manage complexity in an information technology environment by applying best practices and using appropriate technologies and methodologies (Unified Modeling Language).
Textbooks

**REQUIRED**

Big Java Late Objects
By: Cay S. Horstmann
Publisher: John Wiley & Sons, Inc.
Publication Date: February 1, 2012
ISBN: 978-1-118-08788-6

Administrative Support

Fairfax campus
   Nguyen Engineering Building, 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://catalog.gmu.edu for more information.

The grading scale for this course is:

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Grade</th>
<th>Notes</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>60 – 72%</td>
<td>D</td>
<td>Passing*</td>
</tr>
<tr>
<td>0 – 59%</td>
<td>F</td>
<td>Failing</td>
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</tbody>
</table>

* A grade of "D" is considered a passing grade for undergraduate courses. However, a minimum grade of "C" is required in the AIT department for any course that is a prerequisite for one or more other courses. For AIT majors, a grade of “C” or better is required in this course because it is a prerequisite for other courses in the program. For IT minor/undergraduate certificate students, a grade of “D” or better is required in this course for it to count towards the minor/undergraduate certificate, provided that you will not be taking any other courses for which this course is a prerequisite.

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>
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</thead>
<tbody>
<tr>
<td><strong>Face-to-Face Sections:</strong> Lab Participation (lowest 1 dropped)</td>
<td>10%</td>
</tr>
<tr>
<td><strong>Online Sections:</strong> Discussion Board Lab Participation (lowest 1 dropped)</td>
<td>10%</td>
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<tr>
<td>Programming Assignments (lowest 1 dropped)</td>
<td>25%</td>
</tr>
<tr>
<td>Midterm Exam</td>
<td>25%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>40%</td>
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</tbody>
</table>

There are no extra credit opportunities. Students may not do any additional work for extra credit nor resubmit any graded activity to raise a final grade.

Late submissions will not be accepted for any graded activity for any reason. Any missed assignment or lab is simply missed, regardless of the reason why (e.g. illness, work, traffic, car trouble, computer problems, death, etc.), and earns a grade of zero. A number of lowest grades (as identified above) will be dropped to handle all of “life’s situations” without the need for any type of
instructor permission to be excused or for you to submit documentation. If you choose not to do a number of assignments or participate in a number of labs, and then later on have to miss an assignment or lab for a valid reason, you will be out of luck if you have already exhausted the number of grades that have earned zeroes because you did not complete the work. You are strongly encouraged to complete all assignments and participate in all labs so that you can check that you understand the material and can throw out bad grades, or grades for which you had to miss an assignment or lab for a valid reason.

**Students have one week to request the re-grading of an assignment.** All requests for the re-grading of an assignment must be requested, in writing (email), within one week of the date grader feedback was posted. In the email request, the student must write a clear explanation of why they believe they should earn more points than were previously earned. **The entire assignment will be re-graded (i.e. there are no partial re-grades).** It is possible that the resulting assignment grade will be higher due to errors in grading, or lower if it is discovered that a sufficient amount of points were not subtracted the first time. Please carefully consider this before making a request. No requests for re-grading will be considered one week after the date grader feedback was posted and the grade will be considered final.

**The midterm and final exam will be conducted on-campus, in a classroom.** The dates, times, and locations will be posted on Blackboard as soon as possible. The exams will be written and “closed book, closed notes, closed friends” – no reference materials other than those provided with the exam will be permitted. 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>Module</th>
<th>Content</th>
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</thead>
<tbody>
<tr>
<td>0</td>
<td>Course Introduction / Administrivia</td>
</tr>
<tr>
<td>1</td>
<td>Review of Procedural Programming Concepts (Methods and Arrays)</td>
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<tr>
<td>2</td>
<td>Introduction of Object-Oriented Techniques</td>
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<td>3</td>
<td>Implementing Classes and Objects / Moving from Procedural to Object-Oriented Solutions</td>
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<td>4</td>
<td>Constructors</td>
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<td>5</td>
<td>Static Variables and Methods</td>
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<td>6</td>
<td>Arrays of Objects</td>
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<td>7</td>
<td>Arrays as Instance Variables</td>
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<tr>
<td>8</td>
<td>Strings / Midterm Exam Review / Midterm Exam</td>
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<tr>
<td>9</td>
<td>Inheritance / Method Overriding</td>
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<tr>
<td>10</td>
<td>Abstract Classes, Abstract Methods, &amp; More on Inheritance / Polymorphism</td>
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<tr>
<td>11</td>
<td>Interfaces</td>
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<tr>
<td>12</td>
<td>Aggregation &amp; Composition</td>
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<tr>
<td>13</td>
<td>Exception Handling</td>
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<tr>
<td>14</td>
<td>Files</td>
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<tr>
<td>15</td>
<td>Final Exam Review / Final Exam</td>
</tr>
</tbody>
</table>
**Important Dates**

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

**Religious Holidays**

A list of religious holidays is available on the [University Life Calendar page](http://registrar.gmu.edu). 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 pre-module quizzes) 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 in face-to-face sections are also expected to attend each lab, to complete hands-on activities and exercises. Each lab will require the student to sign-in to indicate their presence. Labs contain a “present for credit” policy. Students must be present for the duration of the lab to earn lab participation points. **Students that leave lab before the end of the lab period or do not attend lab will earn a grade of zero (0) for the lab, even if they complete the lab on their own or outside of class.**

Any student who expects to miss more than one class or lab session is strongly advised to drop the course and take it in a later semester when he/she can attend every class and lab.

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 the final exam period listed on the Registrar’s website. 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](https://example.com) for this course. Blackboard will used as the primary mechanism 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 discussion board 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.

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. The instructor will use several manual and automated means to detect cheating and/or 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.

**WARNING! This course has a zero tolerance policy for violations of the Honor Code.** There are no second chances. First offenses carry a **minimum** recommended sanction of: an assignment grade of 0, one letter grade (10%) reduction in the final grade, and a requirement to complete an academic integrity seminar. Second and third offenses (and egregious first offenses, as determined solely by the instructor/course coordinator) carry stiffer minimum recommended sanctions, including but not limited to: F in the course, academic suspension, and expulsion. Please do not even think about violating the Honor Code. There are many ways to receive help. You are strongly encouraged to use these methods if you are struggling, so that you can get the help you need. If you have any questions about what does/does not constitute an Honor Code violation, please contact your instructor.

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1 Available at [www.gmu.edu/catalog/apolicies](http://www.gmu.edu/catalog/apolicies) and related GMU Web pages.
Additional information on the enforcement of the George Mason University Honor Code policy can be found at: http://oai.gmu.edu.

For this course, the following additional requirements are specified:

**Note:** “Person”, as mentioned below, includes: current students, former students, tutors, friends, ex-classmates, and anyone else other than the instructor or a current IT 206 GTA.

- All work submitted for a grade must have been prepared by the individual student. Students are expressly prohibited from sharing any work that has been or will be submitted for a grade, in progress or completed, for this course in any manner with a person other than the instructor and teaching assistant(s) assigned to this course. Specifically, students may not do the following, including but not limited to:
  - Discuss questions, example problems, or example work with another person that leads to a solution to work submitted for a grade.
  - Give to, show, or receive from another person (intentionally, or accidentally because the work was not protected) a partial, completed, or graded solution.
  - Ask another person about the completion or correctness of an assignment.
  - Post questions or a partial, completed, or graded solution electronically (e.g. a Web site).
  - Have another person “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 (e.g. instructor provided lecture notes, assignment directions, assignment questions, or anything not created solely by the student), using any non-electronic or electronic medium (e.g. 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.

**Peer advisors may not assist a student on any assignment which will 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. Non-compliance is a violation of the GMU Honor Code. All suspected violations of the Honor Code are required to be taken seriously and reported!