IT 206 - Object-Oriented Techniques for IT Problem Solving

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 (IT 102 or MATH 112 or MATH 125). 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 IT 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.
(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 objects 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.
- 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).
- Apply effective debugging strategies.
Textbooks

** REQUIRED**

Starting Out with Java: From Control Structures through Objects
By: Tony Gaddis

Publisher: Pearson, Inc.
Publication Date: March 22, 2015
ISBN: 978-0-133-95705-1

** RECOMMENDED**

By: Lesley Anne Robertson

Publisher: Course Technology
Publication Date: September 29, 2006
ISBN: 978-1-4239-0132-7

Administrative Support

Fairfax Campus
    Nguyen Engineering Building, Room 5400
    Phone: 703-993-3565

Science and Technology Campus
    Bull Run Hall, Suite 102
    Phone: 703-993-8461

For a map and directions, visit: http://maps-directions.gmu.edu/
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 Range</th>
<th>Grade</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>98-100%</td>
<td>A+</td>
<td>92-97%</td>
</tr>
<tr>
<td>88-89%</td>
<td>B+</td>
<td>82-87%</td>
</tr>
<tr>
<td>78-79%</td>
<td>C+</td>
<td>72-77%</td>
</tr>
<tr>
<td>60-69%</td>
<td>D</td>
<td>0-59%</td>
</tr>
</tbody>
</table>

- **For IT majors pursuing the Database Technology and Programming (DTP) concentration and have a catalog year of Fall 2016 or later**
  - A grade of “B” or better is required in this course to take upper-level programming courses where this course is a prerequisite for other DTP concentration courses.

- **For all other IT 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 certificates and non-IT majors**
  - A grade of “D” or higher 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.

Individual 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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<tbody>
<tr>
<td>Programming Assignments (lowest 1 dropped)</td>
<td>20%</td>
</tr>
<tr>
<td>Quizzes (2)</td>
<td>25%</td>
</tr>
<tr>
<td>Midterm Exam</td>
<td>25%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>30%</td>
</tr>
</tbody>
</table>

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

**Late submissions will not be accepted for any programming assignments for any reason.** All programming assignments must be posted to Blackboard by the due date/time. Programming assignments may not be submitted through any other medium (e.g. email). Any missed programming assignment 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 programming
assignments (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 programming assignments, and then later on have to miss a programming assignment for a valid reason, you will be out of luck if you have already exhausted the number of programming assignments that have earned zeroes because you did not complete the work. You are strongly encouraged to complete all programming assignments so that you can check your understanding of the material and can throw out bad grades, or grades for which you had to miss a programming assignment for a valid reason.

**Students have one week to request the re-grading of a programming assignment/quiz/exam.** All requests for the re-grading of a programming assignment/quiz/exam must be requested to the instructor, 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 programming assignment/quiz/exam will be re-graded (i.e. there are no partial re-grades). It is possible that the resulting 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. No requests for re-grading will be considered one week after the date grader feedback was posted and the grade will be considered final.

**Exams will be conducted on-campus, in a classroom.** All exams are “closed book, closed notes, closed friends” – no reference materials other than those provided with the exam will be permitted. Exams are retained by the IST 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.

**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 alternate arrangements.
**Attendance Policy**

Students are expected to attend each class, complete any required preparatory work (including assigned reading) and participate actively in lecture and lab. As members of the academic community, all students are expected to contribute regardless of proficiency with the subject matter. Final grades may be adjusted (upward or downward) by the instructor based on student participation, or lack thereof. Students that fail to attend lecture or lab are unable to participate.

*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.*

**Exams**

Departmental policy requires students to take exams (identified below as quizzes and exams) at the scheduled time and place, unless there are 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. *Excessive area traffic or parking trouble are not valid reasons to arrive late.*

*Students must not make travel plans or other discretionary arrangements that conflict with scheduled classes or the FULL final exam period listed on the Registrar’s Web site.* If the University is closed due to weather or other unforeseen conditions, classes or exams may be rescheduled at another day and time during the exam period.

This course uses a block exam format for exams based on the schedule below. All sections will meet simultaneously. Exams **MUST** be taken at the scheduled time. Mason IDs will be checked. Failure to produce an acceptable Mason ID will result in an inability to complete an exam and a grade of zero.

<table>
<thead>
<tr>
<th></th>
<th>Face to Face Sections</th>
<th>Online Sections</th>
<th>Makeup Day**</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Quiz 1</strong></td>
<td>During lecture. Check the course schedule for dates.</td>
<td>Sat, 3/3, 1:00pm - 2:15pm</td>
<td>Scheduled with professor</td>
</tr>
<tr>
<td><strong>Quiz 2</strong></td>
<td></td>
<td>Sat, 5/12, 1:00pm - 2:15pm</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>All Sections</th>
<th>Makeup Day**</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Midterm Exam</strong></td>
<td>Sat, 3/3, 10:00am - 12:00pm</td>
<td>Fri, 3/2, 7:30pm - 9:30pm</td>
</tr>
<tr>
<td><strong>Final Exam</strong></td>
<td>Sat, 5/12, 10:00am - 12:00pm</td>
<td>Fri, 5/11, 7:30pm - 9:30pm</td>
</tr>
</tbody>
</table>

*Check the EXAMS section in Blackboard for location.*
** Makeup exams are restricted to students who meet one of the following criteria:
- The University closed due to snow or other unforeseen circumstance on the original exam day
- More than two exams are scheduled on the same day
- Another course or exam is scheduled on the same day at the same time
- A severe, unanticipated, unavoidable, last minute emergency that prevents completion of the exam (with supporting documentation)

Students requiring a makeup exam, including students taking exams with ODS, are required to notify the instructor in writing (email) with **at least two weeks’ advance notice** (the sooner the better). This allows for adequate planning for necessary resources.

**Deadlines to place a makeup request, including students taking exams with ODS, are as follows:**
- Midterm Exam / Quiz 1 - 2/16/18
- Final Exam / Quiz 2 - 4/27/18

Failure to notify the instructor in writing (email) with at least two weeks’ advance notice will result in denial of the makeup request.

**All other reasons for a makeup will be denied.** Students have a long lead time in which to plan to attend the exams. Students unable to take exams during their scheduled times should complete the course in a future semester.

**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 be 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. 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.
**Privacy**

Instructors respect and protect the privacy of information related to individual students. As described above, issues relating to an individual student will be 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, ensuring equal access to university services. Students with any kind of disability are strongly encouraged to register with ODS as soon as possible to take advantage of available services. Accommodations for disabled students must be made in advance – ODS cannot assist students retroactively, and at least two weeks’ 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. On admission to Mason, students agree to comply with the requirements of the GMU Honor Code and System. Similarly, graduating students are bound by the ethical requirements of the professional communities they join. Ethics requirements for some communities relevant to IST graduates are:

- ACM Code of Ethics and Professional Conduct
- IEEE Code of Ethics
- EC-Council Code of Ethics

To uphold the rigor of the course and the value of your degree, the Honor Code will be rigorously enforced. The instructor will use several manual and automated means to detect cheating in all work submitted by students. Keep in mind it is extremely easy to detect cheating with logic and code.

The penalty for cheating will always be far worse than a zero grade, to ensure it is not worth taking the chance. Any instance of misconduct that is detected will be referred to the Office of Academic Integrity (OAI) and will most certainly translate into at least course failure (a final grade of F).
If you have questions about what does/does not constitute an Honor Code violation, contact your instructor for clarification. For this course, the following additional requirements are specified:

- Students are encouraged to discuss course content, labs, and similar activities with other current IT 206 students; however, **all programming assignment submissions must contain only original, individually completed work.** More specifically, if any student submission is deemed to be greater than or equal to 50% identical to another student’s submission, the course content discussion that occurred constitutes misconduct and all students involved will be referred to OAI for violating the Honor Code. In particularly obvious situations where a submission does not contain original, individually completed work, a match less than 50% may still result in a referral to OAI for misconduct for all students involved.

- Students are expressly prohibited from:
  - Discussing program design, algorithm logic, or code with individuals other than the course’s instructor or current IT 206 graduate teaching assistants
  - Receiving, giving, or showing another student a partial, completed, or graded solution.
  - Knowingly sharing computers or storage devices (e.g. USB drive).
    - If work is stolen because of a shared or borrowed computer or storage device, all students involved will be held equally responsible.
  - Stealing another student’s work by taking photographs, using a lost storage device, or gaining access to another student’s work in any other way without their knowledge.
    - This action represents a particularly egregious offense placing an innocent student in jeopardy of receiving an Honor Code violation. **Any student who has stolen will be referred for two violations: cheating and stealing,** and will receive a sanction recommendation of at least course failure and a one-semester suspension.
  - Posting questions or a partial, complete, or graded solution on the Internet, even after the course has concluded.
  - Incorporating program design, algorithm logic, or code found on the Internet.

- All work must be newly created by the student during this term. Work developed for another course, or for this course in a prior term, may not be used without prior instructor approval.

- Posting or sharing course content (e.g. instructor lecture notes, assignment directions, or anything not created by the student), using any non-electronic or electronic medium (e.g. web site) where it is accessible to someone other than the individual student constitutes stealing/copyright infringement and is strictly prohibited without prior instructor approval.
If you have any questions on these requirements, please discuss them with your instructor. Any deviation from these requirements is considered a violation. All suspected violations of the Honor Code are required to be taken seriously and reported!