IT 415 Information Visualization

Logistics

Instructor: Professor Bernardo Darquea
On-line

Course Description

IT Information Technology 415 Information Visualization
Prerequisites: IT 213.

Information visualization is an important area that focuses on the use of visualization techniques to help people understand and analyze abstract data. Through careful analysis of data, creation of visual representations, and implementation with interactive techniques, visualized information increases our ability to gain insight and make decisions for many types of datasets, tasks, and analysis scenarios. This course will provide students the opportunity to learn the principles and applied technologies in information visualization and explore the application of development protocols. Relevant topics will be chosen to enable students to create comprehensible applied visualizations and may include fundamentals of information visualization; system functional requirements development; current important visualization applications: geographic information visualization and scientific visualization; advanced interactive visualization -- virtual reality; future trends in information visualization. Students will get hands on experience with the latest web-based widely-used visualization tools and software to include design and development of a rudimentary

Prerequisites

The prerequisite for this course is IT 213 (or an approved equivalent course). A grade of "C" or better must be achieved in the prerequisite course before a student is qualified to take this course. The prerequisite course must be completed prior to, not concurrently with, this course.

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

Rationale

Today vast amounts of raw and refined information can be supplied and accessed to support analysis and decisions. Indeed, information access and retrieval is considered less a problem and at times a burden. The
most pressing need now is to be able to present the information in a manner that is usable. This requires that cogent information be provided in context. To the maximum extent possible the information must be displayed in an intuitive manner that supports not only analytical but cognitive processes. (Source: Taylor Connor Associates LLC, all rights reserved)

To support this burgeoning technology requirement designers and developers of information systems need to be current not only with the technology but the unique aspects of information visualization design. This course is intended to develop an awareness of the design issues; an understanding of the underlying technology; introduce students to currently available technology; guide students in design protocols; and examine typical applications of those technologies.

**Objectives**

Students will learn the principles of information visualization system design based on user functional requirements. They will learn about current tools and technologies used in information visualization development as well as current off the shelf information visualization software systems.

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

- Learn the principles involved in information visualization
- Learn about the variety of existing techniques and systems in information visualization
- Give examples of current information visualization technology
- Develop a rudimentary information visualization design based on the requirements
- Develop skills in applying different visualization techniques to particular tasks
- Learn how to evaluate visualization systems
- Gain a background that will aid the design of new, innovative visualizations
- Learn how to write scientific/technical documentations
- Learn some project management techniques

**Required Materials**

One hard disk with at least 8GB storage.


*More may be added in the class.*

**Faculty and Staff**

**INSTRUCTOR: BERNARDO DARQUEA**  
**EMAIL: BDARQUEA@GMU.EDU**  
**OFFICE HOURS: BY APPOINTMENT.**

Teaching Assistant: Harsha Balachandran.  
Email: hbalacha@masonlive.gmu.edu
Grading

Grades will be awarded in accordance with the GMU Grading System for undergraduates. See [HTTP://WWW.GMU.EDU/CATALOG/APOLICIES/ UNDER GRADING SYSTEM FOR MORE INFORMATION.](http://www.gmu.edu/catalog/appolicies)

The grading scale for this course is:

- 97 – 100% A+ Passing
- 93 – 96% A PASSING
- 90 – 92% A- PASSING
- 87 – 89% B+ PASSING
- 83 – 86% B PASSING
- 80 – 82% B- PASSING
- 77 – 79% C+ PASSING
- 73 – 76% C PASSING
- 70 – 72% C- PASSING
- 60 – 69% D PASSING
- 0 – 59% F FAILING

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

Final grades will be determined based on the following components:

- 1 Individual Project/Presentation: 25%
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- Labs: 20%
- 1 Final Individual Project: 30%

These components are outlined in the following sections.

There will be bonus opportunities worth 25 points each.

Due Dates

The due dates are posted on Blackboard. Generally the projects are due on a Thursday by 11:59 PM. Please note the time. Late projects lose 10 points instantly.

Visualization Final Project

Each student shall propose to design an information visualization based on one concrete application area (such as GIS, statistics, network, performance, bioinformatics, etc.). Students may use the development program, tool, or language of their choice after instructor’s approval. Once the proposals are approved by instructor, students will build the proposed information visualization.

The Proposal, Progress Report, and Final Technical Report are to be one page, double-spaced, no
pictures, and font size 11 or 12, font Calibri or Cambria. Do NOT submit two pages; you will lose points.

The project will contain four components:

1. **Proposal** *(submitted in MS Word)* (10 points)
   - Introduction
   - Objectives
   - Description of the proposed system
   - Proposed development platforms

2. **Progress Report** *(submitted in MS Word)* (10 points)

3. **Final Technical Report** *(submitted in MS Word)* (20 points)
   - Abstract
   - Objectives
   - Functional requirements
   - System architecture and description
   - Development platforms
   - Experimental analysis and conclusions

4. **A Working Visualization** *(submitted in electronic format)* (30 points)
   - The visualization should be demonstrated in the presentation
   - It should be submitted in one zipped file via Blackboard

5. **Final Presentation** (30 points)
   - Video presentation (5-minutes) You will present to the class by submitting the video link in the forum or by uploading your video.
   - Demonstrations of the working visualization

**Individual Projects**

The individual projects will constitute the following:

1. The first project will be a presentation (PowerPoint and hands-on) using one of the Google Visualization tools on the military spending of the top 10 or more countries in the world

2. The second project will be a working visualization on one of the topics at the end of the book. You may use whatever visualization tool you like or program one yourself as has been done by some of my students in the past.

**Assignment Submission**

- Assignments are due on time; see due dates above
- Be sure to put all your files into a **folder** and name the folder like this
  "IT 415 - Individual Project # - First Last" as in "IT 415 - Individual Project 1 - Bugs Bunny"
- Zip the folder and name it using the same formatting

**Reading Assignments**

You are required to read roughly one chapter in your book every week.
Additional Assignments

As part of this course, you are required to watch the tutorial videos posted. There are also useful links that you must visit. These links provide you with additional information, tutorials, and visualization concepts. Plan on watching one video per week and visiting two useful links per week.

Outcomes

Visualization is an art as well as a science. It also requires professional presentation abilities. Consider two websites that have the same content, one that is plain and one that is beautiful to look at and find information on quickly. That is an example of visualization. In this course you will learn:

- Researching and finding raw data
- Understanding what information visualization is and what it is not
- Learning to use Google API visualization tools
- Learning to use Google document tools in conjunction with visualization tools
- Learning Tableau Public
- Learning to use Excel as a practical tool for data formatting and visualization
- Learning to setup and use a portable web server to host your visualizations on any computer
- Publishing your visualization on the web
- Learning to create beautiful presentations to go along with visualization
- Learning to use audio/video tools to create video presentations
- Research and learn additional visualization tools

Participation

Whether you are in class or online, you are expected to participate. If in class, you are to present your ideas and share your knowledge with your classmates. Online and on-campus students are to participate in the Discussion Forums provided online. These forums are to be viewed daily. You are to post questions there and also try to help your classmates by answering their questions.

Attendance Policy

Departmental policy requires students to take exams at the scheduled time and place, unless there are truly compelling circumstances supported by appropriate documentation. Except in such circumstances, failure to attend 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.

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 (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, or in person - not in the public forums 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.

**Email Etiquette**

In the age of technology, when most forms of communication are electronic, it is important to adopt a proper etiquette to communicate with one another. It is asked that students use salutation (Dr., Professor, etc.) when sending emails to their instructors and also make sure to SIGN their name at the end of the email. Students must also indicate which class they are in. The instructors reserve the right NOT to reply to emails that are not properly addressed or do not have a signature. Students should also use their GMU email for any correspondence with the instructors.

**Be sure to check your emails daily including the morning of the class.**

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

On admission to Mason, students agree to comply with the requirements of the GMU Honor System and Code1. 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. Dean Griffiths has mandated a "zero tolerance" policy for plagiarism within The Volgenau School. The Instructor reserves the right to use manual and/or automated means (including such services as Turnitin.com) 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.