VOLGENAU SCHOOL OF ENGINEERING

GEORGE MASON UNIVERSITY

Department of Information Sciences and Technology

IT 322: Health Data Challenges

Course Syllabus

Spring 2018

This syllabus contains information common to all sections of IT 322 for the Spring 2018 semester. For each section, a customized syllabus with information specific to that section will be made available to registered students via the Blackboard Learning System.

Logistics

Detailed information on all IT 322 sections offered in the Fall semester including the day, time, location, instructors' names and their contact information is available through the Schedule of Classes posted on PatriotWeb.

Course Description

> **IT   Information Technology**
> **322   Health Data Challenges (3:3:0)**
>
> *IT 214, STAT 250 or STAT 344*
>
> Covers methodology and tools used to work with health data structures supporting organizations' needs for reliable data that are captured, stored, processed, integrated, and prepared for further querying, decision making, data mining and knowledge discovery for a variety of clinical and organizational purposes. Data security and privacy, data standards, data interoperability, health information exchange, and big data analytics are discussed.

From http://catalog.gmu.edu/

Prerequisites

The prerequisites for this course are IT 214, STAT 250 or STAT 344. A grade of "C" or better **must** be achieved in the prerequisite courses **before** a student is qualified to take this course. The 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 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

For many businesses, processing data and deriving useful information from it is the key component of their corporate strategy and crucial to their profitability. Many healthcare organizations are transitioning from relying on generic reports and dashboards to developing powerful analytic applications that drive effective decision-making throughout an organization. This course is intended to develop understanding of healthcare analytics fundamentals, introduce students to currently available technologies and tools, and examine typical applications of those technologies to real-world situations.

Student Outcomes

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

- Understand how healthcare analytics can be used for quality and performance improvement
- Define healthcare quality and value
- Use basic statistical methods and control chart principles for data analysis
- Work efficiently with complex healthcare data and immediately participate and contribute as a data science team member on big data and other analytics projects by:
  - Deploying a structured lifecycle approach to data science and big data analytics projects
  - Reframing a business challenge as an analytics challenge
  - Appling analytic techniques and tools to analyze big data, create statistical models, and identify insights that can lead to actionable results
  - Selecting optimal visualization techniques to clearly communicate analytic insights to business sponsors and others
  - Using tools such as R and RStudio, MapReduce/Hadoop, in-database analytics, and window and MADlib functions
- Explain how advanced analytics can be leveraged to create competitive advantage and how the data scientist role and skills differ from those of a traditional business intelligence analyst

List Of Topics

- Fundamentals of Healthcare Analytics
- Developing an Analytics Strategy to Drive Change
- Defining Healthcare Quality and Value
- Data Quality and Governance
- Working With Data
- Developing and Using Effective Indicators
- Leveraging Analytics in Quality Improvement Activities
- Basic Statistical Methods and Control Chart Principals
- Advanced Analytics in Healthcare
- Becoming an Analytical Healthcare Organization
- Introduction to Big Data Analytics
- Data Analytics Lifecycle
- Introduction to R programming
- Statistical Hypothesis Testing
- Visualization in R using Rattle GUI library
- Introduction to Database Concepts
- Working with Structured Query Language (SQL)
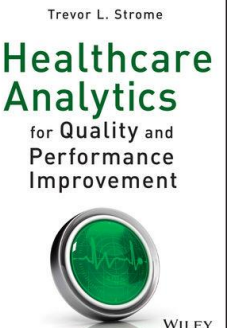- Introduction to NoSQL
- Hadoop Fundamentals

References

Textbooks

There are two required textbooks for this course:

1. *Healthcare Analytics for Quality and Performance Improvement* by T. Strome
2. *Data Science and Big Data Analytics* by EMC

You need to purchase **one** book only - *Healthcare Analytics for Quality and Performance Improvement* (see details below). The second book, *Big Science and Big Data Analytics*, is an "open-source" book and will be provided to registered students via the Blackboard Learning System.

Trevor L. Strome **Healthcare Analytics** for **Quality** and **Performance Improvement** WILEY	*Healthcare Analytics for Quality and Performance Improvement* by Trevor L. Strome Hardcover: 226 pages Publisher: Wiley; 1 edition (October 7, 2013) ISBN-10: 1118519698 ISBN-13: 978-1118519691 Publisher's web-site: http://www.wiley.com/

Faculty and Staff

IT 322 Course Coordinator:

> **Vivian Motti**
> Email: vmotti@gmu.edu
> Office hours: TBA

IT 322 Course Instructor:

> **Prof. Rupen Shah**
> Email: rshah13@gmu.edu
> Office hours: Wednesday 6.15 – 7.15 Manassas campus

IT 322 Teaching Assistants:

TBA

Administrative Support

Fairfax campus
> **Patty Holly**
> Engineering Building, 5400
> Phone: 703-993-3565

Prince William campus
> **Cindy Woodfork**
> Bull Run Hall, Suite 102
> Phone: 703-993-8461

<u>**Grading**</u>

Grades will be awarded in accordance with the Mason 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:

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**

* 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 Concentrations – see http://www.gmu.edu/catalog/courses/it.html for more information on those courses.

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

Students are responsible for checking the currency of their grade books. Grade discrepancies must be brought to instructor's attention within one week of assignment submission and 48 hours of exam submission.

Final grades will be determined based on the following components:

Quizzes	10%
Homeworks	15%
Labs	10%
Midterm Exam	30%
Final Exam	35%

These components are outlined in the following sections.

Quizzes

Quizzes will be assigned every week. Each quiz is to be prepared and submitted as specified by the Instructor.

Labs

Labs will be assigned each class. Each lab is to be prepared and submitted as specified by the Instructor.

Mid-term Test

Midterm Exam will be conducted during the scheduled class session 7 and will be based on topics addressed in Classes 1-6. Midterm exam will be "closed book, closed notes" – no reference materials other than those provided with the exam paper will be permitted.

NET Session: The Mid-term exam will NOT be online. It would be taken in person in class. Proof of ID required. The location and time of the exams would be announced during the semester. If the student cannot attend the exam due to schedule conflicts, he/she may take the exam during the same week at Fairfax Campus at a date and time established by the instructor.

Final exam

The final exam will be held during the scheduled final exam session (see http://registrar.gmu.edu) and will be based on topics addressed throughout the entire course. The final exam will be "closed book, closed notes" – no reference materials other than those provided with the exam paper will be permitted. Final exams will be retained by the Department of Information Sciences and Technology and will not be returned to students.

NET Session: The midterm exam and the final exam will NOT be online. Exams will be held during the scheduled exam sessions. It would be taken in person in class. Proof of ID is required. The location and time of the exams would be announced during the semester. If the student cannot attend an exam due to schedule conflicts, he must contact the instructor in advance to schedule an alternative date and time for the exam.

No make-up for any activity including exams, unless arranged in advance. Only in special cases, such as medical problems and family emergency, make-ups and late assignments may be allowed with verifiable proof. Arrive promptly to exams. Late students may not be admitted.

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.

Schedule

A detailed schedule will be published on Blackboard. As many factors may affect the development and progress of a class, the instructor reserves the right to alter the schedule as may be required to assure attainment of course objectives. The 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 dropping, adding the course etc. are available via http://registrar.gmu.edu/calendars/

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 in in-class sections are expected to attend each class, to complete any required preparatory work 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 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 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.

NET Version attendance: During each week the students must perform all the requirements published for that week. A detailed week-by-week schedule of classes will be published on the net version of the course.

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 classroom.

Electronic devices are potential distractions in the classroom environment. Cell phones, pagers and other handheld devices must be turned off or set to "silent" mode and not used while class is in session. Laptop computers and similar devices may be used only if such use is directly related to the classroom activity in progress – for some activities the Instructor may require that such devices not be used in order to maximize student engagement.

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

When sending an e-mail to the instructor, please include the following:

- **Course number**
- **Section number**
- **Your full name**

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 IST 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 George Mason University, students agree to comply with the requirements of the Mason 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. The Instructor reserves the right to use manual and/or automated means (including such services as SafeAssign.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.

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.

- 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.

Students may seek assistance with assigned work (and are encouraged to do so if they feel the need), **provided**:

- The directions for the assigned work do not prohibit such assistance.

- Such assistance is acknowledged in the submitted work, clearly identifying the person(s) giving assistance and the nature of the assistance given.

- Any work to be submitted is prepared entirely an exclusively by the student submitting it. Students are expressly prohibited from sharing any assessable work for this course in any manner with other students (except students assigned as Teaching Assistants or Undergraduate Peer Mentors to this course and the student's section), unless all students involved have had their work graded and returned by the Instructor, or the Instructor has explicitly approved such sharing.

NET Sections only:

For the net section you will need to have the following additional resources:

- Computer with fast internet connection

- Microphone and web camera (optional)