Course Syllabus: AIT-580 Analytics: Big Data to Information [Credits: 3], Fall 2020, Sections 002, 004

Instructor: Prof. Harry J. Foxwell, hfoxwell@gmu.edu, 703-304-3838 (mobile/text)

Catalog Description:

This course provides an overview of Big Data Analytics concepts, tools, and methods, and their use in commercial, scientific, governmental, social, and other application areas. Topics include technical and non-technical disciplines required to collect, process and interpret enormous amounts of data available from numerous public sources. Course content includes discussions of, and hands-on practice with technologies involved in collecting, mining, analyzing, visualizing data, and interpreting the results. Additional topics covered include system infrastructure and acquisition, law and policy, and ethical issues related to data collection.

This course is currently one of the core requirements for the IT Management concentration for the MS in Applied Information Technology; it can also be taken as an elective for the MS/AIT concentrations.

Prerequisite(s): Graduate Standing
Recommended recent previous course work: Programming; Statistics

The course includes but is not limited to the following topics, and emphasizes the technical aspects of Data Analytics projects:

- characteristics and representations of data
- principles of data analysis
- tools for conducting data analytics research
  - querying data using SQL, R, Python, and other software tools
- data visualization concepts and methods
- roles of the Data Scientist and the Data Analytics Project Manager
- architecture of big data analytics systems
- Public Big Data resources
- Big Data Use Cases in Social Media, Government, and Industry
- data governance, security, curation, privacy, legal, and ethical issues
- machine learning, AI, and predictive analytics

Course assignments include:

- Big Data case studies
- Topic-specific readings and exercises
- Discussions of Big Data Analytics topics
- Lab exercises using Data Analytics software
- Data Analytics projects

Learning Objectives: Upon successful completion of this course, you can demonstrate:

- competence in identifying data types and relevant analytical methods
- how to prepare and collect data for analysis
- how to select and use analytical tools (R, Python, SQL, and others)
- how to conduct and report a data analytics research project
- understanding of big data concepts, vocabulary, and common use cases

Required Course Material:
Required Textbook:

- **Introduction to Data Mining and Analytics**, K. Jamsa, 2021, Jones & Bartlett Learning
  - Digital version: [https://www.jblearning.com/catalog/productdetails/9781284218688](https://www.jblearning.com/catalog/productdetails/9781284218688)
  - There will be assignments from the textbook

Recommended texts:

- **Practical Statistics for Data Scientists**, P. Bruce, 2020, O'Reilly Media
- **Python for Data Analytics 2nd Edition**, W. McKinney, 2018, O'Reilly Media

Computer and Technical Requirements:

Students should have access to a Mason-recommended laptop computer (including a webcam, and Internet access). You will need computer speakers or headphones to listen to recorded content. A headset microphone is recommended for live audio sessions using course tools like Blackboard Collaborate Ultra. Also see [https://labs.vse.gmu.edu/index.php/Main/RemoteWorkStudents](https://labs.vse.gmu.edu/index.php/Main/RemoteWorkStudents)

Other Recommended Resources:

- **Books**:
    - [https://www.nostarch.com/bookofr](https://www.nostarch.com/bookofr)
  - An Introduction to Statistical Learning with Applications in R, G. James, et al., 2016 Springer
    - [http://www-bcf.usc.edu/~gareth/ISL/index.html](http://www-bcf.usc.edu/~gareth/ISL/index.html)

- **Tutorials**:
  - A variety of tutorials (SQL, R, Statistics, Python, etc.) are available at [https://its.gmu.edu/service/linkedInlearning/](https://its.gmu.edu/service/linkedInlearning/) and at [https://dsc.gmu.edu/](https://dsc.gmu.edu/)
  - Seeing Theory: [http://students.brown.edu/seeing-theory/](http://students.brown.edu/seeing-theory/)
  - The Statistics Tutor’s Quick Guide to Commonly Used Statistical Tests
    - [www.statstutor.ac.uk/resources/uploaded/tutorsquickguidetostatistics.pdf](http://www.statstutor.ac.uk/resources/uploaded/tutorsquickguidetostatistics.pdf)

There will be required textbook and Web-based readings and tutorials, along with recommended resources to help you learn. These will be listed on the course Blackboard site's Course Resources link and within individual assignment links.

Other Expectations:

- Some familiarity with…
  - Linux operating system
  - Programming concepts
    - using R, Python, Tableau, other data analytics tools
  - Basic statistics
- ...if you're not:
  - self study, tutorials, books, etc are available
  - ask lots of questions!

Course dates: Week of **August 24** through week of **December 7**

- Mason Academic Calendars
- Religious Holiday Calendar

AIT-580 **ALL SECTIONS ONLINE:**

Classroom Location: Online/Blackboard

There will be weekly online meetings using Blackboard Collaborate Ultra and other collaboration tools (e.g., Webex, Zoom).
These online meetings will be recorded. If you are unable to attend a scheduled online meeting for your section you are welcome to attend a different section's meeting; the same content will be covered in each of the weekly sessions.

**Section Meeting Times:**

- 002: Mondays @7:30pm
- 004: Tuesdays @7:30pm

**Blackboard:** [mymason.gmu.edu](http://mymason.gmu.edu)

*All* assignments, class announcements, schedules, files and presentations will use Blackboard.

**Professor's Email:** hfoxwell@gmu.edu

*Sending email: In the Subject line of your email, use the prefix AIT580-Section#:*

For example: Subject: AIT580-002: Question about Assignment #1

University policy: *all* course related communications must use faculty and student Mason email addresses.

**Office location:** Research Hall 434 *(currently closed due to University virus response)*

**Online Office hours:** *By appointment; TBD*

**Phone:** 703-304-3838 (mobile)

**Text:** 703-304-3838 (be sure to identify yourself as a student and what section you are in)

**Graduate Teaching Assistant (GTA):**

Sai Sumanth Sriram, ssriram2@masonlive.gmu.edu (PhD student)

GTA Office Hours: Call or email the GTA to arrange appointment day/time/location

The GTA assists with understanding assignments and with grading.

**Grading Policy**

Student grades will be determined based on general assignments & lab exercises, case studies and reports, and the final project:

<table>
<thead>
<tr>
<th>Grade Component</th>
<th>Weight</th>
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<tbody>
<tr>
<td>General assignments &amp; lab exercises</td>
<td>35%</td>
</tr>
<tr>
<td>Case studies and reports</td>
<td>25%</td>
</tr>
<tr>
<td>Final project</td>
<td>40%</td>
</tr>
</tbody>
</table>

**Grading Interpretation Guidelines:** Some grade components are evaluated *subjectively*:

- **A:** *consistently above and beyond* the course/assignment requirements
- **B:** *meets and occasionally exceeds* the course/assignment requirements
- **C:** *minimally meets* the course/assignment requirements
- **F:** *fails to meet* the course/assignment requirements

**Grade Values:**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Value</th>
</tr>
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<tbody>
<tr>
<td>A</td>
<td>100-95</td>
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<tr>
<td>A-</td>
<td>95-90</td>
</tr>
<tr>
<td>B+</td>
<td>90-85</td>
</tr>
<tr>
<td>B</td>
<td>85-80</td>
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</tbody>
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Honor Code

All work performed in this course will be subject to GMU's Honor Code. Students are expected to do their own work in the course unless a group project is approved by the instructor. In papers and project reports, students are expected to write in their own words, rather than cutting-and-pasting from sources found on the Internet. The goal of assignments is to demonstrate what you have learned, not what you can google. When you do use text or graphical material from books, articles, and the Web, enclose the material in quotes and provide a complete and proper reference. If a paragraph is used then it should be indented in the text (both left and right margins). In-text citation can use the [Author, Year] format or the Numerical [1] format which must refer to the source in the References section of your assignment. Use Chicago Manual of Style for guidance on citation style, usage, etc. (Don't buy the big CMS. See the smaller A Manual for Writers by Kate Turabian). Regardless of the citation method used, proper citations always include: Author(s), Title, Publication Date, Publisher, and URL (if from the Web, along with Last Accessed Date). BlackBoard's SafeAssign service will be used to review selected student assignments. You can use Zotero for help with proper citations.

NOTES:

- [Wikipedia is not a primary reference](#). Use it for initial discovery, but use and cite primary references (which Wikipedia itself might use).
- If you need assistance with writing an assignment, you can get assistance here: [http://writingcenter.gmu.edu](http://writingcenter.gmu.edu)
- The first item Prof Foxwell looks at in major assignments is your References section!
- Any programming/coding assignments must adhere to the CS Honor Code.

Assignments

Unless otherwise specified, all assignments must be submitted to Blackboard as PDF files. Do not email them to the instructor or TA unless you are having difficulty with Blackboard. Generally, you are permitted two submission attempts (for minor corrections if needed); if you do resubmit an assignment, let the TA know in case the first attempt was already graded.

Use the following filename format: Lastname-AssignmentName.pdf. For example: Smith-Assignment1.pdf

Class Participation:

Contribute actively, and participate in online sessions and discussion topics and other activities posted on Blackboard. Online behaviour: [http://www.albion.com/netiquette/corerules.html](http://www.albion.com/netiquette/corerules.html)

Other Notes:

- There will be significant reading assignments along with the assumption that you have actually read them.
- Lecture slides from instructor's material will be posted on Blackboard; lecture material will be asked about on assignments and on final project.
- Course content:
  - Some material you may already know (good! that's review!)
  - Some material you may have learned earlier and have forgotten (good! you'll be reminded)
  - Some material you may know more than the instructor (good! share it!).
- **Call or email the instructor if you anticipate being unable to meet any course requirements in a timely manner.**
  - See [https://ds.gmu.edu/](https://ds.gmu.edu/) for any special accommodations
  - **IF YOU NEED HELP, ASK FOR IT!** : [https://caps.gmu.edu/](https://caps.gmu.edu/)
  - Family Educational Rights and Privacy Act of 1974 (FERPA)
• Personal Safety and Security: The Mason Alert system provides emergency information of various sorts. Students can sign up for it by visiting the website https://alert.gmu.edu.
• Computer and IT Security: Visit GMU's IT http://itu.gmu.edu/ web sites regularly, and watch for & respond to any security notifications. Norton AntiVirus Software is free to download for all GMU students/faculty/staff.