COURSE:
AIT 664: Information: Representation, Processing and Visualization

DESCRIPTION:
This course is aimed at educating information professionals on basic concepts to understand and analyze the design of information systems. The course material focuses on key conceptual questions about information such as what is information and what is knowledge, what are differences and boundaries in representing and processing information for humans and machines, what is information theory, what are basic techniques to organize, and structure information, and how to interact with information through basic visualization methods.

OBJECTIVES:
The course objectives for student learning outcomes include:
- Ability to apply concepts of data, information and knowledge from an interdisciplinary perspective
- Understand representation limits of information for machine processing
- Acquire skills to apply data mining techniques to discover novel informative patterns
- Explain and apply the types of information visualization

PREREQUISITES:
- Graduate Standing
- Recommended Prerequisite: AIT 524 or permission of department

GRADING:
Weight of grade components are:
Mid-term: 15%, Final Group Project: 45%, Group Seminar: 10%, Assignments: 15%,
Participation (measured through your engagement in Blackboard Discussions & performance in Quizzes): 15%

Grading scale for numerical scores is:

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Numerical Range</th>
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<tbody>
<tr>
<td>A+</td>
<td>97-100</td>
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<tr>
<td>A</td>
<td>93-96</td>
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<tr>
<td>A-</td>
<td>90-92</td>
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<tr>
<td>B+</td>
<td>87-89</td>
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<tr>
<td>B</td>
<td>83-86</td>
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<tr>
<td>B-</td>
<td>80-82</td>
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<tr>
<td>C</td>
<td>70-79</td>
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<tr>
<td>F</td>
<td>0 – 69</td>
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INSTRUCTOR & OFFICE HOURS:
- Check your course section on Blackboard.
- Office hours by appointment, please email to your course section instructor.

COURSE POLICIES:
The requests for late assignment submissions or make-up exams will be solicited for health reasons, or extreme circumstances. An extra credit opportunity will be provided to improve grades of the mid-term exam.
REQUIRED READINGS AND REFERENCES:
The following books are required that have free e-versions available for reading. In addition, relevant online tutorials, articles, and tool references will be provided in the class:


COURSE OUTLINE:
Here is the tentative semester plan for the topics to be covered each week:

<table>
<thead>
<tr>
<th>Week</th>
<th>Contents</th>
<th>Book (Bx), Chapter (ch-y)</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>What is Information: Historical Multidisciplinary Perspective; Information Systems</td>
<td>B1, ch-1 &amp; 2</td>
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<td>2</td>
<td>Data-Information-Knowledge-Wisdom (DIKW) Model; Project Announcement and Guidance</td>
<td>B1, ch-3; Web references</td>
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<td>3</td>
<td>Multimodal Information Representation and Data Biases</td>
<td>B2, ch-2 &amp; 13; Web references</td>
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<tr>
<td>4</td>
<td>Human Information Processing: Information Processing Theory; Human-Computer Interaction</td>
<td>B1, ch-9 &amp; 10; B2, ch-2</td>
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<td>5</td>
<td>Machine Information Processing: Types of Data Mining Systems</td>
<td>B2, ch-1; B1, ch-3</td>
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<td>6</td>
<td>Processing Information: Information Theory and Applications</td>
<td>B2, ch-8; Web references</td>
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<tr>
<td>7</td>
<td><strong>Mid-Term; Project Progress Discussion</strong></td>
<td></td>
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<tr>
<td>8</td>
<td>Processing Information: Structured Representation and Data Preprocessing</td>
<td>B1, ch-4; B2, ch-3</td>
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<tr>
<td>9</td>
<td>Processing Information: Methods for Mining Informative Patterns and Rules</td>
<td>B1, ch-5; B2, ch-6</td>
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<tr>
<td>10</td>
<td>Processing Information: Introduction to Association Rules</td>
<td>B1, ch-7; B2, ch-6</td>
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<tr>
<td>11</td>
<td>Processing Information: Introduction to Clustering Methods</td>
<td>B1, ch-7; B2, ch-10</td>
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<tr>
<td>12</td>
<td>Info Visualization: Data Types, Trees &amp; Networks</td>
<td>B1, ch-9 &amp; 10; B2, ch-2</td>
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<tr>
<td>13</td>
<td>Info Visualization: Visual Analytical Tools</td>
<td>Web references</td>
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<tr>
<td>14</td>
<td>Group Project Presentations - session 1</td>
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<tr>
<td>15</td>
<td>Group Project Presentations – session 2</td>
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INSTRUCTION PLAN:

Given the special circumstances of the COVID-19 pandemic, we have switched to online instruction mode for this course, however, with creatives ways to improve student engagement and learning outcomes. The class will include weekly sessions in both asynchronous mode (a pre-recorded lecture material) and synchronous mode (live lecturing, assignment discussion, and open Q&A, during the same time and day as per the original schedule, before switching to the online instruction mode.)

a.) Basic Course Technology Requirements:

- Activities and assignments in this course will regularly use the Blackboard learning system, available at [https://mymason.gmu.edu](https://mymason.gmu.edu). Students are required to have regular, reliable access to a computer with an updated operating system (recommended: Windows 10 or Mac OSX 10.13 or higher) and a stable broadband Internet connection (cable modem, DSL, satellite broadband, etc., with a consistent 1.5 Mbps [megabits per second] download speed or higher. You can check your speed settings using the speed test online.)

- Synchronous session activities and assignments in this course will regularly use web-conferencing software (Blackboard Collaborate). In addition to the requirements above, students are required to have a device with a functional camera and microphone. In an emergency, students can connect through a telephone call, but video connection is the expected norm.

b.) Course Materials and Student Privacy:

Video recordings of class meetings that are shared only with the instructors and students officially enrolled in a class do not violate FERPA or any other privacy expectation. Video recordings that only include the instructor (no student names, images, voices, or identifiable texts) may be shared without violating FERPA (but see below, University Policies: Privacy, for some qualifications and recommendations.)

All course materials posted to Blackboard or other course site are private to this class; by federal law, any materials that identify specific students (via their name, voice, or image) must not be shared with anyone not enrolled in this class. Please note:

- Video recordings — whether made by instructors or students — of class meetings that include audio, visual, or textual information from other students are private and must not be shared outside the class.

- Live video conference meetings (e.g. Blackboard Collaborate session) that include audio, textual, or visual information from other students must be viewed privately and not shared with others in your household or recorded and shared outside the class.

c.) Health Safety Requirements:

While this course’s activities will be conducted online, but if for any reason, a student wants to go to the campus, then, each student going to campus for any reason is required to take Safe Return to Campus Training prior to visiting campus. Training is available in Blackboard ([https://mymason.gmu.edu](https://mymason.gmu.edu)). Students are required to follow the university’s public health and safety precautions and procedures outlined on the university Safe Return to Campus webpage ([www2.gmu.edu/safe-return-plan](http://www2.gmu.edu/safe-return-plan)).
UNIVERSITY POLICIES:

a.) Academic Integrity

The integrity of the University community is affected by the individual choices made by each of us. Mason has an Honor Code with clear guidelines regarding academic integrity. Three fundamental and rather simple principles to follow at all times are that:

(1) all work submitted be your own;

(2) when using the work or ideas of others, including fellow students, give full credit through accurate citations; and

(3) if you are uncertain about the ground rules on a particular assignment, ask for clarification.

No grade is important enough to justify academic misconduct. Plagiarism means using the exact words, opinions, or factual information from another person without giving the person credit. Writers give credit through accepted documentation styles, such as parenthetical citation, footnotes, or endnotes. Paraphrased material must also be cited, using the appropriate format for this class. A simple listing of books or articles is not sufficient. Plagiarism is the equivalent of intellectual robbery and cannot be tolerated in the academic setting. If you have any doubts about what constitutes plagiarism, please see me.

b.) Disability Accommodations

Disability Services at George Mason University is committed to upholding the letter and spirit of the laws that ensure equal treatment of people with disabilities. Under the administration of University Life, Disability Services implements and coordinates reasonable accommodations and disability-related services that afford equal access to university programs and activities. Students can begin the registration process with Disability Services at any time during their enrollment at George Mason University. If you are seeking accommodations, please visit http://ds.gmu.edu/ for detailed information about the Disability Services registration process. Disability Services is located in Student Union Building I (SUB I), Suite 2500. Email: ods@gmu.edu | Phone: (703) 993-2474

c.) Diversity and Inclusion

George Mason University has strong commitment to diversity and inclusion, to create a learning environment that fosters respect for people across identities. We welcome and value individuals and their differences, including gender expression and identity, race, economic status, sex, sexuality, ethnicity, national origin, first language, religion, age and ability. We encourage all members of the learning environment to engage with the material personally, but to also be open to exploring and learning from experiences different than their own. Please check the Mason’s Non-Discrimination Policy here: https://universitypolicy.gmu.edu/policies/non-discrimination-policy/

d.) Sexual Harassment, Sexual Misconduct, and Interpersonal Violence

George Mason University is committed to providing a learning, living and working environment that is free from discrimination and a campus that is free of sexual misconduct and other acts of interpersonal violence in order to promote community well-being and student success. We encourage students who believe that they have been sexually harassed, assaulted or subjected to sexual misconduct to seek assistance and support. University Policy 1202: Sexual Harassment and Misconduct (check here: https://universitypolicy.gmu.edu/policies/sexual-
harassment-policy/) speaks to the specifics of Mason’s process, the resources, and the options available to students.

As a faculty member and designated “Responsible Employee,” I am required to report all disclosures of sexual assault, interpersonal violence, and stalking to Mason’s Title IX Coordinator per university policy 1412 (check here: https://universitypolicy.gmu.edu/policies/reporting-of-clery-act-crimes-andor-prohibited-sexual-conduct/). If you wish to speak with someone confidentially, please contact the Student Support and Advocacy Center (703-380-1434) or Counseling and Psychological Services (703-993-2380). You may also seek assistance from Mason’s Title IX Coordinator (703-993-8730; titleix@gmu.edu).

e.) Privacy

Student privacy is governed by the Family Educational Rights and Privacy Act (FERPA) and is an essential aspect of any course. Instructor responsibilities with respect to student privacy are an important consideration when it comes to faculty and student digital communication.

Students must use their MasonLive email account to receive important University information, including communications related to this class. I will not respond to messages sent from or send messages to a non-Mason email address.

f.) Recording and/or sharing class materials

Recording: Some student recording of class lectures or materials for personal use, especially those that include only the faculty member’s information (e.g., no identifiable names, voices, or images of other students), is generally permitted. Even sharing of some of this material may be allowable, but always consult your professor first.

Sharing of materials: it is limited by what those materials contain and where they are shared:

- Sharing of class materials that contain identifiable student information is limited by FERPA (see “Fall 2020 Policies” on this page for statements about recordings or streaming of class meetings).
- Some kinds of participation in online study sites violate the Mason Honor code: these include accessing exam or quiz questions for this class; accessing exam, quiz, or assignment answers for this class; uploading of any of the instructor’s materials or exams; and uploading any of your own answers or finished work. Always consult your syllabus and your professor before using these sites. A short video for easier explanation is provided by the Office of Academic Integrity here: https://youtu.be/oKbTrgBCN7c
- The unauthorized sharing of any of your materials outside the class would violate important ethical standards and are not permitted without consultation with the instructor.