Catalog description: Data visualization is the communication of information using graphical representations. Graphics, imaging, and basic principles of visual design will be used to transform raw data into a visual form. Visualizations, the tangible end products of this course, will enable the viewer to observe, browse, make sense, and understand the information contained in the data.

Prerequisites: None

Required materials:

- Portions from numerous hard copy texts will be posted on D2L and assigned
- Portions from e-books will be linked on D2L and assigned
- Access to the current version of Microsoft Office Excel. If you are using this software on your laptop, you should install it yourself.
- Access to Tableau Desktop (license key will be sent to you)
- Access to Tableau Public. All Tableau projects will be submitted to the public version.

Overview: Data visualization has a long and rich history. To the Ancients, visualization was needed to track positions of positions of stars and other celestial bodies and to make maps to aid in navigation and exploration. William Playfair introduced histograms and barcharts into the study of statistics in 1786. John Tukey, in the 1960s, championed exploratory data analysis, an area of statistics that looks for patterns rather than confirming hypotheses. His work encouraged the development of statistical packages which have evolved into the industry standards of today. Most recently, advances in statistical computation and the availability of user friendly software packages for graphic display have provided tools for visualization. Today, data is collected on many aspects of our everyday life. Routinely, organizations need to assimilate and process some of this data to gain knowledge and information. Visualization is one tool to do so. And good data visualization can lead to good analysis.¹ This course focuses creating good visualizations which enable the reader to “see the story” of the data.

Learning Outcomes: The following all-college mission objectives are met in this course:

1. to reason logically and evaluate critically. Students assess and evaluate data visualizations throughout the course. This objective is assessed in every assignment.

2. to communicate effectively. Students are taught to communicate via data visualizations. Formative assessment occurs during the in class discussions. Summative assessment occurs during the quizzes and projects.

3. to think creatively, and appreciate aesthetic expressions. Final project will be assessed for creativity and application of the design principles taught.

4. to demonstrate intellectual curiosity. Students are expected to find data of interest to them for the final project.

The following computer science discipline objectives are met in this course:

2. Develop intellectual curiosity and a commitment to lifelong learning. Students are expected to find data of interest to them for the final project.

3. Develop problem solving skills: creative imagination, logical reasoning, critical evaluation, mathematical modeling and common sense. This objective is assessed in every assignment.

4. Develop effective communication skills. This objective is assessed in every project.

7. Generate modes of analytical thinking that can be extended to all areas of human thought and exploration. This objective is assessed in every assignment.

Objectives: At the end of this course, students will be able to

1. Discuss milestones in the history of data visualizations and explain those contributions to today’s work

2. Create and analyze basic one and two variable graphs including boxplots and scatterplots in Excel

3. Critically evaluate visualizations and suggest improvements and refinements

4. Explore data using visualizations

5. List and explain advantages and limitations of common charts and graphs

6. Apply a structured design process to create effective visualizations

7. Use Tableau to create appropriate visualizations of data linked to your discipline or avocation

Expectations: On the top of the list of 10 things that require zero talent are:

1. be on time

2. work ethic

3. effort.

http://i.imgur.com/P5oNdsC.jpg Accessed: January 4, 2019
Those top three will take you far in this class and in life (and I suggest reading the next seven) even if your knack for creativity (definitely needed in this class) is not amazing.

But I have a few more, perhaps more specific for you in this course:

- **Class attendance:** This course will have both interactive lecture and discussion classes and computer lab classes. Typically, the lecture classes will be Tuesdays and consist of new material delivered via lecture, discussion of visualizations techniques and how they were applied, and (potentially) quizzes on previous material. Typically, classes on Thursday will be lab based and consist of applying or further exploring material from the lecture portion.

  **During class** I expect all computers (or other such devices) to be focused on coursework. You should bring your laptop to class daily or borrow one from the library staff prior to the start of class. Your device should be connected to the hub’s monitor and turned on by 9:20 every day unless told otherwise.

  1. Be prepared to start, signed in to D2L and, if told ahead of time, with software packages and files opened no later than three minutes after the class period is scheduled to begin.
  2. Turn off all other notifications, devices and web sites except what we are using that day.
  3. When you are given the chance to explore other web sites related to the current work during lab, you should not be visiting social media, news or sports sites unless that material is directly related to the current project. **Students who do NOT remain on task during the class time should not expect help from me outside of the class period.**

- **Makeup** quizzes, presentations and exams.

  1. Make up quizzes including for excused absences. (See the 18-19 undergraduate catalog pg. 55 for a list of excused absences.)
  2. Presentations and Exams may be made up as detailed in undergraduate catalog. Student athletes must email me the roster with their name on it prior to the class that will be missed for an excused absence.

**Integrity:** Central to the purpose and pursuit of any academic community is academic integrity. All members of the Westminster community, including students, faculty, staff, and administrators, are expected to maintain the highest standards of honesty and integrity, in keeping with the philosophy and mission of the College. Academic dishonesty is a profound violation of this code of behavior.

The paragraph above is taken from the Westminster College 2018-19 Undergraduate Catalog, page 60. It is imperative that you never submit the work of others as though it is your own work nor should you ever allow anyone else to use your work without giving credit to you. The penalty for academic dishonesty in this class is minimally the grade of 0 on the assignment and, except for unusual circumstances, a grade of F for the course. Any event of academic dishonesty is reported to the Dean of the College. Other details of violations and consequences are given in the Catalog.
Group work is expected. You are expected to discuss problems together and reach conclusions together within your own group. In this class, I will consider it is a form of dishonesty for one group to discuss their work with members of another group. It is also a form of dishonesty to encourage or allow such practices on the part of others.

Accessibility: Westminster College actively strives for the full inclusion of all our students. Students with disabilities who require access solutions for environmental or curricular barriers should contact Faith Craig, Director of Disability Resources, located in 414 Thompson Clark Hall.
Phone: 724-946-7192
e-mail: craigfa@westminster.edu

Assessment: Evaluative assessment will be based on a point system and consist of

1. Graded homework and papers
2. Quizzes
3. Projects

Assessment: The following three methods will be used to assess the objectives of this course.

- **Class assignments:** There will short in-class computer lab assignments which will be started in class and completed by the next class period. If these assignments are given to a pair or group of students, each student in the group will receive the same grade.

- **Quizzes:** Closed book quizzes, either on-line or during class, will assess your understanding of both the lecture and lab work.

- **Projects:** Several projects will be assigned over the semester. Details of each project’s requirements will be given at least one week prior to the due date. Generally, each project will be done with an assigned group, demonstrate understanding of specific techniques and objectives and be presented to the class. The projects increase in both difficulty and total points.

- For every unexcused absence beyond the first one, you will lose 5% from your final percentage. For example, if you have a 82% with 3 unexcused absences your final grade will be recorded as $82 - (3 - 1) \times 5 = 72\%$

The final grade will be calculated as:

$$\frac{\text{total points earned}}{\text{total points possible}} - \text{percentage lost due to absences.}$$

Grade cutoffs will be no higher than A: 93, A-: 90, B+: 87, B: 83, B-: 80, C+: 77, C: 73, C-: 70, D: 60.

See you in class!