INTERNATIONAL MANAGEMENT INSTITUTE, BHUBANESWAR
PROGRAMME NAME: PGDM
COURSE TITLE: Data Visualization & Dashboards
CREDIT: Half credit (1.5 credits)
TERM: V (Sept. to Dec, 2018)

Instructor(s)
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Consultation Hours : Tuesday, 2- 3pm else by appointment (by e-mail)

Course Introduction:

Every day we all are generating and accumulating large volume of data in varied formats, which is putting lot of presure on our relatively constant perceptual and cognitive abilities. Data Visualization provides one means to overcome the challenge of information overload as they say "one picture is worth million words". Data visualization helps in understanding and analyzing the data better, improve comprehension, and decision making. Furthermore, visual representations may also help in engaging more diverse audiences in the process of analytic thinking.

In this course we will study techniques and algorithms for creating effective visualizations based on principles from graphic design, visual art, perceptual psychology, and cognitive science. The course is targeted towards students who are interested in using visualization in their daily work for better and faster interpretation of huge varied data and also who are interested in analyzing data for hidden patterns.

In addition to understanding data, course also focus on representing data in more effective manner in the forms of dashboards and stroyboards.

Learning Outcomes:

This course is designed to provide students with the foundations necessary for understanding and extending the current state of the art in data visualization and dashboards. By the end of the course, students will get:

1. An understanding of the key techniques and theory used in visualization, including data models, graphical perception and techniques for visual encoding and interaction.
2. Exposure to a number of common data domains and corresponding analysis tasks.
3. Practical experience building and evaluating visualization systems.
4. Practical exposure in building dashboards and storyboards.

Course Pedagogy:
The course will be totally application and exercise based. Each session large amount of data from varied source will be used to teach a technique. Course will use Excel, SAP Lumira and Crystal Dashboards.

Course Readings
Course workbook comprising of readings and exercises will be distributed.

Course Evaluation criteria:
Quiz (20%): The quizzes will be based on the course covered in the previous classes. There will be n quizzes (n will be decided by the faculty) spread across the entire course. For final evaluation (n-1) quizzes will be considered. The quiz will test the conceptual understanding of the subject.

Project (20%): Project will be mapped to the learning of the course and is to be done at an individual level.

Assignment (20%): Assignments have to be submitted individual. For every SAP module discussed in the class, students are required to complete the business transaction in SAP system and submit the output/report in the program office as assignment. The faculty will announce the reports/output to be submitted for each assignment.

End Term (40%): End term exam will cover all the topics covered in the course. The end term will cover theoretical concepts as well as hand-on exercises covered in the course.

Certification: SAP-IMI co-branded certification from SAP would be awarded on successful completion of the course.

Academic integrity
a) **Plagiarism** is the use of or presentation of ideas, works that are not one's own and which are not common knowledge, without granting credit to the originator. Plagiarism is unacceptable in IMI and will invite penalty. Type and extent of penalty will be at the discretion of the concerned faculty.
b) **Cheating** means using written, verbal or electronic sources of aid during an examination/ quiz/ assignment or providing such assistance to other students (except in cases where it is expressly permitted by the faculty). It also

includes providing false data or references/list of sources which either do not exist or have not been used, having another individual write your paper or assignment or purchasing a paper for one's own submission. Cheating is strictly prohibited at IMI and will invite penalty as per policies of the Institute.

Session Plan:

Session No.	Topic	Learning Outcomes	Reading
1-2	Introduction to Data Visualization & Visual Perceptions • Basic Charts • Types of Charts • How to Choose the correct chart	LO1	Reading: • Visual Analysis Guidebook • Which Chart or Graph Exercise-1 Assignment-1
3-4	Preparing Data & Data management • Importing Data • Deriving Data using Functions • Creating Calculated Datasets • Creating Hierarchies	LO1 LO2	Readings: • Data Visualization basic principles • 5 Things your Spreadsheet can't do Exercise-2 Assignment-2
5-8	Creating Visualization • Using Different Plots • Geographical Analysis • Product Analysis • Infographics: How to tell a data driven story • Mashups	LO2	Readings: • Designing Great Visualizations Exercise-2 Assignment-3
9-10	Generating Visual Reports & creating story	LO3	Readings: • 5 best practices for telling great stories Exercise-3
11-12	Creating Static Dashboards • What are Dashboards, cockpits & Scorecards	LO4	Readings: How to Build Dashboards

	• Mobile Apps for Analytics		Exercise-4
13-15	Creating & Deploying Interactive Dashboards	LO4	Exercise-5

Assignments

Assignment 1: Visualization Design

Using the data on Antibiotics you need to design a static (i.e., single image) visualization that you believe effectively communicates the data and provide a short write-up (no more than one page) describing your design – why & what. While you must use the data set given, note that you are free to transform the data as per your understanding. Your chart image should be interpretable without recourse to your short write-up. Do not forget to include title, axis labels or legends as needed! As different visualizations can emphasize different aspects of a data set, you should document what aspects of the data you are attempting to most effectively communicate. In short, what story (or stories) are you trying to tell?

In your write-up, you should provide a rigorous rationale for your design decisions. Document the visual encodings you used and why they are appropriate for the data. These decisions include the choice of visualization type, size, color, scale, and other visual elements, as well as the use of sorting or other data transformations. How do these decisions facilitate effective communication?

Data Set: Antibiotics

After the World War II, antibiotics were considered as "wonder drugs", since they were easy remedy for what had been intractable ailments. To learn which drug worked most effectively for which bacterial infection, performance of the three most popular antibiotics on 16 bacteria were gathered.

The values in the table represent the minimum inhibitory concentration (MIC), a measure of the effectiveness of the antibiotic, which represents the concentration of antibiotic required to prevent growth in vitro. The reaction of the bacteria to Gram staining is described by the covariate "gram staining". Bacteria that are stained dark blue or violet are Gram-positive. Otherwise, they are Gram-negative.

Table 1—Burtin's Data

Bacteria	Antibiotic			Gram Staining
	Penicillin	Streptomycin	Neomycin	
Aerobacter aerogenes	870	1	1.6	negative
Brucella abortus	1	2	0.02	negative
Brucella anthracis	0.001	0.01	0.007	positive
Diplococcus pneumoniae	0.005	11	10	positive
Escherichia coli	100	0.4	0.1	negative
Klebsiella pneumoniae	850	1.2	1	negative
Mycobacterium tuberculosis	800	5	2	negative
Proteus vulgaris	3	0.1	0.1	negative
Pseudomonas aeruginosa	850	2	0.4	negative
Salmonella (Eberthella) typhosa	1	0.4	0.008	negative
Salmonella schottmuelleri	10	0.8	0.09	negative
Staphylococcus albus	0.007	0.1	0.001	positive
Staphylococcus aureus	0.03	0.03	0.001	positive
Streptococcus fecalis	1	1	0.1	positive
Streptococcus hemolyticus	0.001	14	10	positive
Streptococcus viridans	0.005	10	40	positive

Assignment-2

Use data visualizations to gain insights into the crime data following the Data Visualization exercise by Paul Hawking of Victoria University (available in your exercise book).

Assignment-3

Build an infographic based on data of your choice. Infographic should communicate findings in a compelling way. For datasets you may refer to Kaggle.com.

Project

To be done in a group of two students.

Model and implement a dashboard for key performance indicators for a company. You may pick up the data set from any of the websites and get this approved with objectives for the dashboard that your team would like to build. Build an analytics mobile app also based on data and Test it on your mobile device. You need to submit a working model.

Project Data set and objectives to be defined and submitted: **October 31**
Project Dashboard design to be submitted by **November 30**
Complete Project in working Model to be submitted by **December 12**