

3. IT 6713 Business Intelligence

IT 6713 Business Intelligence Course Outline and Learning Materials

For complete collection of learning materials, including instructor developed materials, please visit <http://jackzheng.net/teaching/it6713/>

Module 1: Introduction

1. Required reading: use the review questions (Task 1) to guide your readings. Please complete this first before the class.
 - a. A practical introduction of BI by Jared Hillam (Intricity):
<http://www.youtube.com/watch?v=LFnewuBsYiY>
 - b. BI intro video by LearnItFirst (there are some good points which I do agree):
<https://www.youtube.com/watch?v=LhZX0MAYKp8>
 - c. An Overview of Business Intelligence Technology (CACM article provided in D2L). Also accessible at <http://cacm.acm.org/magazines/2011/8/114953-an-overview-of-business-intelligence-technology/fulltext>
2. Lecture notes: use the lecture notes as a reading and learning guide; follow the resources presented in the slides for further information and additional learning.
 - a. Downloadable from <http://www.slideshare.net/jgzheng/business-intelligence-overview-30072359>
3. Additional resources and readings: some more good readings. More can be found in the lecture notes. Find your own resources and conduct your own research if necessary.
 - a. The problem of DIKW: <http://blogs.hbr.org/2010/02/data-is-to-info-as-info-is-not/>
 - b. A Brief History of Decision Support Systems by D.J. Power:
<http://dssresources.com/history/dsshistory.html>
 - c. **The Forrester Wave™: Enterprise Business Intelligence Platforms, Q1 2015**
http://www.sas.com/content/dam/SAS/en_us/doc/analystreport/the-forrester-wave-enterprise-bi-platforms-106893.pdf
 - d. Advanced Analytics and Business Intelligence:
<https://www.youtube.com/watch?v=oNNk9-tmsZY>
 - e. History of BI (casual video with wacky visuals):
https://www.youtube.com/watch?v=_1y5jBESLPE

Module 2: Dimensional data model

1. Required reading - please complete this first before the class or start any other tasks.
 - a. “What are Dimensions and Measures” a very quick, simple, and high level introduction video: <http://www.youtube.com/watch?v=qkJOace9FZg>
 - b. A more technical introduction of dimensional modeling
 - i. Dimensional modeling introduction: <https://www.youtube.com/watch?v=Eam2SmYgIzg>
 - ii. Facts and dimensions: <https://www.youtube.com/watch?v=6k3nwXXpnMY>
 - c. Star schema and snowflake schema are two common relational database schema types that implements the dimension model.
 - i. http://en.wikipedia.org/wiki/Star_schema
 - ii. http://en.wikipedia.org/wiki/Snowflake_schema
 - iii. http://www.diffen.com/difference/Snowflake_Schema_vs_Star_Schema
2. Lecture notes (dimensional modeling.pdf): use the lecture notes as a learning and reviewing guide; follow the resources presented in the slides for further information and additional learning.
3. Additional learning resources: some more good readings; these are provided to you for further exploration of the dimensional modeling techniques beyond this course. Also can be found in the lecture notes. Find your own resources and conduct your own research if necessary.
 - a. [A Dimensional Modeling Manifesto by Ralph Kimball:](http://www.kimballgroup.com/1997/08/a-dimensional-modeling-manifesto/) <http://www.kimballgroup.com/1997/08/a-dimensional-modeling-manifesto/>
 - b. LeapFrog Dimensional Modeling training serials playlist: https://www.youtube.com/playlist?list=PLrbIyvYCdg0iAUQoxG5vI_yKqzZ2AcgGe
 - c. DWBI.org dimensional model tutorials: <http://dwbi.org/data-modelling/dimensional-model>

- d. Kimball Dimensional Modeling Techniques collection:
<http://www.kimballgroup.com/data-warehouse-business-intelligence-resources/kimball-techniques/dimensional-modeling-techniques/>
- e. IBM redbooks, Dimensional Modeling: In a Business Intelligence Environment
<http://www.redbooks.ibm.com/abstracts/sg247138.html>

Module 3: Data Storage

1. Required reading - please complete this first before the class or start any other tasks.
 - a. Overview by Intricity: https://www.youtube.com/watch?v=KGHbY_Sales
 - b. Data Warehousing by Andy Wicks:
<https://www.youtube.com/watch?v=zTs5zjSXnvs>
 - c. Tutorialspoint Data Warehousing – Overview:
http://www.tutorialspoint.com/dwh/dwh_overview.htm
 - d. <http://www.kimballgroup.com/2004/03/differences-of-opinion/>
2. Lecture notes: data-storage.pdf. Use the lecture notes as a learning and reviewing guide; follow the resources presented in the slides for further information and additional learning.
3. Additional resources and readings:
 - a. Oracle Introduction to Data Warehousing Concepts:
<http://docs.oracle.com/database/121/DWMSG/concept.htm#DWMSG001>
 - b. <http://www.nagesh.com/publications/technology/173-inmon-vs-kimball-an-analysis.html>
 - c. Is Inmon's Data Warehouse Definition Still Accurate? <http://www.b-eye-network.com/view/16066>
 - d. An Overview of Data Warehousing and OLAP Technology
<http://research.microsoft.com/pubs/76058/sigrecord.pdf>

Module 4: ETL

1. Required readings
 - a. What is an ETL Tool? A quick overview from Intricity:
https://www.youtube.com/watch?v=K_FCHYWGGug
 - b. The Importance of the ETL (describes some typical problems):
<https://www.youtube.com/watch?v=FzayiGi97bc>
 - c. ETL overview: <http://www.dataintegration.info/etl>
 - d. <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.367.4663&rep=rep1&type=pdf> (chapter from Encyclopedia of Database Systems, pp 1095-1101)
 - e. Overview of Power BI and Power Query:
<https://www.youtube.com/watch?v=IM75W9adV74>
2. Lecture notes: ETL.pdf - use the lecture notes as a learning and reviewing guide; follow the resources presented in the slides for further information and additional learning.
3. Labs and tutorials: see lab4.pdf
4. Additional resources and readings:

- a. <https://support.office.com/en-ZA/article/Power-Query-Overview-and-Learning-ed614c81-4b00-4291-bd3a-55d80767f81d>
- b. <http://www.informationweek.com/big-data/big-data-analytics/big-data-debate-end-near-for-etl/d/d-id/1107641>
- c. <http://www.kimballgroup.com/data-warehouse-business-intelligence-resources/kimball-techniques/etl-architecture-34-subsystems/>

Module 5: SSIS

1. Core learning materials
 - a. Download and install SSIS data tools (note it is installed on our virtual lab computers already): <https://www.microsoft.com/en-us/download/details.aspx?id=42313>
 - b. My First Integration Services Solution (download the video to view): <https://code.msdn.microsoft.com/windowsdesktop/My-First-Integration-fa41c0b1>
 - c. Microsoft SSIS Tutorial: Creating a Simple ETL Package (6 lessons): [https://msdn.microsoft.com/en-us/library/ms169917\(v=sql.120\).aspx](https://msdn.microsoft.com/en-us/library/ms169917(v=sql.120).aspx)
 - d. Instructor's three tutorials posted in D2L.
 - e. Integration Services (SSIS) Features and Tasks [https://msdn.microsoft.com/en-us/library/bb522537\(v=sql.120\).aspx](https://msdn.microsoft.com/en-us/library/bb522537(v=sql.120).aspx) – particularly the following sections
 - i. Integration Services (SSIS) and Studio Environments
 - ii. Integration Services (SSIS) Packages
 - iii. Integration Services (SSIS) Connections
 - iv. Integration Services (SSIS) Projects
 - f. Top 10 Common Transformations in SSIS: <http://www.developer.com/db/top-10-common-transformations-in-ssis.html>
2. Additional resources and readings:
 - a. <http://msdn.microsoft.com/en-us/library/bb522537.aspx>

Module 6: OLAP

1. Core required readings
 - a. Video introduction
 - i. What is OLAP from Intricity? <http://www.youtube.com/watch?v=2ryG3Jy6eIY>
 - ii. What is Business Intelligence and an OLAP Cube from ExcelCentral.com: <https://www.youtube.com/watch?v=yoE6bgJv08E>
 - b. [OLAP tutorial from Tutorialspoint: http://www.tutorialspoint.com/dwh/dwh_olap.htm](http://www.tutorialspoint.com/dwh/dwh_olap.htm) and also some good visuals from http://en.wikipedia.org/wiki/OLAP_cube
 - c. [Lutz Hamel, Database Queries, Data Mining and OLAP, The Encyclopedia of Data Warehousing and Mining, 2nd Edition, Idea Group Publishers, 2008. http://homepage.cs.uri.edu/faculty/hamel/pubs/hamel-81-921.pdf](http://homepage.cs.uri.edu/faculty/hamel/pubs/hamel-81-921.pdf)

2. Lecture notes with references: olap.pdf
3. SSAS labs and tutorials – see lab 6 guide.
4. Additional readings and resources:
 - a. The origins of today's OLAP products:
<http://dssresources.com/papers/features/pendse10062002.html>
 - b. OLAP AND OLAP Server Definitions:
<http://www.olapcouncil.org/research/glossaryly.htm>
 - c. https://en.wikipedia.org/wiki/Comparison_of_OLAP_Servers
 - d. <http://www.kimballgroup.com/2002/10/relating-to-olap/>

Module 7: Multidimensional Data Analysis

1. Required readings
 - a. Demo: Explore Adventure Works in Excel by using an OLAP PivotTable report: <https://www.youtube.com/watch?v=v7fAjZxAtLI>
 - b. Using Excel to interact with a SSAS cube (it is for earlier version but very similar in 2013): <https://www.mssqltips.com/sqlservertip/2828/using-excel-to-interact-with-a-ssas-cube/>
 - c. Excel Cube functions
 - i. Quick overview: <https://www.youtube.com/watch?v=B-HBnAWRpL0>
 - ii. http://datasavvy.files.wordpress.com/2013/08/don_t-miss-out-on-excel-cube-functions.pdf
 - iii. <http://www.skylinetechnologies.com/Blog/Article/28/An-Exercise-in-Excel-s-Cube-Functions.aspx>
 - d. Excel OLAP pivot table extension: <http://olappivottableextend.codeplex.com/>
2. Lecture notes with references: olap query.pdf
3. Resources listed in the lab 7, including two tutorials by the instructor on Excel pivot table and cube functions.
4. Additional readings and resources:
 - a. [Layout and format of Excel pivot table: https://support.office.com/en-us/article/Design-the-layout-and-format-of-a-PivotTable-report-a9600265-95bf-4900-868e-641133c05a80](https://support.office.com/en-us/article/Design-the-layout-and-format-of-a-PivotTable-report-a9600265-95bf-4900-868e-641133c05a80)
 - b. [Select data in a pivot table: https://support.office.com/en-us/article/Select-data-in-a-PivotTable-report-db7efaa1-0e86-43fb-ae45-98f028475bf9](https://support.office.com/en-us/article/Select-data-in-a-PivotTable-report-db7efaa1-0e86-43fb-ae45-98f028475bf9)
 - c. [OLAP server action: https://support.office.com/en-us/article/Perform-an-OLAP-server-action-in-a-PivotTable-report-175f7c90-4eef-4a3d-815d-6f4619029a17](https://support.office.com/en-us/article/Perform-an-OLAP-server-action-in-a-PivotTable-report-175f7c90-4eef-4a3d-815d-6f4619029a17)
 - d. <http://thatmsftbiguy.com/excelcubefunction/>

Module 8: Data Visualization

1. Core readings
 - a. The Value of Data Visualization:
<https://www.youtube.com/watch?v=xekEXM0Vonc>

- b. MS data visualization tool choices: <http://sqlserverbiblog.files.wordpress.com/2013/04/data-visualization-choices-dav-204-4089.pdf>
 - c. Dashboard
 - i. What is a business dashboard? <http://www.klipfolio.com/guide-to-business-dashboards>
 - ii. Excel dashboard tutorial: <https://projectbotticelli.com/knowledge/how-to-make-enterprise-dashboards-in-excel-video-tutorial>
2. Lecture notes: data visualization and dashboard.pdf and lab 8.
3. Additional readings and resources:
- a. Data visualization for human perception: http://www.interaction-design.org/encyclopedia/data_visualization_for_human_perception.html
 - b. Dashboard confusion: http://www.perceptualedge.com/articles/ie/dashboard_confusion.pdf
 - c. Shneiderman, B. (1996). The eyes have it: A task by data type taxonomy for information visualizations. http://drum.lib.umd.edu/bitstream/1903/5784/1/TR_96-66.pdf
 - d. Dashboard tool choices: <http://www.wallpaperingfog.co.uk/2011/10/dashboard-software-why-we-chose-what-we.html>
 - e. [Getting Started With Dashboards: http://www.dashboardinsight.com/getting-started/](http://www.dashboardinsight.com/getting-started/)
 - f. <http://prezi.com/qvhyfup5z7yz/dashboard-design-making-reports-pop/>
 - g. <http://www.dashboardinsight.com/articles/digital-dashboards/fundamentals/what-is-a-dashboard.aspx>
 - h. <https://www.geckoboard.com/blog/building-great-dashboards-6-golden-rules-to-successful-dashboard-design/>

Module 9: Personal BI

- 1. Core readings
 - a. Personal Self Service BI:
 - i. <https://intelligentsql.wordpress.com/2012/11/28/types-of-bi/>
 - ii. <http://www.mrc-productivity.com/blog/2015/07/self-service-business-intelligence-101-understanding-the-basics/>
 - b. Microsoft Power BI (Power Pivot, Power Query, Power View)
 - i. <http://www.powerpivotpro.com/a-new-era/> (follow the article to the next three sections)
 - ii. <http://sqlmag.com/blog/does-excel-power-pivot-replace-data-warehouse>
 - iii. Power BI - Overview and Learning: <https://support.office.com/en-us/article/Power-BI-Overview-and-Learning-02730e00-5c8c-4fe4-9d77-46b955b71467>
 - iv. Get started with PowerPivot (complete the Get started section; the rest is for your reference for the term project): <https://support.office.com/en-us/article/Power-Pivot-Help-241aac41-92e3-4e46-ae58-2f2cd7dbcf4f>

2. Lecture notes and tutorials: personal BI.pdf and lab 9.
3. Additional resources and readings:
 - a. <https://www.youtube.com/user/mspowerbi>
 - b. <https://support.powerbi.com/>
 - c. <http://sqlmag.com/sql-server-2012/understanding-powerpivot-and-power-view-microsoft-excel-2013>