

## **Proposal for a Minor**

## NEW MINOR

An academic minor is a secondary area of study that is separate from the major and is typically defined by a set of courses and/or credit hour requirements within a specified discipline. In other words, a minor is a structured group of courses that leads to considerable knowledge and understanding of a subject, although with less depth than a major. Minors are typically between 18 and 32 credit hours in length, depending on the college and disciplinary area.

Once approved at the college level, your college will send the proposal for a new minor to the appropriate Senate academic council (HCCC and/or UC) for review and approval. Once approved at the academic council level, the academic council will send your proposal to the Senate Council office for additional review and then a 10-day posting online, during which senators review on their own and have an option to register an objection if they so desire. If no objection is raised to the Senate Council Office within ten days of the posting the proposal, then it is approved. The Senate Council Office will report approvals to the Provost, Registrar and other appropriate entities, including the contact person.

1. GENERAL INFORMATION			
1a	Home college: Gatton College of Business		
1b	Home educational unit (department or school): <i>Finance &amp; Quantitative Methods</i>		
1c	Proposed minor name: <i>Business Analytics</i>		
1d	CIP Code (provided by <a href="#">Institutional Effectiveness</a> ): 52.1302	Today's date: December 5, 2018	
1e	Is there an accrediting agency related to this minor?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If "Yes," name:		
1f	Requested effective date:	<input type="checkbox"/> Fall semester following approval.	OR <input checked="" type="checkbox"/> Specific Date <sup>1</sup> : <i>Fall 2019</i>
1g	Contact person name: <i>Dan Stone</i>	Email: <i>dstone@uky.edu</i>	Phone: <i>7-3043</i>
2. OVERVIEW			
2a	Provide a brief description of the proposed new minor. (300 word limit)		
	<i>The business analytics minor will prepare students for entry-level business analyst positions. The required courses include Business Intelligence, data visualization, and analytic modeling methods. A unique focus of the program is on data-driven analytic business cases. The elective course allows for specialization within business (i.e., finance, marketing, management, accounting, operations management, economics).</i>		
	<i>Program Learning Objectives</i>		
	<i>1. Create, structure and analyze big data to address business problems.</i>		
	<i>2. Apply statistical and analytics methods and models to business problems.</i>		
	<i>3. Apply Business Intelligence principles and practices to business problems.</i>		
	<i>4. Transform and structure data for use in business analytics</i>		
	<i>5. Create and communicate business information visually.</i>		

<sup>1</sup> Minors are effective for the fall semester following approval. No minor will be made effective unless all approvals, up through and including University Senate approval, are received.

**NEW MINOR**

2b	Will this minor be associated with an existing degree program?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
If "Yes," describe how the new minor will complement the existing degree program. (150 word limit)			
2c	Explain the need for the new minor (e.g. market demand and cross-disciplinary considerations). (300 word limit)		
<p><i>Business increasingly demands professionals who can transform data into information for decisions. For example, a recent report estimated over 350,000 new US positions in data analytics by 2020. The Gatton College proposes a minor in business analytics that will prepare students for entry-level business analyst positions. Students who complete this minor will be positioned as business experts who can partner with data scientists and data engineers to enable business solutions.</i></p> <p><i>The proposed minor is unique among University of Kentucky offerings in its integration of business cases, information technology, and data analytic methods. For example, the minor in Information Studies in the College of Communication and Information emphasizes critical thinking and personal information management. The minor in Statistics focuses on probability and statistical inference.</i></p>			
2d	Describe the demographics of the intended audience. (150 word limit)		
<i>University of Kentucky undergraduates with an interest in business analytics.</i>			
2e	Describe how the proposed minor will be administered, including admissions, student advising, retention, etc. (150 word limit)		
<p><i>The Dean of the Gatton College of Business and the Head of the Department of Finance and Quantitative Methods shall, in consultation with the faculty of record, appoint the Director of the Business Analytics Minor. The director will administer the minor with administrative staff support.</i></p> <p><i>The Program Director will promote and monitor the minor, including addressing issues of student retention. Students will be advised by the Gatton College of Business . This includes advisors in the Gatton Undergraduate Resource Center and the Program Director.</i></p>			
2f	<p>The faculty of record is the faculty body responsible for ALL aspects of the program, including courses, credit hours, rigor, changes to the program, etc. Please identify the program's <i>faculty of record</i> by choosing ONE of the four scenarios below. For more information on each faculty of record scenario, visit <a href="http://www.uky.edu/Faculty/Senate/files/Forms/UNDG_DegPgm/facultyofrecord1.html">http://www.uky.edu/Faculty/Senate/files/Forms/UNDG_DegPgm/facultyofrecord1.html</a>.</p>		
<input type="checkbox"/> Scenario 1      OR <input type="checkbox"/> Scenario 2      OR <input type="checkbox"/> Scenario 3      OR <input checked="" type="checkbox"/> Scenario 4			
<p>If Scenarios 2, 3, or 4 are chosen, please provide describe/list/name the members of the faculty of record and describe the voting rights of members of the faculty of record. Include the process and standards for identifying the program director, as well as adding and deleting members of the faculty of record. (150 word limit)</p>			
<p><i>The initial faculty of record (FOR) will consist of Gatton faculty who agree to serve. The FOR will: (1) teach or conduct research related to business analytics and (2) have full voting rights. FOR who conduct business analytics research will apply for appointment to the FOR. New faculty who teach existing or create new courses in the program will become FOR for 5 years. Changes in program requirements and courses require a majority vote of the FOR. The Dean and Head of the Department of Finance and Quantitative Methods will appoint the first director. Future directors will be jointly determined by the faculty of record in consultation with the Dean and Head of the Department of Finance and Quantitative Methods. See attached list for the initial faculty of record.</i></p>			

**NEW MINOR**

2g	Initially, will any portion of the minor be offered via distance learning (DL)?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If "Yes," please indicate below the percentage of the minor that will be offered via DL.		
	1% - 24% <input checked="" type="checkbox"/>	25% - 49% <input type="checkbox"/>	50% - 74% <input type="checkbox"/>
		75 - 99% <input type="checkbox"/>	100% <input type="checkbox"/>
	If "Yes," describe the DL course(s) in detail, including the number of required DL courses. (200 word limit)		
	<i>AN300 (first class in the minor) will be offered online.</i>		
<b>3. RESOURCES</b>			
3a	Will the minor utilize courses from other academic units?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If "Yes," two pieces of supporting documentation are required.		
	<input checked="" type="checkbox"/> Check to confirm that appended to the end of this form is a letter of support from each unit's chair/director <sup>2</sup> from which individual courses will be used. The letter must include demonstration of true collaboration between multiple units <sup>3</sup> and impact on the course's use on the home educational unit.		
	<input checked="" type="checkbox"/> Check to confirm that appended to the end of this form is verification that each unit's chair/director of the other unit has consent from the faculty members of the unit. This typically takes the form of meeting minutes.		
3b	What are the (non-course) financial implications for the proposed minor, including any projected budget needs? (300 word limit)		
	<i>The creation of the minor in Business Analytics will incur few additional costs beyond an administrative stipend paid to the Director and course development stipends to instructors. All required courses in the minor are existing course titles. All electives either exist or are proposed by departments independent of this proposal. The college will provide a budget for recruiting students to the minor and cocurricular events to promote student enrollment and engagement.</i>		
3c	Will the proposed minor utilize resources (e.g. departmentally controlled equipment or lab space) from additional units/programs?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If "Yes," identify the other resources that will be shared. (150 word limit)		
	If "Yes," two pieces of supporting documentation are required.		
	<input type="checkbox"/> Check to confirm that appended to the end of this form is a letter of support from the appropriate chair/director <sup>4</sup> of each unit from which "other resources" will be used.		
	<input type="checkbox"/> Check to confirm that appended to the end of this form is verification that the chair/director of each affected unit has consent from the faculty members of the unit. This typically takes the form of meeting minutes.		
<b>4. ADMISSIONS CRITERIA AND CURRICULUM STRUCTURE</b>			
4a	Are there any admissions requirements for the proposed minor? (150 word limit)	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If "Yes," describe below.		

<sup>2</sup> A dean may submit a letter only when there is no educational unit below the college level, i.e. there are no departments/schools.

<sup>3</sup> Show evidence of detailed collaborative consultation with such units early in the process.

<sup>4</sup> A dean may submit a letter only when there is no educational unit below the college level, i.e. there is no department/school.

**NEW MINOR**

4b	Are there any prerequisites for the minor? (If “Yes,” indicate and answer using the area below. If “No,” indicate and proceed to 4d.)		Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Prefix & Number	Course Title	Credit Hrs	Course Status <sup>5</sup>
	<i>Completion of college-pre-major requirements and admission to Upper Division in Business &amp; Economics, or, consent of Department</i>		Existing
			Select one....
			Select one....
			Select one....
			Select one....
			Select one....
4c	Provide the Bulletin language for prerequisites. (150 word limit)		
	Completion of college-pre-major requirements and admission to Upper Division in Business & Economics, or, consent of Department of Finance and Quantitative Methods		
4d	List the required courses below.		
Prefix & Number	Course Title	Credit Hrs	Course Status <sup>6</sup>
AN300	<i>Introduction to Business Analytics</i>	3	Existing (needs change)
AN306	<i>Business Intelligence and Data Visualization</i>	3	Existing (needs change)
AN324	<i>Business Data Management</i>	3	Existing (needs change)
AN420G	<i>Business Data Mining</i>	3	Existing (needs change)
AN450G	<i>Business Analytics Strategy &amp; Application</i>	3	Existing (needs change)
4e	Provide the Bulletin language for required courses.		
	See attached file for descriptions		
4f	Are there any electives for the minor? (If “Yes,” indicate and answer using the area below. If “No,” indicate and proceed to 4h.)		Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Prefix & Number	Course Title	Credit Hrs	Course Status <sup>7</sup>
	see attached list		Select one....

<sup>5</sup> Use the drop-down list to indicate if the course is a new course (“new”), an existing course that will change (“change”), or if the course is an existing course that will not change (“no change”).

<sup>6</sup> Indicate if the course is new (“new”), exists but will change (“change”), or exists but will not change (“no change”).

<sup>7</sup> Indicate if the course is new (“new”), exists but will change (“change”), or exists but will not change (“no change”).

**NEW MINOR**

			Select one....
			Select one....
			Select one....
			Select one....
			Select one....
			Select one....

4g Provide the Bulletin language for electives.  
 Students will select one elective (three credit hours) from the attached list of electives:

4h What is the total number of credit hours required for the minor? (e.g. 18 or 20) 18  
 If an explanation about the total credit hours is necessary, use the space below. (150 word limit)

4i Are there any other requirements for the minor? If "Yes," note below. (150 word limit) Yes  No

**5. APPROVALS/REVIEWS**

Information below does not supersede the requirement for individual letters of support from educational unit administrators and verification of faculty support (typically takes the form of meeting minutes).  
*In addition to the information below, attach documentation of department and college approval. This typically takes the form of meeting minutes but may also be an email from the unit head reporting department- and college-level votes.*

	Reviewing Group Name	Date Approved	Contact Person Name/Phone/Email
5a	(Within College)		
	<i>See attached list</i>		/ /
			/ /
			/ /
			/ /

5b	(Collaborating and/or Affected Units)		
			/ /
			/ /
			/ /
			/ /
			/ /
			/ /
			/ /
			/ /

5c	(Senate Academic Council)	Date Approved	Contact Person Name
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**NEW MINOR**

	Health Care Colleges Council (if applicable)		
	Undergraduate Council	1/29/19	Joanie Ett-Mims

## **Faculty of Record**



*2f The initial faculty of record (FOR) will consist of Gatton faculty who agree to serve. The FOR will: (1) teach or conduct research related to business analytics and (2) have full voting rights. FOR who conduct business analytics research will apply for appointment to the FOR. New faculty who teach existing or create new courses in the program will become FOR for 5 years. Changes in program requirements and courses require a majority vote of the FOR. The Dean and Head of the Department of Finance and Quantitative Methods will appoint the first director. Future directors will be jointly determined by the faculty of record in consultation with the Dean and Head of the Department of Finance and Quantitative Methods.*

***Initial Faculty of Record:***

- *Steve Borgatti, Management*
- *Eric Gladstone, Management*
- *Andrew Grimes, Marketing and Supply Chain*
- *Carlos Lamarche, Economics*
- *Anita Lee-Post, Marketing and Supply Chain*
- *Ajay Mehra, Management*
- *Ram Pakath, Finance and Quantitative Methods*
- *Darshak Patel, Economics*
- *Jeff Payne, Accountancy*
- *Simon Sheather, Finance and Quantitative Methods*
- *Dan Stone, Accountancy*

December 3, 2018

All proposed faculty of record (FOR) have confirmed their willingness to serve in writing.

*Dan Stone*

Dan Stone

Chair, Business Analytics Task Force

## **Electives**

## Minor in Business Analytics

### List of electives

Students will choose one elective (3 credit hours) from following list.

<b>Prefix &amp; Number</b>	<b>Course Title</b>	<b>Credit Hrs</b>	<b>Course Status</b>
ACC555	Forensic Accounting & Fraud Examination	3	Existing
ACC590*	Special Topics in Accounting*	3	Existing
ECO430	Cost Benefit Analysis	3	Proposed (under review)
ECO463	Analysis of Business Conditions	3	Existing
ECO491G	Applied Econometrics	3	Existing
FIN430	Financial Modeling	3	Existing
MGT390*	Special Topics in Management*	3	Existing
MGT780	Advanced Social Network Analysis (For Undergraduate Seniors with permission of Instructor)	3	Existing
MKT325	Digital Marketing Strategy Evaluation	3	Proposed (under review)

\* Use of a specific subtitle must be approved by the director of the minor.

## Within-College Approvals

Within-College List of Approvals / Reviews

<b>Reviewing Group Name</b>	<b>Date Approved</b>	<b>Contact Person Name / Phone / Email</b>
Gatton College Faculty	Dec. 17, 2018	Associate Dean Jennifer Siebenthaler, <a href="mailto:jwsiebenthaler@uky.edu">jwsiebenthaler@uky.edu</a> , 7-3031
Gatton College Undergraduate Studies Committee	Dec. 10, 2018	Associate Dean Jennifer Siebenthaler, <a href="mailto:jwsiebenthaler@uky.edu">jwsiebenthaler@uky.edu</a> , 7-3031
Dean's Office	Dec. 5, 2018	Dean Simon Sheather, 7-8939
Department of Accountancy	Dec. 6, 2018	Dr. Urton Anderson, Chair, <a href="mailto:urton.anderson@uky.edu">urton.anderson@uky.edu</a> , 218-1788
Department of Economics	Dec. 5, 2018	Dr. Bill Hoyt, Chair, 7-2518, <a href="mailto:whoyt@uky.edu">whoyt@uky.edu</a>
Department of Finance and Quantitative Methods	Nov. 30, 2018	Dr. Paul Childs, Chair, 7-9160, <a href="mailto:paul.childs@uky.edu">paul.childs@uky.edu</a>
Department of Management	Nov. 26, 2018	Dr. Daniel Brass, Chair, 7-4260, <a href="mailto:dbrass@uky.edu">dbrass@uky.edu</a>
Department of Marketing	Nov. 30, 2018	Dr. David Hardesty, Chair, 7-9419,

**From:** [Jennifer Siebenthaler](#)  
**To:** [Stone, Dan](#)  
**Subject:** New Program Vote  
**Date:** Monday, December 10, 2018 4:39:46 PM

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**TO:** Gatton College Faculty

**FROM:** Jennifer Siebenthaler, Associate Dean for Undergraduate Affairs

The Gatton College Undergraduate Studies Committee (Zack Edens, Meike Eilert, Wendy Liu, Darshak Patel, and Jane Wells) recently approved several proposals. The proposal forms and syllabi are available in the faculty file at [https://proxy.qualtrics.com/proxy/?url=https%3A%2F%2Fuky-my.sharepoint.com%2F%3A%2F%3A%2Fpersonal%2Fje224\\_uky\\_edu%2FEpiB3TGFYmlMvpZ7T7YvO-MB6aty04Ejy-79RbgSaboXgg%3Fe%3DDXhttpR&token=LxLr2CGPYOmHtgCnewGtUMMWJ6WvkIpeg5A%2FToie4v0%3D](https://proxy.qualtrics.com/proxy/?url=https%3A%2F%2Fuky-my.sharepoint.com%2F%3A%2F%3A%2Fpersonal%2Fje224_uky_edu%2FEpiB3TGFYmlMvpZ7T7YvO-MB6aty04Ejy-79RbgSaboXgg%3Fe%3DDXhttpR&token=LxLr2CGPYOmHtgCnewGtUMMWJ6WvkIpeg5A%2FToie4v0%3D). Proposed new courses and changes to existing courses have been approved by the appropriate academic unit.

**Please feel free to contact the following individuals if you have any questions regarding a specific proposal.**

Dan Stone: Proposed Business Analytics Minor and the proposed updates to course titles and descriptions: AN 300, 306, 324, 420G, and 450G

Nicole Jenkins: Proposed Undergraduate Certificate in Business, online delivery of MGT 292, and proposed updates to ACC 221 course description and credit hours (from 2-credit hour to 3-credit hour)

Wendy Liu or Cynthia Vines: Proposed Undergraduate Certificate in Financial Planning and the proposed new courses: ACC 356, 357, 457; FIN 357, 358, 359

Paul Childs: Proposed Online General Business degree, the proposed new courses: ACC 360 and FIN 310, and online delivery of: ECO 391, FIN 300, MGT 340, ECO 311, MGT 410, ACC 201

**Provide your vote for each item by Friday, December 14<sup>th</sup> at 4 pm.**

**Follow this link to Vote:**

[Vote Here](#)

Or copy and paste the URL below into your internet browser:

[https://uky.az1.qualtrics.com/jfe/form/SV\\_0rqd2hJejDoYJDv?](https://uky.az1.qualtrics.com/jfe/form/SV_0rqd2hJejDoYJDv?Q_DL=1Afo9gDnkfZeLJz_0rqd2hJejDoYJDv_MLRP_bJXfazJj1TaNpid&Q_CHL=email)

[Q\\_DL=1Afo9gDnkfZeLJz\\_0rqd2hJejDoYJDv\\_MLRP\\_bJXfazJj1TaNpid&Q\\_CHL=email](https://uky.az1.qualtrics.com/jfe/form/SV_0rqd2hJejDoYJDv?Q_DL=1Afo9gDnkfZeLJz_0rqd2hJejDoYJDv_MLRP_bJXfazJj1TaNpid&Q_CHL=email)

Follow the link to opt out of future emails:

[Click here to unsubscribe](#)

**From:** [Sheather, Simon](#)  
**To:** [B&E Faculty](#)  
**Subject:** Results of last week's online vote  
**Date:** Monday, December 17, 2018 10:36:35 AM  
**Attachments:** [image001.png](#)

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Colleagues,

Thank you to all those who participated in last week's online vote. As you can see from the detailed results below, there was very strong support for each of the proposals under consideration.

Sincerely,

Simon



Simon J. Sheather  
Dean  
Gatton College of Business & Economics

Melissa Richards  
Executive Assistant  
859-257-8939  
[Melissa.richards@uky.edu](mailto:Melissa.richards@uky.edu)

University of Kentucky  
Gatton College  
371 Gatton Building  
Lexington, KY 40506-0034  
[simon.sheather@uky.edu](mailto:simon.sheather@uky.edu)

The Undergraduate Studies Committee moves to approve:

- Proposed updates to course titles and descriptions: AN 300, 306, 324, 420G, and 450G  
100% approve      0% disapprove
- Proposed Business Analytics Minor  
100% approve      0% disapprove

The Undergraduate Studies Committee moves to approve:

- Online delivery of MGT 292  
100% approve      0% disapprove
- Proposed updates to ACC 221 course description and credit hours (from 2-credit hour to 3-credit hour)  
100% approve      0% disapprove
- Proposed Undergraduate Certificate in Business  
97% approve      3% disapprove



The Undergraduate Studies Committee moves to approve:

1. Proposed new courses: ACC 356, 357, 457; FIN 357, 358, 359  
100% approve            0% disapprove
2. Proposed Undergraduate Certificate in Financial Planning  
100% approve            0% disapprove

The Undergraduate Studies Committee moves to approve:

1. Proposed new courses: ACC 360 and FIN 310  
98% approve            2% disapprove (ACC 360) 100%  
approve            0% disapprove (FIN 301)
2. Online delivery of: ECO 391, FIN 300, MGT 340, ECO 311, MGT 410, ACC 201  
100% approve            0% disapprove (except for FIN 300 98%  
approve 2% disapprove)
3. Proposed Online General Business degree  
93% approve            7% disapprove

## Letters of Support – Minor in Business Analytics

December 5, 2018

Dear Undergraduate Council,

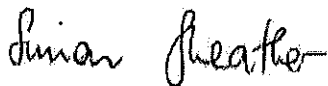
I write to affirm the college's strongest support of the proposed Minor in Business Analytics in the Gatton College of Business. The Minor in Business Analytics will link technology knowledge and skill with deep exploration of business data and strategy. The global marketplace demands and expects these skills of our graduates. In addition, the minor will link state of the art technology training with emerging principles and practices of data display and data management strategy.

The proposal has been carefully vetted by the College's Undergraduate Studies Committee in close consultation with the Dean's office and the Data Analytics Working Group of the College. The proposed Minor in Business Analytics will utilize the strengths of an outstanding, cross-disciplinary faculty in the Gatton College. Because the proposal uses existing course titles, few additional resources will be required for its successful launch.

My experience in teaching business analytics, and creating business analytics programs, confirms that the Minor in Business Analytics will attract strong student interest across disciplines. This minor affords the opportunity to capitalize on strong demand from our students, and their prospective employers, by linking this demand to relevant, global business principles and practices.

The College of Business fully supports the proposed Minor in Business Analytics in the Gatton College of Business.

Sincerely,



Simon Sheather  
Dean  
Gatton College of Business and Economics

see blue.



Gatton College of  
Business and Economics  
Von Allmen School of Accountancy

December 6, 2018

To: Gatton Undergraduate Studies Committee

From: Urton Anderson  
Director, School of Accountancy

cn=Urton Anderson, o=University  
of Kentucky, ou=Gatton College,  
email=uan222@uky.edu, c=US  
2018.12.06 15:53:18 -05'00'

The School of Accountancy strongly endorses the proposed minor in business analytics and approves the use of the proposed accounting courses as electives (ACC 590 – Internal Audit, ACC 590 – IT Audit, and ACC 555 Fraud Examination). This was unanimously approved by the Von Allmen School Faculty in its December 4 2018 faculty meeting.

seeblue.



University of  
Kentucky.

Gatton College of  
Business and Economics  
Department of Economics

To: Dan Stone  
Chair, Committee on Business Analytics

From: William Hoyt *William Hoyt*  
Chair, Department of Economics

Re: Inclusion of Economics courses in Business Analytics minor

The Department of Economics, via an e-mail vote, unanimously approves the inclusion of Economics courses ECO 391, ECO 491G, and ECO 463 in the proposed Business Analytics minor.

see blue.



Gatton College of  
Business and Economics  
Department of Finance & Quantitative Methods

November 30, 2018

Dear Business Analytics Working Group,

The Department of Finance and Quantitative Methods has voted for and fully supports the proposed Business Analytics Minor. We approve using AN 300, AN 306, AN 324, AN 420G, and AN 450G as required courses in the minor. We also approve using FIN 430 as an elective for the minor.

The content of this minor is in high demand in many of today's businesses. Students that successfully complete the minor will be better prepared for the workforce and will enhance their job prospects.

Sincerely,

Digitally signed by Paul Childs  
DN: cn=Paul Childs, o=University of Kentucky,  
ou=Department of Finance and Quantitative  
Methods, email=pchildsg@uky.edu, c=US  
Date: 2018.11.30 17:58:14 -0500

Paul D. Childs  
Department Chair, Finance and Quantitative Methods  
Gatton College of Business and Economics  
University of Kentucky

seeblue.

344 Gatton College of Business and Economics Building | Lexington, KY 40506 | P: 859-257-9160 | gatton.uky.edu

An Equal Opportunity University



November 26, 2018

Department of  
Management  
338 Gatton Business and  
Economics Building  
Lexington, KY 40506-0034  
<http://gatton.uky.edu>

The Department of Management is in full support of the proposed Business Analytics Minor and approves the inclusion of MGT 390 and MGT 780 as electives.

Sincerely,

Daniel  
J. Brass

Digitally signed by Daniel J. Brass  
DN: cn=Daniel J. Brass,  
o=University of Kentucky,  
ou=Department of  
Management,  
email=dbrass@uky.edu, c=US  
Date: 2018.11.26 14:30:15  
-0500

Daniel J. Brass  
J. Henning Hilliard Professor of Innovation Management  
University Research Professor  
Director, LINKS Center for Social Network Analysis  
Chair, Department of Management  
University of Kentucky  
Lexington, KY 40506  
[dbrass@uky.edu](mailto:dbrass@uky.edu)  
<http://linkscenter.org>  
859-257-4260



Gatton College of  
Business and Economics  
Department of Marketing & Supply Chain

November 30, 2018

Dear Business Analytics Working Group,

I am pleased to express the Department of Marketing and Supply Chain's strongest support of the proposed Business Analytics Minor in the Gatton College of Business and Economics. The Business Analytics Minor will provide students with an expansive orientation to analytics across multiple business disciplines. These courses will prepare students for the challenges associated with analytics in today's business environment. The enclosed proposal has been carefully vetted by the Department's faculty and by me.

The proposed Business Analytics Minor will utilize the strengths of the outstanding faculty in the Gatton College of Business and Economics. A minor in Business Analytics will attract a broad spectrum of interest from students at the University of Kentucky. This minor would give us the opportunity to capitalize on a lively interest among students and better prepare them for future employment opportunities.

The Department of Marketing and Supply Chain fully supports the proposed Business Analytics Minor in the Gatton College of Business and Economics.

Sincerely,

A handwritten signature in black ink that reads 'David M. Hardesty'. The signature is written in a cursive, flowing style.

David M. Hardesty  
Chair Department of Marketing and Supply Chain  
Carol Martin Gatton Endowed Chair  
Director of the Behavioral Research Lab  
University of Kentucky

see blue.

438A Gatton College of Business and Economics Building | Lexington, KY 40506 | P: 859-257-9419 | [david.hardesty@uky.edu](mailto:david.hardesty@uky.edu)



**Stone, Dan**

---

**From:** Hoyt, William  
**Sent:** Monday, April 15, 2019 10:59 AM  
**To:** Stone, Dan  
**Cc:** Patel, Darshak; Hoyt, William  
**Subject:** RE: final items needed for approval of minor in business analytics



Gatton College of  
Business and Economics  
Department of Economics

Dan,

If you look at the online Course Catalog you will see this course listed. We think it may have been removed from the Bulletin due to the fact it has not been offered for a number of years (we offered the equivalent course as a special topics (ECO 410) entitled “Economic Forecasting” when we could and should have used ECO 463). Darshak is looking into the discrepancy between the catalog and bulletin.

I confirm that, following discussion and support of the faculty of the Department of Economics, I approve of ECO 430 (Benefit-Cost Analysis) as an elective in the Business Analytics minor.

Bill

William Hoyt  
Chair and Gatton Endowed Professor  
Department of Economics  
Gatton College of Business and Economics  
University of Kentucky  
Lexington, KY 40506

[whoyt@uky.edu](mailto:whoyt@uky.edu)  
01-859-257-2518

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**From:** Stone, Dan <dstone@uky.edu>  
**Sent:** Monday, April 15, 2019 10:52 AM  
**To:** Hoyt, William <whoyt@uky.edu>  
**Subject:** final items needed for approval of minor in business analytics

Hi Bill,

A couple of items that the senate council has requested for approving the minor in business analytics.

1. No one seems to be able to find information about ECO 463 – which is a proposed elective. Can you please clarify the status and offering plan for this course?
2. Can you please confirm that you approve of ECO430 being an elective in the minor in business analytics?

Thanks,

Dan

## Stone, Dan

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**From:** Hardesty, David M.  
**Sent:** Saturday, April 13, 2019 1:44 PM  
**To:** Stone, Dan  
**Subject:** Re: request related to minor in business analytics

I approve

David Hardesty  
Carol Martin Gatton Endowed Chair  
Department Chair Marketing and Supply Chain  
Director of the Behavioral Research Lab  
University of Kentucky  
[david.hardesty@uky.edu](mailto:david.hardesty@uky.edu)

Sent from my iPhone

On Apr 12, 2019, at 4:20 PM, Stone, Dan <[dstone@uky.edu](mailto:dstone@uky.edu)> wrote:

Hi David,

I need this to get final approval of the minor in business analytics.

Can you please confirm that you approve of including MKT325 as an elective in the minor in business analytics?

Thanks,

Dan

Syllabi

**AN 300: Introduction to Business Analytics**  
**[Term]**

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**Instructor:** Anita Lee-Post

**Office:** BE 435Q

**E-mail:** [dsianita@uky.edu](mailto:dsianita@uky.edu)

**Office Hours:** MF 1pm to 2pm

**E-mails will be responded to within 48 hours excluding Sundays**

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**COURSE DESCRIPTION:**

This course introduces Business Analytics and its application to business problems in functional domains including Operations, Marketing, Management, etc. Students learn contemporary tools, models, and methods for developing and deploying descriptive, predictive, and prescriptive analytics approaches to solving such problems. This core course enables future in-depth knowledge of Business Analytics in advanced classes.

**COURSE PREREQUISITES:**

(1) Completion of all college pre-major requirements and admission to upper division in Business and Economics, or, (2) consent of department.

**COURSE OBJECTIVES:**

1. Develop an understanding of the nature and importance of Business Analytics in today's business settings.
2. Develop the capabilities to use appropriate Business Analytics tools, models, and methods for managerial problem-solving and decision making.
3. Build a solid foundation for advanced Business Analytics coursework.

**LEARNING OUTCOMES:**

After completion of this course, you should be able to:

1. Distinguish between descriptive, predictive, and prescriptive forms of Business Analytics.
2. Understand the relationship between Business Analytics and Business Intelligence.
3. Demonstrate the ability to utilize basic Business Analytics tools and techniques for data acquisition, data storage, data pre-processing, data retrieval/querying/reporting, data visualization/dash-boarding, data mining, and data modeling.
4. Demonstrate the ability to proceed from business problem scenarios to actionable solutions using Business Analytics.

**TEXT:**

Custom e-text

**Software:**

Excel and JMP available in the university's [virtual den](#) and/or download a copy from <https://download.uky.edu>

Tableau Public: <https://public.tableau.com/en-us/s/>

**AN 300: Introduction to Business Analytics**  
**[Term]**

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**TECHNICAL REQUIREMENTS:**

**Course Site:**

[Canvas](#)

If you are new to Canvas, review [Canvas Orientation](#).

**Technical Assistance:**

[Help with Canvas](#); Live Chat; Phone: 844-480-0838

[UKAT Service Desk](#); Phone: 859-218-4357; Email: [218help@uky.edu](mailto:218help@uky.edu)

**GRADING:**

There will be four exams. Each exam counts as 15% of your grade. The dates for these exams are listed in the **TENTATIVE COURSE SCHEDULE** section of this Syllabus. The remaining 40% of your grade is for course assignments that include concept questions, case studies, practice problems and practice exams. Numerical grades will be converted to letter grades as follows: A = 85-100; B = 75-84; C = 65-74; D = 55-64; E = 0-54.

**Exam:**

Exams will be taken online using a proctoring service approved by the University.

**Course Assignments:**

Course assignments are located within their respective **Modules** in Canvas. You cannot access an assignment until you finished watching and/or listening to the lecture presentation, reading your text, and going through any additional tutorial or examples.

Course assignments include concept questions, practice problems, and practice exams. They are multiple choice, multiple answers, and numeric answer questions related to materials covered.

You are allowed two attempts with each assignment. Use the feedback from the first attempt to work out the correct answers in the second attempt. Keep a log of your problem-solving process to show when you have questions about problem solving. Attach your notes/log file at the end of each module for review and reference.

You must use the [Submit Quiz] button to submit your work before its due date to receive full credit.

**Late-penalty:**

Any course assignments submitted after the due date will receive a zero score.

**Mid-Term Grade:**

Mid-term grades will be posted in myUK by the deadline established in the Academic Calendar.

**AN 300: Introduction to Business Analytics**  
**[Term]**

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**INACTIVITY:**

You are expected to withdraw from the class if you miss more than 20% of the course assignments.

**VIRTUL MEETING:**

To address any question you may have regarding any aspect of the course, virtual meetings are set up using Zoom during the office hours.

**POLICY ON COMMUNICATION:**

Emails will be responded to within 48 hours, excluding Sundays and public holidays. If you have questions, do not wait till the last minute to ask them as you will not get an answer immediately. Do not ask questions about materials of the exam on the date of the exam. Questions about problem solving should be accompanied by the body of the question (i.e., not just a reference to the question) and your attempted solution process.

**ATTENDANCE REQUIREMNTS:**

In order to meet federal regulations, I will monitor your participation in this class through assignments. I will assess your engagement on [date1] using a graded readiness assignment. Students whose engagement cannot be determined on [date1] will be reported to the University on [date2]. Once you are marked for non-participation, you will be dropped from the class and from Canvas with grade symbol "NA".

If you will be missing any class period or will not be submitting an assignment during that period, it is your responsibility to notify me, regardless if the absence or missed assignment is excused or not under University rules.

**POLICY ON ACADEMIC ACCOMMODATIONS DUE TO DISABILITY:**

If you have a documented disability that requires academic accommodations, please contact me immediately. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the [Disability Resource Center](#) (Suite 407, Multidisciplinary Science Building, 257-2754) for coordination of campus disability services available to students with disabilities. To be eligible for testing accommodations, the Letter of Accommodation must be presented to me at least a minimum two weeks before the examination.

**LIBRARY SERVICES:**

Librarian: Carla Cantagallo  
Phone: 859-257-0500 ext. 2171 or 800-828-0439 (option #6)  
Email: [dllservice@email.uky.edu](mailto:dllservice@email.uky.edu)  
Interlibrary loan service <http://libraries.uky.edu>

**AN 300: Introduction to Business Analytics**  
**[Term]**

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**ACADEMIC INTEGRITY:**

We consider academic integrity to be extremely important. All the course assignments and exams must be your own individual work, i.e., no copying from others or group work. A plea of ignorance is not acceptable as a defense against the charge of academic dishonesty.

When you submit work purporting to be your own, but which in any way borrows ideas, organization, wording or anything else from another source without appropriate acknowledgement of the fact, you are guilty of plagiarism. Plagiarism includes reproducing someone else's work, whether it be a published article, chapter of a book, a paper from a friend or some file, or something like this. Plagiarism also includes the practice of employing or allowing another person to alter or revise the work which you submit as your own, whoever that other person may be. Students may discuss assignments among themselves, but when the actual work is done, it must be done by the student, and the student alone. We will seek the most severe sanctions possible for any cheating that is uncovered.

**EXCUSED ABSENCES:**

Please see "[Student Rights and Responsibilities](#)" under the rules of the University Senate concerning circumstances that count as "excused absences". Only significant illness, illness or death of an immediate family member, university related trips, major religious holidays, and interviews for full-time job opportunities post-graduation and graduate or professional schools are considered as excused absences in this class.

Please note that appropriate verification<sup>1</sup> for an absence must be provided for it to be considered excused. Only a tier 2 or tier 3 document confirming a visit to university health services or a doctor's note from a non-university health services is an acceptable verification for an excused absence of significant illness. Appropriate verification for post-graduation job/graduate school interviews should include evidence that the student had little or no control over the date and time of the interview and that the student is not able to reschedule the interview to a non-conflicting time reasonably close to the originally scheduled time.

Documents supporting schedule conflicts due to university related activities or post-graduation job/graduate school interviews should be submitted in writing at least two weeks prior to the occurrence of such absences when feasible and in no case more than one week after the absence. Documents supporting an absence for observing a major religious holiday should be submitted in writing no later than the last day in the semester to add a class. Documents supporting significant illness and death of an immediate family members must be submitted within one week following the period of the excused absence. An opportunity to make up missed work and/or exams due to an excused absence will be given, if feasible, during the semester in which the absence occurred.

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<sup>1</sup> A verifiable documentation is one that is not fabricated; i.e., its authenticity can be confirmed with evidence.



**AN 300: Introduction to Business Analytics**  
**[Term]**

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**TENTATIVE COURSE SCHEDULE:**

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<b>Week</b>	<b>Topic</b>
1-2	Introduction <ul style="list-style-type: none"><li>• Business Analytics vs business intelligence</li><li>• Descriptive, predictive, prescriptive Analytics</li><li>• Business Analytics in practice</li></ul>
3-4	Data and Business Analytics <ul style="list-style-type: none"><li>• Data acquisition</li><li>• Data pre-processing</li><li>• Data querying</li><li>• Data reporting</li></ul>
<b>[exam 1 date] EXAM #1</b>	
5-7	Data visualization <ul style="list-style-type: none"><li>• Tables</li><li>• Charts</li><li>• Dashboards</li></ul>
8-10	Descriptive Analytics <ul style="list-style-type: none"><li>• Cluster analysis</li><li>• Association rules</li><li>• Text mining</li></ul>
<b>[exam 2 date] EXAM #2</b>	
11-13	Predictive Analytics <ul style="list-style-type: none"><li>• Time series forecasting</li><li>• Linear and multiple regression</li></ul>
<b>[exam 3 date] EXAM #3</b>	
14-16	Prescriptive Analytics <ul style="list-style-type: none"><li>• Linear optimization model</li></ul>
<b>[exam 4 date] EXAM #4</b>	

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# AN306: Business Intelligence and Data Visualization<sup>1</sup>

Fall 2019

Date: 11/30/2018

## Instructor & class:

Professor: Dan Stone  
Office Location: 423X  
Office Hours: to be announced  
Class meeting day and location: [TR 3:30 pm - 4:45 pm, room TBA.](#)  
Email: [dstone@uky.edu](mailto:dstone@uky.edu) (I generally avoid email after 8 pm, before 9am, and on some weekends. I believe that you and I have a “[right to disconnect](#)”.)  
Phone: 859-257-3043 (office); 859-559-2460 (cell)  
Website: <http://gatton.uky.edu/faculty-research/faculty/stone-dan>  
Twitter Handle: Dan Stone@DStoneGattonBus

## Description

This course introduces students to the principles, tools and best practices of business intelligence and data visualization to enable the analysis of business data to improve decisions and performance. The course provides students with hands-on experience using appropriate software to create visual displays of quantitative data – in reports, graphs, charts, maps, stories and dashboards -- to facilitate communication of actionable insights for managerial decision-making.

## Required Course Materials

- Required textbook: [Tableau Your Data](#), 2<sup>nd</sup> edition, D. Murray
- Downloadable files from the [textbook website](#).
- Provided licenses for Tableau Desktop and Tableau Desktop Prep
- Tableau online resources:
  - Free Training Videos: <https://www.tableau.com/learn/training>
  - Knowledge Base: <https://www.tableau.com/support/knowledgebase>
  - Community Forums: see description below
- Access to MS Excel, MS PowerPoint, MS Word

## Course Prerequisites

- AN300
- General computer skills and knowledge of MS Excel, MS Word, and MS PowerPoint
- Access to high-speed internet for research and data gathering
- Access to a computer to install software - highly recommended (see *Required Software* below)

## Additional Useful (Optional) Readings

*The Big Book of Dashboards: Visualizing Your Data Using Real-World Business Scenarios*, Steve Wexler, Jeffrey Shaffer, Andy Cotgreave, Wiley (2017)

*The Functional Art*, Alberto Cairo, New Riders (2012)

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<sup>1</sup> Note on source: Portions of this syllabus are adapted from one created by Jeffrey A. Shaffer, Vice President, Unifund, University of Cincinnati, [JeffreyShaffer@gmail.com](mailto:JeffreyShaffer@gmail.com) .

*The Truthful Art*, Alberto Cairo, New Riders (2016)  
*The Wall Street Journal Guide to Information Graphics: The Dos and Don'ts of Presenting Data, Facts, and Figures*, Dona M. Wong, W. W. Norton & Company (2010)  
*Information Dashboard Design: Displaying Data for At-a-Glance Monitoring*, Stephen Few, O'Reilly Media (2013)  
*Show Me the Numbers: Designing Tables and Graphs to Enlighten*, Stephen Few, Analytics Press (2004)  
*Now You See It*, Stephen Few, Analytics Press (2009)  
*Storytelling with Data*, Cole Nussbaumer, Wiley (2015)  
*Visualize This: The Flowing Data Guide to Design, Visualization, and Statistics*, Nathan Yau, Wiley (2011)  
*The Visual Display of Quantitative Information*, Edward Tufte, Graphics Press, 2<sup>nd</sup> Edition (2001)

### Tableau Forums and User Groups

1. The [Tableau community forums](#) are an important resource for answering your technical Tableau questions.
2. Please also consider joining the [Lexington Tableau User Group](#) – a source of information about local Tableau events.

### Course Objectives

- Provide an overview of the practice of data visualization
- Introduce students to the key design principles and techniques for visualizing data
- Develop an understanding of the fundamentals of communication and alignment around concepts that are required for effective data presentation
- Provide an overview and develop an introductory level of competency on the use of Tableau and Tableau Prep that can be used for data visualization
- Allow for project-based opportunities to identify, understand, analyze, prepare, and present effective visualizations on a variety of topics

### Learning Objectives:

- Identify and describe the principles of business intelligence
- Describe the key design principles and practices of business data visualization
- Identify, harvest, and clean simple business data sets for use in business visualization
- Apply data visualization principles to development visualizations using appropriate software
- Analyze business data to identify, understand, analyze, prepare, and present data visualizations to identify, articulate and solve business problems.

### Course Modules

Module	Topic	# weeks
1	Class intro	0.5
2	Intro to data analytics	1

3	Principles of visual design	3
4	Visual analytics	1
5	Dashboards, Infographics & storytelling	2.5
6	Calculations	1
7	Data preparation and Organization	2
8	Publishing & Sharing	0.5
9	Projects & Presentations	3
-	Exams (midterm, final)	1
	<b>Total</b>	<b>15.5</b>

### Course Format

Students will read class material, watch videos, attend lectures, study best and worst visualization practices, analyze and critique visualizations, problem solve, work individually and in teams, and discuss course material. Students will also practice applying the techniques and best practices discussed to problems.

### Technology Compatibility and Conflicts

Students may use any technology platform for their projects that allows the work to be presented for class review and is accessible for review by the course instructor. If there is any question about whether work can be accessed for review or presentation (*e.g.*, if it is not created in one of the software tools listed under “Required Course Materials”), you must check with the instructor before submitting your work.

### Expectations

Students should prepare and participate by:

1. Reading scheduled assignments
2. Watching assigned videos
3. Participating in class discussions in class, and on Canvas
4. Completing the assigned homework
5. Participating in Team Projects
6. Taking examinations at the day and time assigned

Students should complete individual assignments (including tests, exams, homework, and other assignments) independently. The student’s individual submissions must represent his or her individual work, and citations must be provided when referencing other sources. Also, you may not re-use a data set from one project to another; you must start with a new data set each time.

Some assignments will be assigned to teams. It is important that you participate as necessary in the teams to complete assignments. Low participation in your team may affect your final grade for team assignments.

### Performance Evaluation

<b><u>Course grades will be determined as follows:</u></b>	<b><u>%</u></b>
Exercises, Homework, and Presentations	40%
Contributions to Community Learning	10%

Midterm and Final Exam (20 each)	25%
Final Project - Interactive Data Visualization and Presentation	<u>25%</u>
Total:	100%

Extra credit (one opportunity per student, see description) maximum: 5% of grade.

## Grading Scale

90% - 100%	A
80% - 89%	B
70% - 79%	C
60% - 69%	D
Below 60%	E

Questions regarding grading must be addressed within one week of return of the graded assignment, quiz or exam to the student.

## Team Member Feedback and Grading

For team projects, the instructor may allow members to comment on contributions and work effort of other team members. This feedback will be considered in assigning individualized grades for team projects. In other words, input from team members influence project grades.

## Exams

The in-class exams will cover the concepts and applications in the class including the use of Tableau. Without prior approval, make-up opportunities are limited to documented emergencies. Instructor discretion is used in determining whether a situation constitutes an emergency.

## Projects

Through a variety of projects, we will analyze best practices and compare with not-so-best practices. Students will learn to critique visualizations and will create and recreate various data visualizations using data sets. The final project will be **interactive, i.e.**, not a static chart.

## Solving Technical and Software Questions

Learning new software results in many technical questions. Becoming an independent, life-long learner means that you can solve these problems using available resources without asking your “boss”. Investigating and solving these questions is an important part of learning software. Hence, when you have a question about Tableau that you cannot answer, please follow these steps:

1. Check the course discussion board to see if this question has been posted and resolved by your classmates
2. Consult Tableau’s extensive online resources and training videos:
  - a. <http://onlinehelp.tableau.com/current/pro/online/windows/en-us/help.htm>
  - b. <http://www.tableau.com/support/manuals/quickstart>
  - c. <http://www.tableau.com/learn/training>
3. Check Tableau’s community discussion forum to see if the solution has been posted there. If your question has never been posted on the forum, then post it!
  - a. Home page: <https://community.tableau.com/welcome>

- b. Beginner: <https://community.tableau.com/groups/newbie-tableau-desktop>
  - c. Advanced: <https://community.tableau.com/community/viz-talk/tableau-community-library/calculation-reference-library>
  - d. Tips for an effective post: <https://community.tableau.com/docs/DOC-5471>
4. Post the question to the class discussion board.
  5. Ask a classmate or your instructor for help.
  6. Please post the question that you encountered, along with the solution you found, on the course discussion board.

Following the above steps will help you develop the ability to research and answer Tableau questions autonomously, while also fostering collaboration among your peers to find and share solutions. These skills will serve you well as you continue to use Tableau after this class is completed.

## **Course Policies**

### **Grading Policy**

The grading scale is as follows: 90% and above is an A, 80% to 89.99% is a B, 70% to 79.99% is a C, 60% to 69.99% is a D, and below 60% is an E.

Midterm grades will be posted in myUK by the deadline established in <http://www.uky.edu/registrar/content/spring-2018-semester>.

### **Excused Absences**

Students need to notify the professor of absences prior to class when possible. Senate Rules 5.2.4.2 defines the following as acceptable reasons for excused absences: (a) serious illness, (b) illness or death of family member, (c) University-related trips, (d) major religious holidays, (e) interviews for full-time job opportunities post-graduation and interviews for graduate or professional school, and (f) other circumstances found to fit “reasonable cause for nonattendance” by the professor.

Students anticipating an absence for a major religious holiday are responsible for notifying the instructor in writing of anticipated absences due to their observance of such holidays no later than the last day in the semester to add a class. Two weeks prior to the absence is reasonable but should not be given any later. Information regarding major religious holidays may be obtained through the Ombud (859-257-3737, [http://www.uky.edu/Ombud/ForStudents\\_ExcusedAbsences.php](http://www.uky.edu/Ombud/ForStudents_ExcusedAbsences.php))

Any student that misses more than 20% of the course due to excused absences will need to withdraw from the course or take an incomplete and restart the course at a future date that permits full engagement in the course.

Per Senate Rule 5.2.4.2, students missing any graded work due to an excused absence are responsible: for informing the Instructor of Record about their excused absence within one week following the period of the excused absence (except where prior notification is required); and for making up the missed work. The professor must give the student an opportunity to make up the work and/or the exams missed due to an excused absence, and shall do so, if feasible, during the semester in which the absence occurred

### **Verification of Absences**

Students may be asked to verify their absences for them to be considered excused. Senate Rule 5.2.4.2 states that faculty have the right to request “appropriate verification” when students claim an excused absence because of illness, or death in the family. Appropriate notification of absences due to University-related trips is required prior to the absence when feasible and in no case more than one week after the absence.

UHS provides an “Explanatory Statement of Absence from Class” or a “Tier 1” excuse that students may complete on their own without being seen by UHS at all. In addition, UHS generates “Tier 2” and “Tier 3” documents after visits to UHS. The Tier 2 document is an email sent to the student, at the student’s request. The email confirms that the student made a medical visit to UHS. In order to provide the Instructor with verification of an illness, the student will forward the email received from UHS to the Instructor, who may then email the original sender to verify the authenticity of the email sent to the student. The Tier 3 document is a form that UHS provides by email to the student. This form “states any applicable restrictions [on the student] based on illness or injury.” Tier 1 statements are not acceptable as documentation justifying an absence for it to be excused. Tier 2 will be accepted as appropriate documentation for an absence to be considered excused when the student makes a medical visit to the UHS on the day and time of class. Tier 3 will be required for all other circumstances such as a major illness requiring missing more than one class period or has other extenuating circumstances. Health care providers’ notes presented as verification from outside the University Health System will be expected to follow the same verification principles as the UHS Tier 2 and UHS Tier 3 documentation and will be evaluated accordingly. For an excuse to be deemed excused, it must be provided to the instructor within one week of the missed class event.

### **Academic Integrity**

Per University policy, students shall not plagiarize, cheat, or falsify or misuse academic records. Students are expected to adhere to University policy on cheating and plagiarism in all courses. The minimum penalty for a first offense is a zero on the assignment on which the offense occurred. If the offense is considered severe or the student has other academic offenses on their record, more serious penalties, up to suspension from the University may be imposed.

Plagiarism and cheating are serious breaches of academic conduct. Each student is advised to become familiar with the various forms of academic dishonesty as explained in the Code of Student Rights and Responsibilities. Complete information can be found at the following website: <http://www.uky.edu/Ombud>. A plea of ignorance is not acceptable as a defense against

the charge of academic dishonesty. It is important that you review this information as all ideas borrowed from others need to be properly credited.

Senate Rules 6.3.1 (see <http://www.uky.edu/Faculty/Senate/> for the current set of Senate Rules) states that all academic work, written or otherwise, submitted by students to their instructors or other academic supervisors, and is expected to be the result of their own thought, research, or self-expression. In cases where students feel unsure about a question of plagiarism involving their work, they are obliged to consult their instructors on the matter before submission.

When students submit work purporting to be their own, but which in any way borrows ideas, organization, wording, or content from another source without appropriate acknowledgment of the fact, the students are guilty of plagiarism.

Plagiarism includes reproducing someone else's work (including, but not limited to a published article, a book, a website, computer code, or a paper from a friend) without clear attribution. Plagiarism also includes the practice of employing or allowing another person to alter or revise the work, which a student submits as his/her own, whoever that other person may be. Students may discuss assignments among themselves or with an instructor or tutor, but when the actual work is done, it must be done by the student, and the student alone.

When a student's assignment involves research in outside sources or information, the student must carefully acknowledge exactly what, where and how he/she has employed them. If the words of someone else are used, the student must put quotation marks around the passage in question and add an appropriate indication of its origin. Making simple changes while leaving the organization, content, and phraseology intact is plagiaristic. However, nothing in these Rules shall apply to those ideas, which are so generally and freely circulated as to be a part of the public domain.

Please note: Any assignment you turn in may be submitted to an electronic database to check for plagiarism.

### **Accommodations due to disability**

If you have a documented disability that requires academic accommodations, please see me as soon as possible during scheduled office hours. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (DRC). The DRC coordinates campus disability services available to students with disabilities. It is located on the corner of Rose Street and Huguelet Drive in the Multidisciplinary Science Building, Suite 407. You can reach them via phone at (859) 257-2754 and via email at [drc@uky.edu](mailto:drc@uky.edu). Their web address is <http://www.uky.edu/DisabilityResourceCenter>.

### **Non-Discrimination Statement and Title IX Information**

The University of Kentucky faculty are committed to supporting students and upholding the University's non-discrimination policy.

Discrimination is prohibited at UK. If you experience an incident of discrimination we encourage you to report it to Institutional Equity & Equal Opportunity (IEEO) Office, 13 Main Building, (859) 257-8927.

### **Acts of Sex- and Gender-Based Discrimination or Interpersonal Violence**



If you experience an incident of sex- or gender-based discrimination or interpersonal violence, we encourage you to report it. While you may talk to a faculty member or TA/RA/GA, understand that as a "Responsible Employee" of the University these individuals MUST report any acts of violence (including verbal bullying and sexual harassment) to the University's Title IX Coordinator in the IEEO Office. If you would like to speak with someone who may be able to afford you confidentiality, the Violence Intervention and Prevention (VIP) program (Frazee Hall – Lower Level; <http://www.uky.edu/StudentAffairs/VIPCenter/>), the Counseling Center (106 Frazee Hall, <http://www.uky.edu/StudentAffairs/Counseling/>), and the University Health Services (<http://ukhealthcare.uky.edu/uhs/student-health/>) are confidential resources on campus.

### **Homework**

Homework assignments are due by the date and time indicated in the syllabus or as indicated by the instructor.

### **Late Assignments**

Late assignments will receive a deduction of 5% per day, beginning with a 5% deduction for assignments turned in past the date and time due. Assignments more than 3 days late will not be accepted.

### **Adjustments to Assignments, Schedule, and Syllabus**

The scope, timing, and due date/time of any assignments, projects, homework, exams, or any other required work may be adjusted by the instructor as needed to maximize learning opportunities for students and/or better serve the goals of the course. The syllabus may be modified if needed.

Adjustments will be communicated to students in class and on Canvas with as much notice as possible.

## GRADING RUBRICS for Visualizations, Projects, and Lab Assignments

Criteria	10 – Outstanding	9 – Proficient	8 – Basic	7 (or lower) - Below Expectations
<b>OBJECTIVE</b>				
<b>Completed assignment per requirements</b>	All portions of the assignment, including presentations, data preparation, and visualizations were attempted and submitted. This is a pass / fail component. All or no points are awarded.			
<b>Data is appropriate and sufficient for the analysis</b>	The data set chosen or used by is appropriate, correct, and sufficient to support the thesis of the analysis.	Data is appropriate but minor data issues may be present or enhancements may be needed for a proper analysis.	Data is related but not sufficient to support the analysis, or significant data issues prevent a clear reading of the results.	Data has little or no relation to the topic being explored, errors will lead to incorrect conclusion, and/or data issues make the analysis unusable.
<b>Headers, directions, citations, and visual cues are given as guides</b>	Clear direction is provided. Visual cues, tooltips, and citations are consistently and correctly employed to inform and guide.	Header, footers, and instructions are present, but visual cues may be missing or could be improved.	The user must self-discover functionality. Headers and footers may be missing. Difficult to know what to do.	The user has little or no indication of how to engage. Directions are missing on clear. Missing headers and footers for context and meaning.
<b>Basic visualization rules and best practices are consistently applied and demonstrated</b>	Chart types are suitable and best options for the analysis. All axes and text are treated appropriately. The application of color is correct and clearly conveys meaning.	Chart types chosen are acceptable, but axes may be cluttered or have rotated text. Color choices communicate meaning but can be improved.	Charts incorrectly used for the purpose intended. Axes are difficult to read and detract from understanding. Color used in a distracting or unsuitable manner.	Difficult to understand what is intended with the chart and data. Color actively distracts and confuses. Chart junk dominates the visualization and the meaning is unreadable.
<b>The visualization allows the user to conduct the intended analysis</b>	The visualization facilitates quick cognition and leading to a fact-based conclusion or assertion.	Study is required to interpret the data and how it applies to the thesis of the analysis.	The visualization does not directly address the topic or relies on presentation support.	The visualization is completely inappropriate and cannot be used to conduct the intended analysis.
<b>SUBJECTIVE</b>				
<b>Viz is clean, clear, concise, captivating (Shaffer 4 C's)</b>	The 4Cs are well represented; the visualization is clear, clean, concise, and captivating.	Aspects of the 4Cs are apparent; opportunity exists for further enhancement.	Multiple aspects of the 4Cs are missing or have not been well addressed in the visualization.	Significant or complete disregard for the guidance present in the 4Cs, resulting in a poor visualization.
<b>Attractiveness and attention to design and details of craft</b>	Fonts choices are conscious and consistent, proper grammar and spelling is used, and choice of position, size, and emphasis integrate elements into a visually appealing and engaging whole.	Visualization shows thought and planning, and most aspects work in harmony. May exhibit minor issues with spelling, alignment, or sizing mismatched with importance.	Visualization appears sloppy and may be difficult to understand as a coherent whole. Multiple issues with spelling, font consistency, positioning, or other distracting characteristics.	Little or no apparent thought or given and visualization comes across as disorganized. May be visible through numerous spelling or grammar issues, poor alignment and positioning choices inappropriate font use, etc.
<b>The visualization is usable and actionable</b>	The visualization is targeted to the audience, the story is evident, and the conclusion or action required is clearly apparent. No additional interpretation is needed.	There is a clear message or story conveyed, but the action or conclusion that should be drawn is not definitive. May require interpretation.	The visualization suggests possibilities but is unclear; action is impossible.	No apparent message or relevancy to the user; no actions can nor should be taken based on the analysis.
<b>Design is of high quality, integrity, and impact. Findings and analysis are clear and relevant</b>	The analysis shows a level of quality, integrity, and competency that makes the viz impactful, generating a high level of trust.	The overall conclusions of the analysis seem to be sound, with support by anecdotes or additional evidence.	The analysis shows a trend or suggests a result, but is not trustworthy because of errors in process, omission, or scope.	The visualization is poorly designed, greatly compromising its integrity and usefulness.
<b>Overall effectiveness of communication and presentation</b>	The visualization (or presentation) is delivered in a convincing way that demonstrates confidence, competency, and thoroughness.	Delivery provides a strong argument and is well supported; minor details should be vetted and affirmed.	The presentation and communication leaves concerns or lingering lack of clarity. Work required to review and confirm.	The communication and presentation results in confusion and low level of confidence in the analysis, requiring a significant or complete re-do.

## AN324: Business Data Management

Spring 2020

Date: Dec. 5, 2018

### Instructor & class:

Professor: Office Location: Office Hours: to be announced Class meeting day and location: Email: Phone: Website: Twitter Handle:
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### Description

This course introduces “big data,” data harvesting and cleaning, relational databases, structured query language (SQL), data warehousing, and online analytical processing (OLAP). The course emphasizes data structure, database design, data queries and data manipulation.

### Required Course Materials

- Required textbooks:
  - Learning Alteryx: A beginner's guide to using Alteryx for self-service analytics and business intelligence, 2017, [Renato Baruti](#), Packt Publishing.
  - SQL QuickStart Guide: The Simplified Beginner's Guide To SQL, 2015, ClydeBank Technology
- Provided licenses for Alteryx, JMP, Tableau, Tableau Data Prep, MySQL, and Oracle.
- Online resources:
  - Free Alteryx Training : <https://community.alteryx.com/t5/Alteryx-Academy/ct-p/alteryx-academy>
  - Tableau Knowledge Base: <https://www.tableau.com/support/knowledgebase>
- Access to MS Excel, MS PowerPoint, MS Word
- Access to a computer that can run the required course software

### Forums and User Groups

1. Online community forums are an important resource for answering technical questions.

### Course Prerequisites

- AN306 or consent of instructor
- General computer skills and knowledge of MS Excel, MS Word, and MS Powerpoint
- Access to high-speed internet for research and data gathering

### Learning Objectives:

- Describe the use data management software and database systems for strategic and operational advantage
- Describe technologies for managing data including cloud computing, data warehousing and Web-enabled data-driven systems
- Use data management software to harvest, evaluated, clean, and share business data.
- Develop relational schemas and data dictionaries for a business database

- Write SQL statements for data definition and manipulation
- Describe and evaluate a database based on relational database management system (DBMS)

### Course Modules

Module	Topic	# weeks
1	Class intro	1
2	Intro to Business Data and “Big Data”	1
3	Principles of Business Data Structure and Management	2
4	Data Management Software	2
5	Relational Databases in Business	2.5
6	Structured Query Language (SQL)	2.5
7	Data Presentations; Publishing & Sharing Data	1
89	Projects & Presentations	2
-	Exams (midterm, final)	1
	<b>Total</b>	<b>15</b>

### Course Format

Students will read class material, watch videos, attend lectures, study best and worst visualization practices, analyze and critique visualizations, problem solve, work individually and in teams, and discuss course material. Students will also practice applying the techniques and best practices discussed to problems.

### Technology Compatibility and Conflicts

Students may use any technology platform for their projects that allows the work to be presented for class review and is accessible for review by the course instructor. If there is any question about whether work can be accessed for review or presentation (*e.g.*, if it is not created in one of the software tools listed under “Required Course Materials”), you must check with the instructor before submitting your work.

### Expectations

Students should prepare and participate by:

1. Reading scheduled assignments
2. Watching assigned videos
3. Participating in class discussions in class, and on Canvas
4. Completing the assigned homework
5. Participating in Team Projects
6. Taking examinations at the day and time assigned

Students should complete individual assignments (including tests, exams, homework, and other assignments) independently. The student’s individual submissions must represent his or her individual work, and citations must be provided when referencing other sources. Also, you may not re-use a data set from one project to another; you must start with a new data set each time.

Some assignments will be assigned to teams. It is important that you participate as necessary in the teams to complete assignments. Low participation in your team may affect your final grade for team assignments.

### Performance Evaluation

<u>Course grades will be determined as follows:</u>	<u>%</u>
Exercises, Homework, and Presentations	40%
Contributions to Community Learning	10%
Midterm and Final Exam	25%
Final Project - Data Presentations	<u>25%</u>
Total:	100%

Extra credit (one opportunity per student, see description) maximum: 5% of grade.

### Grading Scale

90% - 100%	A
80% - 89%	B
70% - 79%	C
60% - 69%	D
Below 60%	E

Questions regarding grading must be addressed within one week of return of the graded assignment, quiz or exam to the student.

### Team Member Feedback and Grading

For team projects, the instructor may allow members to comment on contributions and work effort of other team members. This feedback will be considered in assigning individualized grades for team projects. In other words, input from team members influence project grades.

### Exams

The in-class exams will cover the concepts and material in the class. Without prior approval, make-up opportunities are limited to documented emergencies. Instructor discretion is used in determining whether a situation constitutes an emergency.

### Projects

Through a variety of projects, we will analyze best practices and compare with not-so-best practices. Students will learn to critique visualizations and will create and recreate various data visualizations using data sets. The final project will be **interactive, i.e.**, not a static chart.

### Contributions to Community Learning (CCL)

An important part of learning, and to contribute to others' learning, is to think aloud, "on one's feet," to ask good questions, and to pose good questions and offer good insights in public. At the same time, polls indicate that many people are [more afraid of public speaking than dying!](#) Now that's fear!

Contributions to community learning include attending class and participating (speaking) in class discussions, and, when asked, providing constructive comments regarding others' contributions. This includes:

- 1) Attending class (see policies on excused and unexcused absences),
- 2) Contributing to oral class discussions by asking good questions and answering

questions – see the class participation grading rubric (under files → grading templates, on the class Canvas site)

- 3) Posting to the community discussion boards
- 4) Not speaking so frequently as to impede others from participating, e.g., answering every question asked in class,
- 5) Treating others respectfully,
- 6) Refraining from
  - (a) inappropriate uses of electronic devices (web browsing, shopping, checking last nights' scores),
  - (b) writing or reading outside materials during class,
  - (c) engaging in cross-talk chatting about topics unrelated to class.

I will post CCL grades twice: at mid-semester, and at class completion.

### **Solving Technical and Software Questions**

Learning new software results in many technical questions. Becoming an independent, life-long learner means that you can solve these problems using available resources without asking your “boss”. Investigating and solving these questions is an important part of learning software. Hence, when you have a question about software that you cannot answer, please follow these steps:

1. Check the course discussion board to see if this question has been posted and resolved by your classmates
2. Consult online resources and training videos:
3. Check community discussion forum to see if the solution has been posted there. If your question has never been posted on the forum, then post it!
4. Post the question to the class discussion board.
5. Ask a classmate or your instructor for help.
6. Please post the question that you encountered, along with the solution you found, on the course discussion board.

Following the above steps will help you develop the ability to research and answer questions. These skills will serve you well.

### **Course Policies**

#### **Grading Policy**

The grading scale is as follows: 90% and above is an A, 80% to 89.99% is a B, 70% to 79.99% is a C, 60% to 69.99% is a D, and below 60% is an E.

Midterm grades will be posted in myUK by the deadline established in <http://www.uky.edu/registrar/content/spring-2018-semester>.

#### **Excused Absences**

Students need to notify the professor of absences prior to class when possible. Senate Rules 5.2.4.2 defines the following as acceptable reasons for excused absences: (a) serious illness, (b) illness or death of family member, (c) University-related trips, (d) major religious holidays, (e) interviews for full-time job opportunities post-graduation and interviews for graduate or

professional school, and (f) other circumstances found to fit “reasonable cause for nonattendance” by the professor.

Students anticipating an absence for a major religious holiday are responsible for notifying the instructor in writing of anticipated absences due to their observance of such holidays no later than the last day in the semester to add a class. Two weeks prior to the absence is reasonable, but should not be given any later. Information regarding major religious holidays may be obtained through the Ombud (859-257-3737, [http://www.uky.edu/Ombud/ForStudents\\_ExcusedAbsences.php](http://www.uky.edu/Ombud/ForStudents_ExcusedAbsences.php))

Any student that misses more than 20% of the course due to excused absences will need to withdraw from the course or take an incomplete and restart the course at a future date that permits full engagement in the course.

Per Senate Rule 5.2.4.2, students missing any graded work due to an excused absence are responsible: for informing the Instructor of Record about their excused absence within one week following the period of the excused absence (except where prior notification is required); and for making up the missed work. The professor must give the student an opportunity to make up the work and/or the exams missed due to an excused absence, and shall do so, if feasible, during the semester in which the absence occurred

### **Verification of Absences**

Students may be asked to verify their absences in order for them to be considered excused. Senate Rule 5.2.4.2 states that faculty have the right to request “appropriate verification” when students claim an excused absence because of illness, or death in the family. Appropriate notification of absences due to University-related trips is required prior to the absence when feasible and in no case more than one week after the absence.

UHS provides an “Explanatory Statement of Absence from Class” or a “Tier 1” excuse that students may complete on their own without being seen by UHS at all. In addition, UHS generates “Tier 2” and “Tier 3” documents after visits to UHS. The Tier 2 document is an email sent to the student, at the student’s request. The email confirms that the student made a medical visit to UHS. In order to provide the Instructor with verification of an illness, the student will forward the email received from UHS to the Instructor, who may then email the original sender to verify the authenticity of the email sent to the student. The Tier 3 document is a form that UHS provides by email to the student. This form “states any applicable restrictions [on the student] based on illness or injury.” Tier 1 statements are not acceptable as documentation justifying an absence for it to be excused. Tier 2 will be accepted as appropriate documentation for an absence to be considered excused when the student makes a medical visit to the UHS on the day and time of class. Tier 3 will be required for all other circumstances such as a major illness requiring missing more than one class period or has other extenuating circumstances. Health care providers’ notes presented as verification from outside the University Health System will be expected to follow the same verification principles as the UHS Tier 2 and UHS Tier 3 documentation and will be evaluated accordingly. For an excuse to be deemed excused, it must be provided to the instructor within one week of the missed class event.

## **Academic Integrity**

Per University policy, students shall not plagiarize, cheat, or falsify or misuse academic records. Students are expected to adhere to University policy on cheating and plagiarism in all courses. The minimum penalty for a first offense is a zero on the assignment on which the offense occurred. If the offense is considered severe or the student has other academic offenses on their record, more serious penalties, up to suspension from the University may be imposed.

Plagiarism and cheating are serious breaches of academic conduct. Each student is advised to become familiar with the various forms of academic dishonesty as explained in the Code of Student Rights and Responsibilities. Complete information can be found at the following website: <http://www.uky.edu/Ombud>. A plea of ignorance is not acceptable as a defense against the charge of academic dishonesty. It is important that you review this information as all ideas borrowed from others need to be properly credited.

Senate Rules 6.3.1 (see <http://www.uky.edu/Faculty/Senate/> for the current set of Senate Rules) states that all academic work, written or otherwise, submitted by students to their instructors or other academic supervisors, and is expected to be the result of their own thought, research, or self-expression. In cases where students feel unsure about a question of plagiarism involving their work, they are obliged to consult their instructors on the matter before submission.

When students submit work purporting to be their own, but which in any way borrows ideas, organization, wording, or content from another source without appropriate acknowledgment of the fact, the students are guilty of plagiarism.

Plagiarism includes reproducing someone else's work (including, but not limited to a published article, a book, a website, computer code, or a paper from a friend) without clear attribution. Plagiarism also includes the practice of employing or allowing another person to alter or revise the work, which a student submits as his/her own, whoever that other person may be. Students may discuss assignments among themselves or with an instructor or tutor, but when the actual work is done, it must be done by the student, and the student alone.

When a student's assignment involves research in outside sources or information, the student must carefully acknowledge exactly what, where and how he/she has employed them. If the words of someone else are used, the student must put quotation marks around the passage in question and add an appropriate indication of its origin. Making simple changes while leaving the organization, content, and phraseology intact is plagiaristic. However, nothing in these Rules shall apply to those ideas, which are so generally and freely circulated as to be a part of the public domain.

Please note: Any assignment you turn in may be submitted to an electronic database to check for plagiarism.

## **Accommodations due to disability**

If you have a documented disability that requires academic accommodations, please see me as soon as possible during scheduled office hours. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (DRC). The DRC coordinates campus disability services available to students with disabilities. It is located on the corner of Rose Street and Huguelet Drive in the Multidisciplinary Science Building, Suite 407. You can reach them via phone at (859) 257-2754 and via email at [drc@uky.edu](mailto:drc@uky.edu). Their web address is <http://www.uky.edu/DisabilityResourceCenter>.

## **Non-Discrimination Statement and Title IX Information**



The University of Kentucky faculty are committed to supporting students and upholding the University's non-discrimination policy.

Discrimination is prohibited at UK. If you experience an incident of discrimination we encourage you to report it to Institutional Equity & Equal Opportunity (IEEO) Office, 13 Main Building, (859) 257-8927.

### **Acts of Sex- and Gender-Based Discrimination or Interpersonal Violence**

If you experience an incident of sex- or gender-based discrimination or interpersonal violence, we encourage you to report it. While you may talk to a faculty member or TA/RA/GA, understand that as a "Responsible Employee" of the University these individuals MUST report any acts of violence (including verbal bullying and sexual harassment) to the University's Title IX Coordinator in the IEEO Office. If you would like to speak with someone who may be able to afford you confidentiality, the Violence Intervention and Prevention (VIP) program (Frazee Hall – Lower Level; <http://www.uky.edu/StudentAffairs/VIPCenter/>), the Counseling Center (106 Frazee Hall, <http://www.uky.edu/StudentAffairs/Counseling/>), and the University Health Services (<http://ukhealthcare.uky.edu/uhs/student-health/>) are confidential resources on campus.

### **Homework**

Homework assignments are due by the date and time indicated in the syllabus or as indicated by the instructor.

### **Adjustments to Assignments, Schedule, and Syllabus**

The scope, timing, and due date/time of any assignments, projects, homework, exams, or any other required work may be adjusted by the instructor as needed to maximize learning opportunities for students and/or better serve the goals of the course. The syllabus may be modified if needed.

Adjustments will be communicated to students in class and on Canvas with as much notice as possible.

**AN 420G-001: BUSINESS DATA MINING**  
**Departmental Prefix – FAQM: College Prefix – BE**  
**T, R – 11:00 AM – 12:15 PM : Room: BE 260**  
**Instructor: Dr. Ram Pakath**  
**Office – BE 351: Office Hours – T, R – 1:00 – 2:00 PM or By Appointment**  
**Phone: 859-257-4319; Email – [AN420G001F20@GMAIL.COM](mailto:AN420G001F20@GMAIL.COM) (preferred contact mode)**

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### Course Description:

Data mining is concerned with tools and techniques to help a data/business analyst numerically and visually explore vast data sets, classify data, predict outcomes, or identify associations, patterns, and exceptional events. In practical terms, such capabilities allow firms to better segment markets, evaluate and classify stocks, identify prospective customers, foretell contingencies and catastrophes, identify defaulters and fraudulent transactions, measure churn, identify threats, perform service requests, bundle goods, and services, recognize how events (e.g., purchases) are likely to unfold over time, and so on. Such capabilities often make the difference between survival and demise in today's, increasingly global, increasingly competitive, and increasingly volatile business settings.

This course is an introduction to the rapidly blossoming field of Data Mining, a cornerstone of Business Analytics at several Fortune 500 firms. It is one of twelve Ahead-of-the-Curve Careers identified by US News. Global Knowledge lists Business Intelligence, of which Business Analytics is a part, is listed as one example of a “hot” IT specialty. A Business Week Special Report highlights well-known US corporations’ use of Business Intelligence software to cut costs, manage risks, and increase profits.

### Course Goals:

To expose students to issues and techniques related to the following:

- Data acquisition and pre-processing (including data pre-processing, creating visual representations, and generating descriptive statistics).
- Building classification/prediction models using techniques such as Naïve, Nearest Neighbor, Naïve Bayes, Classification/Regression Trees, Logistic Regression, Neural Networks, Association Rule Mining, Cluster Analysis, and Ensemble Modeling.
- Model performance evaluation.

### Intended Student Learning Outcomes:

At the end of the course, students should be able to:-

- Explain how data mining differs from and has overlaps with, traditional statistical analysis and information retrieval/querying as well as the difference between explanatory modeling and predictive modeling.
- Demonstrate how to conduct descriptive and visual analyses of data using spreadsheets and specialized software.
- Perform pre-processing steps including data cleansing, data transformation, and data partitioning.
- Identify predominant classification and prediction tasks suited to data mining.
- Demonstrate how to set up and execute data mining models, including ensemble models, using specialized software.
- Evaluate data mining output reports including confusion matrices, error matrices, cumulative lift charts, decile-wise lift charts, ROC charts, etc. to help choose between multiple models for a given task.

**Course Pre-requisites:**

AN300

**Course Text:**

Data Mining for Business Analytics: Concepts Techniques, and Applications with JMP Pro, G. Shmueli, P.C. Bruce, M. L. Stephens, and N. R. Patel, Wiley, 978-1-118-87752-4, May 2016.

**Software:**

We will use appropriate versions of the following software in this class on an as-needed basis – MS Excel, Tableau, JMP Pro. This software will be provided for use in the classroom (Room 260). Instructions for installing the same on your personal machines will be provided.

**Recommended Additional Readings:****Text References:**

1. Introduction to Data Mining, P. Tan, M. Steinbach, A. Karpatne, and V. Kumar, Addison Wesley, 2018.
2. Data Mining: The Textbook, C.C. Agarwal, Springer, 2015.
3. Making Sense of Data – A Practical Guide to Exploratory Data Analysis and Data Mining, G. J. Myatt and W. P. Johnson, Wiley, 2014.
4. Data Mining – Concepts, Models, Methods, and Algorithms, M. Kantardzic, Wiley Inter-Science, 2011
5. Applied Data Mining – Statistical Methods for Business & Industry, P. Giudici, Wiley, 2003.

**Non-text References:-**

1. Competing on Analytics – The New Science of Winning, T. H. Davenport and J. G. Harris, Harvard Business School Press, 2007.
2. Freakonomics – A Rogue Economist Explores the Hidden Side of Everything, S. D. Levitt and S. J. Dubner, William Morrow/Harper Collins, 2006.
3. Super Crunchers – Why Thinking by Numbers is the New Way to be Smart, I. Ayres, Bantam Books, 2007.

I may draw upon other references (both books and articles), such as those above, on an as-needed basis.

**Student Evaluation Criteria:**

Problem Assignments:	70 points	Periodic; TBA
In-class/Take-Home Quizzes/Exams:	30 points	Periodic; TBA
[ <u>Note</u> : The Final Exam for this class is scheduled on TBA from TBA to TBA]		
Theory/Application Paper (Grad Students only)**	25 points	TBA

\*\* A paper-writing assignment is required of Graduate Students only. I will discuss potential topics and paper specifications with individual students early in the semester.

**Course Grading Scheme:**

The default grading scheme for Undergraduate students is:

A = [90% - 100%]; B = [80% - 90%]; C = [70% - 80%]; D = [60% - 70%]; E = [00% - 60%]

The default grading scheme for Graduate students is:

A = [90% - 100%]; B = [80% - 90%]; C = [70% - 80%]; E = [00% - 70%]

Note 1: During the semester, I shall use a 5-point scale, as shown above for undergraduate students, to assign grades to all students. However, graduate students earning a final, cumulative course score that translates to a "D," will be awarded an "E" for the course as the Grad School does not permit D grades.

Note 2: I may choose to relax the above default grading schemes, at my discretion.

Note 3: All undergraduate students will be provided with a Midterm Evaluation of course performance during the midterm grades submission window based on criteria in the syllabus.

**Tentative Course Schedule:**

Data Mining techniques are typically classified into four categories: Classification, Prediction, Grouping, and Identifying Associations. Time and circumstances permitting, I hope to address material pertaining to an Introduction to the field of Data Mining, Data Pre-processing, Classification, Prediction, Grouping, and Association Detection, during this semester. This material will be drawn from the following list of possible topics to address:

1. Introduction & Preliminaries
2. Pre-processing:-
  - a. Data Exploration, Cleansing, & Visualization with MS Excel, Tableau, JMP Pro
  - b. Data Dimension Reduction & Partitioning
3. Classification:-
  - a. The Naïve Classifier & the k-Nearest Neighbor Classifier
  - b. The Naïve Bayes Classifier
  - c. Classification Trees
  - d. Logistic Regression
  - e. Neural Networks
4. Prediction:-
  - a. Multiple Regression
  - b. Regression Trees
  - c. Neural Networks
5. Grouping:-
  - a. Hierarchical (Agglomerative) Clustering
  - b. k-Means Clustering
6. Identifying Associations:-
  - a. Association Rule Mining

[Note :- Dates for assignment submission, exams, project progress reports, final project reports, and the theory/application paper (only for Graduate students) will be determined during the semester. You will be given sufficient notice in each case.]

## Course Policies:-

As a rule, all students must adhere to Student Rights & Responsibilities-related information available in the Rules of the University Senate. I elaborate below, on some of the more important aspects of student responsibility for the purposes of this class.

### 1. Disabilities Accommodation:-

If you have a documented disability that requires academic accommodations, please see me as soon as possible during scheduled office hours. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (DRC). The DRC coordinates campus disability services available to students with disabilities. It is located on the corner of Rose Street and Huguelet Drive in the Multidisciplinary Science Building, Suite 407. You can reach them via phone at (859) 257-2754 and via email at [drc@uky.edu](mailto:drc@uky.edu). Their web address is <http://www.uky.edu/DisabilityResourceCenter>.

### 2. Non-Discrimination Statement and Title IX Information:-

The University of Kentucky faculty are committed to supporting students and upholding the University's non-discrimination policy.

Discrimination is prohibited at UK. If you experience an incident of discrimination, we encourage you to report it to Institutional Equity & Equal Opportunity (IEEO) Office, 13 Main Building, (859) 257-8927.

### 3. Acts of Sex- and Gender-Based Discrimination or Interpersonal Violence:-

If you experience an incident of sex- or gender-based discrimination or interpersonal violence, we encourage you to report it. While you may talk to a faculty member or TA/RA/GA, understand that as a "Responsible Employee" of the University these individuals MUST report any acts of violence (including verbal bullying and sexual harassment) to the University's Title IX Coordinator in the IEEO Office. If you would like to speak with someone who may be able to afford you confidentiality, the Violence Intervention and Prevention (VIP) program (Frazee Hall – Lower Level; <http://www.uky.edu/StudentAffairs/VIPCenter/>), the Counseling Center (106 Frazee Hall, <http://www.uky.edu/StudentAffairs/Counseling/>), and the University Health Services (<http://ukhealthcare.uky.edu/uhs/student-health/>) are confidential resources on campus.

### 4. Attendance:-

- a. Unexcused Absences: Any student with unexcused absences exceeding 1/10<sup>th</sup> (i.e., 10%) of the class contact hours will have their final course grade reduced by one letter grade.
- b. Any curve that I may choose to apply to your grade at any point will be some function of your attendance during all or part of the preceding weeks. Please make sure that you respond when I record attendance for the class.
- c. Beginning Fall 2019, federal guidelines mandate that we are to monitor student attendance and engagement. For this term, Gatton College administration has asked all instructors to monitor attendance and engagement as follows:

*In order to meet federal regulations, the instructor will monitor student participation in this class through attendance or assignments. The instructor will assess student engagement at least*

*once during the first three weeks of the semester using an instrument or activity. Students whose engagement cannot be determined on that date may be dropped from the course. If you will be missing any class period or will not be submitting an assignment during that period, it is your responsibility to notify the instructor, regardless if the absence or missed assignment is excused or not under University rules.*

- d. Students will be asked to verify their absences for them to be considered excused. Senate Rule 5.2.4.2 states that faculty have the right to request “appropriate verification” when students claim an excused absence because of illness, or death in the family. Appropriate notification of absences due to University-related trips is required prior to the absence when feasible and in no case more than one week after the absence.

e. Excused Absences:

Students need to notify the professor of absences prior to class when possible. Senate Rules 5.2.4.2 defines the following as acceptable reasons for excused absences: (a) serious illness, (b) illness or death of family member, (c) University-related trips, (d) major religious holidays, (e) interviews for full-time job opportunities post-graduation and interviews for graduate or professional school, and (f) other circumstances found to fit “reasonable cause for nonattendance” by the professor.

Students anticipating an absence for a major religious holiday are responsible for notifying the instructor in writing of anticipated absences due to their observance of such holidays no later than the last day in the semester to add a class. Two weeks prior to the absence is reasonable but should not be given any later. Information regarding major religious holidays may be obtained through the Ombud (859-257-3737, [http://www.uky.edu/Ombud/ForStudents\\_ExcusedAbsences.php](http://www.uky.edu/Ombud/ForStudents_ExcusedAbsences.php))

Any student that misses more than 20% of the course due to excused absences will need to withdraw from the course or take an incomplete and restart the course at a future date that permits full engagement in the course. Per Senate Rule 5.2.4.2, students missing any graded work due to an excused absence are responsible: for informing the Instructor of Record about their excused absence within one week following the period of the excused absence (except where prior notification is required); and for making up the missed work. The professor must give the student an opportunity to make up the work and/or the exams missed due to an excused absence, and shall do so, if feasible, during the semester in which the absence occurred

UHS provides an “Explanatory Statement of Absence from Class” or a “Tier 1” excuse that students may complete on their own without being seen by UHS at all. In addition, UHS generates “Tier 2” and “Tier 3” documents after visits to UHS. The Tier 2 document is an email sent to the student, at the student’s request. The email confirms that the student made a medical visit to UHS. In order to provide the Instructor with verification of an illness, the student will forward the email received from UHS to the Instructor, who may then email the original sender to verify the authenticity of the email sent to the student. The Tier 3 document is a form that UHS provides by email to the student. This form “states any applicable restrictions [on the student] based on illness or injury.” Tier 1 statements are not acceptable as documentation justifying an absence for it to be excused. Tier 2 will be accepted as appropriate documentation for an absence to be considered excused when the student makes a medical visit to the UHS on the day and time of class. Tier 3 will be required for all other circumstances such as a major illness requiring missing more than one class period or has other extenuating circumstances. Health care providers’ notes presented as verification from outside the University Health System will be expected to follow the same verification principles as the UHS Tier 2 and UHS Tier 3 documentation and will be evaluated accordingly. For an excuse to be deemed excused, it must be provided to the instructor within one week of the missed class event.

5. **Submission of Assignments :-** All homework must be turned in at the scheduled date and time, personally, by each student. Do not send your homework in with anybody else, or fax it, or email it (unless you are asked to) or hand over directly to my TAs (if any). Late submissions will not be accepted without a valid, verifiable excuse and will be awarded a grade of zero
6. **Makeup Opportunities:-** If you miss a scheduled exam/quiz with a valid excuse, I will offer you one, common makeup opportunity along with all students who missed it. Please avail of this one opportunity or accept a grade of zero for the exam/quiz. If you do have an excused absence when homework or other assignment is due, personally turn in your work to me the very next day following your excused absence period. If a hardcopy submission, and I am not in, slide your work under my office door with a note indicating date and time turned in. Any homework submitted without regard to these guidelines will receive a grade of zero.
7. **Communication Policy:-**
  - a. Make it a point to stay in touch with your email account at least twice each day (morning and night). Make sure that your account is in good working order (i.e., has sufficient inbox room; is active (not suspended), etc.) throughout the semester. Should your email address change for any reason, immediately send me a brief message to this effect (also stating your full name) from your new email account.
  - b. Address all non-confidential email correspondences to me, regarding this class, to the designated Gmail account for this class: [AN420G001F20@Gmail.com](mailto:AN420G001F20@Gmail.com). Confidential exchanges must occur in person or via your Link Blue email account.
  - c. I will make use of Canvas during the semester for tasks such as the distribution of Lecture Notes, Homework Assignments, Quizzes, making Announcements, and such. As with your email accounts, stay in touch with Canvas continually.
  - d. If you wish to have a personal meeting, please stop by during my office hours (T, R: 1:00-2:00 PM). Please do not walk in arbitrarily as I do have other demands on my time.
  - e. If my office hours are not convenient, first try resolving the issue through an email.
  - f. If email discussions will not work for you, set up an appointment (either in-class or via email) for a personal meeting outside of walk-in (i.e., office) hours.
  - g. The least preferred mode of interaction would be a voicemail message (I tend not to check voicemail as frequently as I check email, so my response may be slower or not forthcoming. Further, I prefer not to play telephone tag.)
6. **Classroom Conduct Policy:-**
  - a. Do not walk out before I dismiss class or wander in and out of class for any reason (i.e., finish trips to the restroom, the vending machines, the water fountain, etc., before you come in). Please understand that late arrivals, early departures, and other movement are disruptive to the group and the teacher. Likewise, reserve chats, jokes, newspaper reading, laying your head down/sleeping, cell phone usage (shut them off while in class), and such, for outside of class. Remember, you always have the option of staying away from class in case you are in the mood for something other than what is going on in class – feel free to exercise that option.

- b. This class is being held in a computer lab/classroom. During class, the computers in the room are intended strictly for class-related use and as directed by the instructor and his/her assistants. Please do not misuse the computers during class.
- c. The penalty for any conduct violation could be an absence for the day in question at the minimum or as severe as an E in the course, depending on circumstances.
- d. What if you suddenly fall ill or suffer some other form of distress during class? If your condition permits it, quietly pack up your belongings, write me a brief note, leave the note on my desk, and depart. If you are unable to write, just pack up your belongings and quietly leave. In either case, contact me with necessary details before the next class meeting or as soon as you are well enough to.

## 7. Academic Integrity:-

Per University policy, students shall not plagiarize, cheat, or falsify or misuse academic records. Students are expected to adhere to University policy on cheating and plagiarism in all courses. The minimum penalty for a first offense is a zero on the assignment on which the offense occurred. If the offense is considered severe or the student has other academic offenses on their record, more serious penalties, up to suspension from the University may be imposed.

Plagiarism and cheating are serious breaches of academic conduct. Each student is advised to become familiar with the various forms of academic dishonesty as explained in the Code of Student Rights and Responsibilities. Complete information can be found at the following website: <http://www.uky.edu/Ombud>. A plea of ignorance is not acceptable as a defense against the charge of academic dishonesty. It is important that you review this information as all ideas borrowed from others need to be properly credited.

Senate Rules 6.3.1 (see <http://www.uky.edu/Faculty/Senate/> for the current set of Senate Rules) states that all academic work, written or otherwise, submitted by students to their instructors or other academic supervisors, and is expected to be the result of their own thought, research, or self-expression. In cases where students feel unsure about a question of plagiarism involving their work, they are obliged to consult their instructors on the matter before submission.

When students submit work purporting to be their own, but which in any way borrows ideas, organization, wording, or content from another source without appropriate acknowledgment of the fact, the students are guilty of plagiarism.

Plagiarism includes reproducing someone else's work (including, but not limited to a published article, a book, a website, computer code, or a paper from a friend) without clear attribution. Plagiarism also includes the practice of employing or allowing another person to alter or revise the work, which a student submits as his/her own, whoever that other person may be. Students may discuss assignments among themselves or with an instructor or tutor, but when the actual work is done, it must be done by the student and the student alone.

When a student's assignment involves research in outside sources or information, the student must carefully acknowledge exactly what, where and how he/she has employed them. If the words of someone else are used, the student must put quotation marks around the passage in question and add an appropriate indication of its origin. Making simple changes while leaving the organization, content, and phraseology intact is plagiaristic. However, nothing in these Rules shall apply to those ideas, which are so generally and freely circulated as to be a part of the public domain.

Please note: Any assignment you turn in may be submitted to an electronic database to check for plagiarism.



8. **Group work & Student Collaboration:** - In activities that call for student collaboration, all students involved in a group effort are expected to contribute equally to the final outcome. In the event there are verifiable complaints about a group member from others in the group, the student in question will be awarded a grade of zero for the activity.

# AN450G Business Analytics Strategy and Applications Spring 2020

Date: December 7, 2018

## Instructor & class:

Professor: Office Location: Office Hours: Class meeting day and location: Email: Phone: Website: Twitter Handle:
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## Course Description

This case-based course examines the role of analytics in the development and execution of business strategy. The examination includes applying the principles, tools, and techniques for data-driven business decision-making within business domains. Students will learn to critically analyze data for its use in achieving strategic goals.

## Course Prerequisites

- AN300, AN306, AN324, must have completed or be taking AN420G concurrently.
- General computer skills and knowledge of MS Excel, MS Word, and MS PowerPoint
- Access to high-speed internet for research and data gathering

## Required Course Materials

- Required textbook: [Data Strategy: How to Profit from a World of Big Data, Analytics and the Internet of Things](#), 2017, B. Marr.
- Case resources available on Google Drive.
- Online readings and resources.
- Provided licenses for Tableau Desktop, Tableau Desktop Prep, Alteryx, JMP Pro
- Access to MS Excel, MS PowerPoint, MS Word
- Access to a computer to install required software

## Course Objectives

- Explain the relationship between business and data strategy and governance.
- Describe alternative business data management and governance strategies.
- Develop an understanding of the fundamentals of communication and alignment around concepts that are required for effective data presentation

## Learning Objectives:

- Identify and describe the principles of data strategy.
- Write simple programs for harvesting and cleaning data.
- Identify and explain the principles of digital ethics and governance.
- Apply data management strategies to provide insight into business cases using appropriate software.

## Course Modules

Module	Topic	Week
1	Introduction to class and technologies	1
2	Principles of Data Strategy	1
3	Introduction to Python and coding	1
4	Digital Ethics and Governance	1
5	Case 1: New York City Restaurant Analysis (Zagat Ratings)	2
6	Case 2: Airbnb Occupancy Analysis	2
7	Case 3: Freddie Mac Single Family Home Mortgage Analysis	2
8	Final Project - Case 4: Business & Economic Assessment of a Kentucky Community or Not-for-Profit Organization	2.5
9	Use Case Examples and Speakers	2
-	Exams (midterm, final)	1
	<b>Total</b>	<b>15.5</b>

## Course Format

Students will read class material, watch videos, attend lectures, study best and worst data management and strategy practices, analyze, problem solve, work individually and in teams, and discuss course material. Students will also practice applying the techniques and best practices discussed to case analyses.

## Technology Compatibility and Conflicts

Students may use any technology platform for their projects that allows the work to be presented for class review and is accessible for review by the course instructor. If there is any question about whether work can be accessed for review or presentation (*e.g.*, if it is not created in one of the software tools listed under “Required Course Materials”), you must check with the instructor before submitting your work.

## Expectations

Students should prepare and participate by:

1. Reading scheduled assignments
2. Watching assigned videos
3. Participating in class discussions in class, and on Canvas
4. Completing the assigned homework
5. Participating in Team Projects
6. Taking examinations at the day and time assigned

Students should complete individual assignments (including tests, exams, homework, and other assignments) independently. The student’s individual submissions must represent his or her individual work, and citations must be provided when referencing other sources. Also, you may not re-use a data set from one project to another; you must start with a new data set each time.

Some assignments will be assigned to teams. It is important that you participate as necessary in the teams to complete assignments. Low participation in your team may affect your final grade for team assignments.

## Performance Evaluation

<b>Course grades will be determined as follows:</b>	<b>%</b>
Case Analyses	55%
Contributions to Community Learning	20%
Midterm and Final Exam	25%
Total:	100%

## Grading Scale

90% - 100%	A
80% - 89%	B
70% - 79%	C
60% - 69%	D
Below 60%	E

Questions regarding grading must be addressed within one week of return of the graded assignment, quiz or exam to the student.

**Graduate Student Requirement.** Graduate students will write a paper on a course relevant topic. The instructor will discuss potential topics and paper specifications with individual students early in the semester.

**Team Member Feedback and Grading** For team projects, the instructor may allow members to comment on contributions and work effort of other team members. This feedback will be considered in assigning individualized grades for team projects. In other words, input from team members influence project grades.

## Exams

The in-class exams will cover the concepts and material in the class. Without prior approval, make-up opportunities are limited to documented emergencies. Instructor discretion is used in determining whether a situation constitutes an emergency.

## Contributions to Community Learning (CCL)

An important part of learning, and to contribute to others' learning, is to think aloud, "on one's feet," to ask good questions, and to pose good questions and offer good insights in public. At the same time, polls indicate that many people are [more afraid of public speaking than dying!](#) Now that's fear!

Contributions to community learning include attending class and participating (speaking) in class discussions, and, when asked, providing constructive comments regarding others' contributions. This includes:

- 1) Attending class (see policies on excused and unexcused absences),
- 2) Contributing to oral class discussions by asking good questions and answering questions – see the class participation grading rubric (under files → grading templates, on the class Canvas site)
- 3) Posting to the community discussion boards
- 4) Not speaking so frequently as to impede others from participating, e.g., answering every question asked in class,
- 5) Treating others respectfully,
- 6) Refraining from

- (a) inappropriate uses of electronic devices (web browsing, shopping, checking last nights' scores),
- (b) writing or reading outside materials during class,
- (c) engaging in cross-talk chatting about topics unrelated to class.

I will post CCL grades twice: at mid-semester, and at class completion.

### **Solving Technical and Software Questions**

Learning new software results in many technical questions. Becoming an independent, life-long learner means that you can solve these problems using available resources without asking your “boss”. Investigating and solving these questions is an important part of learning software. Hence, when you have a software question that you cannot answer, please follow these steps:

1. Check the course discussion board to see if this question has been posted and resolved by your classmates
2. Consult online resources and training videos:
3. Check community discussion forums to see if the solution has been posted there. If your question has never been posted on the forum, then post it!
4. Post the question to the class discussion board.
5. Ask a classmate or your instructor for help.
6. Please post the question that you encountered, along with the solution you found, on the course discussion board.

Following the above steps will help you develop the ability to research and answer technical questions autonomously, while also fostering collaboration among your peers to find and share solutions. These skills will serve you well after this class is completed.

### **Course Policies**

#### **Grading Policy**

The grading scale is as follows: 90% and above is an A, 80% to 89.99% is a B, 70% to 79.99% is a C, 60% to 69.99% is a D, and below 60% is an E.

Midterm grades will be posted in myUK by the deadline established in <http://www.uky.edu/registrar/content/spring-2018-semester>.

#### **Excused Absences**

Students need to notify the professor of absences prior to class when possible. Senate Rules 5.2.4.2 defines the following as acceptable reasons for excused absences: (a) serious illness, (b) illness or death of family member, (c) University-related trips, (d) major religious holidays, (e) interviews for full-time job opportunities post-graduation and interviews for graduate or professional school, and (f) other circumstances found to fit “reasonable cause for nonattendance” by the professor.

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### **Verification of Absences**

Students may be asked to verify their absences for them to be considered excused. Senate Rule 5.2.4.2 states that faculty have the right to request “appropriate verification” when students claim an excused absence because of illness, or death in the family. Appropriate notification of absences due to University-related trips is required prior to the absence when feasible and in no case more than one week after the absence.

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When a student's assignment involves research in outside sources or information, the student must carefully acknowledge exactly what, where and how he/she has employed them. If the words of someone else are used, the student must put quotation marks around the passage in question and add an appropriate indication of its origin. Making simple changes while leaving the organization, content, and phraseology intact is plagiaristic. However, nothing in these Rules shall apply to those ideas, which are so generally and freely circulated as to be a part of the public domain.

Please note: Any assignment you turn in may be submitted to an electronic database to check for plagiarism.

### **Accommodations due to disability**

If you have a documented disability that requires academic accommodations, please see me as soon as possible during scheduled office hours. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (DRC). The DRC coordinates campus disability services available to students with disabilities. It is located on the corner of Rose Street and Huguelet Drive in the Multidisciplinary Science Building, Suite 407. You can reach them via phone at (859) 257-2754 and via email at [drc@uky.edu](mailto:drc@uky.edu). Their web address is <http://www.uky.edu/DisabilityResourceCenter>.

### **Non-Discrimination Statement and Title IX Information**

The University of Kentucky faculty are committed to supporting students and upholding the University's non-discrimination policy.

Discrimination is prohibited at UK. If you experience an incident of discrimination we encourage you to report it to Institutional Equity & Equal Opportunity (IEEO) Office, 13 Main Building, (859) 257-8927.

### **Acts of Sex- and Gender-Based Discrimination or Interpersonal Violence**

If you experience an incident of sex- or gender-based discrimination or interpersonal violence, we encourage you to report it. While you may talk to a faculty member or TA/RA/GA,

understand that as a "Responsible Employee" of the University these individuals MUST report any acts of violence (including verbal bullying and sexual harassment) to the University's Title IX Coordinator in the IEEEO Office. If you would like to speak with someone who may be able to afford you confidentiality, the Violence Intervention and Prevention (VIP) program (Frazee Hall – Lower Level; <http://www.uky.edu/StudentAffairs/VIPCenter/>), the Counseling Center (106 Frazee Hall, <http://www.uky.edu/StudentAffairs/Counseling/>), and the University Health Services (<http://ukhealthcare.uky.edu/uhs/student-health/>) are confidential resources on campus.

### **Homework**

Homework assignments are due by the date and time indicated in the syllabus or as indicated by the instructor.

### **Adjustments to Assignments, Schedule, and Syllabus**

The scope, timing, and due date/time of any assignments, projects, homework, exams, or any other required work may be adjusted by the instructor as needed to maximize learning opportunities for students and/or better serve the goals of the course. The syllabus may be modified if needed.

Adjustments will be communicated to students in class and on Canvas with as much notice as possible.