

Syllabus
FST 253. Beer Making Laboratory -- 1 Credits
Term, Year
Meeting Day(s), Time, Place

Instructor: *Name and Title*
Office: *Location and office hours (if applicable)*
Phone: *Include personal number only if you are willing to release to students*
E-mail: *@tillamookbay.cc or @mail.tillamookbay.cc or other*

Course Description: Integrates the science of brewing into the procedural aspects of making beer for advanced home brewers and early career professional brewers. Prerequisite(s): 21 years of age or older.

Addendum to Course Description:

This course is intended to articulate to Oregon State University (OSU).

Suggested Reading Sources:

Brewing: Science and Practice. Briggs et al. (2004).
Handbook of Brewing, 2nd Ed. Priest and Stewart. (2006).
Beer: Tap into the Art and Science of Brewing. Bamforth. (2003).
Essays in Brewing Science. Lewis.

TBCC Email: TBCC will use electronic communication methods to conduct official and legal College business. Students are responsible to check their TBCC email and the TBCC student portal (MyTBCC) for information from the College.

Course Learning Outcomes:

1. Recognize the expansive variety of beer styles and how differences in ingredients and process lead to this diversity.
2. Identify the raw ingredients of beer and understand the molecular transformations that take place during brewing.
3. Apply scientific principles and methodologies as they relate to the brewing process.
4. Recognize techniques used by brewing scientists.
5. Appreciate beer and brewing in relation to the larger world.
6. Apply current industrial brewing practices and identify alternative methodologies.
7. Describe findings of independent research, orally and in writing.

Program Learning Outcomes:

- Perform critical reasoning, perceive assumptions, and make judgments based on the basic principles of agriculture, natural resources, and related fields.
- Exhibit critical thinking skills when addressing issues in agriculture, natural resources, and related fields.
- Communicate effectively, both in writing and orally, agriculture and natural resource concepts.

Institutional Learning Outcomes:

ILO #4. Write purposefully, capably, and ethically in a variety of contexts.

ILO#5. Speak with clarity, skill, and appropriateness before a variety of audiences.

ILO #8. Analyze and evaluate information to address issues and solve problems.

ILO #13. Demonstrate the knowledge, skills, and professional attitude necessary to enter and succeed in a defined profession or advanced academic program.

Competencies and Skills:

- Beer styles and overview of brewing
- Ingredients (malted barley, water, hops, yeast)
- Process I: Mash and Wort Production
- Process II: Fermentation
- Protein Analysis and Fermentation
- Process III: Packaging, Carbonation, and Oxidation
- Post-Production:
 - Microbiology and sanitation
 - Commercial brewing and guest brewers
- Current Topics in Brewing Research

Instructional Materials: No textbook required. Readings will be assigned in classes.

Course Requirements:

Quizzes: Quizzes will be worth 100 points each. There will be 10 quizzes over the course of the term that will occur at the start of class and cover material from the previous week. There will not be a quiz in the first week of the term.

Lab Assignments: Lab assignments will worth 10 points each and will be part of every lab. Lab assignments will be collected at the end of every class except in the first week.

Beer Research Paper: A 1-Page Beer Research Paper will be worth 100 points. It will be due the final week of the term (Week 11) and will be worth 10% of the final course grade.

Grading:

Quizzes = 100 points each = 1,000 points	45% of course grade
Lab Assignments = 100 points each = 1,000 points	45% of course grade
Beer Research Paper = 100 points	10% of course grade

A = 90-100% B = 80-89% C = 70-79% D = 60-69% F = 0-59%

ADA Statement:

Students who have a documented disability and require a classroom adjustment or accommodation should contact the Disabilities Coordinator/Career Education Advisor and provide the Approved Academic Accommodation form to the Instructor.

Academic Support Statement:

The Learning Center provides assistance to students with writing and math assignments. Hours are posted in the Library and classrooms. Peer tutors are available to assist students in a variety of subjects. Contact the Library for more information on peer tutoring.

Class Registration Statement:

Students may attend this course only if registered. Students who are unable to attend must drop the course through Student Services. To have tuition charges removed, the course must be dropped by the student before the drop with refund deadline in the Class Schedule. Students who never attend, or stop attending, without dropping may receive a NS, W, or F and will be required to pay for the course.

Grading Options Statement:

Students taking credit classes can choose between receiving traditional letter grades (A-F) and Pass/No Pass (P/NP) if the department has permitted both options for a course. *If you do not select a grading option*, you will automatically have the default grading option for that course. The default option is generally a letter grade, but could be pass/no pass. You can change your grading option through Student Services up until the eighth week of the term (for an eleven-week course). The only grading option available for each student is the one the student submitted during the selection timeframe. With the instructor's written permission, some courses may allow students to attend a course without receiving a grade or credit for the course. In order to Audit a class, you must return a signed form to Student Services. Your request must be processed by Student Services by the drop deadline for the course. You cannot opt into or out of (i.e. change your grading option from audit to a letter grade) after the drop deadline. Auditing a course does not satisfy requirements for entry into courses where prerequisites are specified.

Academic Integrity/Student Conduct Statement:

Students of Tillamook Bay Community College are expected to behave as responsible members of the College community while on campus and to be honest, ethical, and professional in their behavior and academic work. Tillamook Bay Community College strives to provide students with the knowledge, skills, judgment, and wisdom they need to function in society and careers as educated adults. Respect for others and behavior appropriate for a professional and educational environment is required of all. Behavior that violates the Code of Student Conduct, including any behavior disruptive to the educational process, is subject to disciplinary action. To falsify or fabricate the results of one's research; to present the words, ideas, data, or work of another as one's own; or to cheat on an examination is dishonest and corrupts the essential process of higher education. Academic dishonesty is also subject to disciplinary action. The full text of TBCC's Code of Student Conduct and Academic Integrity Policy can be found in the Student Rights and Responsibilities section of the TBCC Catalog.

Tentative Schedule by Week/Day and Date:

- Week 1. Beer Styles
- Week 2. Overview of Brewing
- Week 3. Ingredients (Malted Barley, Water, Hops, Yeast)
- Week 4. Process I: Mash and Wort Production
- Week 5. Process I: Mash and Wort Production Continued
- Week 6. Process II: Fermentation
- Week 7. Protein Analysis and Fermentation
- Week 8. Process III: Packaging, Carbonation, and Oxidation
- Week 9. Post-Production: Microbiology and Sanitation
- Week 10. Post-Production: Commercial Brewing and Guest Brewers

Week 11. Current Topics in Brewing Research
Beer Research Project Paper Due

Technology Statement:

Most students need the following in order to take courses at TBCC. You are still encouraged to take this class, but if you lack technical or skill knowledge, please see me after class or make an appointment so that we can talk.

Technical (need):

1. Access to a computer (at home, school, or work) which you can use for extended periods of time.
2. Broadband internet access (cable modem, DSL, or other high speed).
3. Firefox 3.0 or later or Internet Explorer 7 or later. Safari and Chrome also work.
4. Permission/ability to install plug-ins or class software (e.g. Adobe Reader or Flash).
5. Highly recommended: up-to-date anti-virus software. If you are using your own computer check out the free anti-virus program at www.Avast.com.

Skills (ability):

1. Navigate web sites, including downloading and reading files from web sites.
2. Download and install software or plug-ins such as Adobe Reader or Flash.
3. Use email, including attaching and downloading documents/files from emails.
4. Save files in commonly used word processing formats (.doc, .docx, .rtf).
5. Copy and paste text and other items on a computer.
6. Save and retrieve documents and files on your computer.
7. Locate information on the internet using search engines.



Course Content and Outcomes Guide

DATE: 2/14/2014
SUBMITTED BY: Jeff Sherman/Emily Henry/Lori Gates
COURSE NUMBER: **FST 253**
COURSE TITLE: **Beer Making Laboratory**
CREDIT HOURS: 1

LECTURE HOURS:
LECTURE/LAB HOURS:
LAB HOURS: 30

SPECIAL FEE:

COURSE DESCRIPTION and PREREQUISITES:

Integrates the science of brewing into the procedural aspects of making beer for advanced home brewers and early career professional brewers. Prerequisite(s): 21 years of age or older.

ADDENDUM TO COURSE DESCRIPTION:

This course is intended to articulate to Oregon State University (OSU).

Suggested Reading Sources:

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Handbook of Brewing, 2nd Ed. Priest and Stewart. (2006).
Beer: Tap into the Art and Science of Brewing. Bamforth. (2003).
Essays in Brewing Science. Lewis.

INTENDED COURSE OUTCOMES:

1. Recognize the expansive variety of beer styles and how differences in ingredients and process lead to this diversity.
2. Identify the raw ingredients of beer and understand the molecular transformations that take place during brewing.
3. Apply scientific principles and methodologies as they relate to the brewing process.
4. Recognize techniques used by brewing scientists.
5. Appreciate beer and brewing in relation to the larger world.
6. Apply current industrial brewing practices and identify alternative methodologies.
7. Describe findings of independent research, orally and in writing.

OUTCOME ASSESSMENT STRATEGIES:

Student learning outcomes will be evaluated through a variety of means, including (but not limited to) some or all of the following:



- Problem sets
- Written assignments
- Lab reports
- Attendance and participation
- Presentations
- Quizzes

COURSE CONTENT (Themes, Concepts, Issues) and SKILLS:

Course Topics:

- Beer styles and Overview of Brewing
- Ingredients (malted barley, water, hops, yeast)
- Process I: Mash and Wort Production
- Process II: Fermentation
- Protein Analysis and Fermentation
- Process III. Packaging, carbonation, and oxidation
- Post-Production:
 - Microbiology and Sanitation
 - Commercial Brewing
- Current Topics in Brewing Research

OUTCOMES CROSSWALKS	
Identify which course outcome aligns to individual program learning outcomes. It is possible that all program outcomes may not be address by the course outcomes.	
Course Outcomes	Program Outcomes
<i>Students who complete this course should be able to:</i>	
<ul style="list-style-type: none"> • Recognize the expansive variety of beer styles and how differences in ingredients and process lead to this diversity. 	<ul style="list-style-type: none"> • Perform critical reasoning, perceive assumptions, and make judgments based on the basic principles of agriculture, natural resources, and related fields. • Exhibit critical thinking skills when addressing issues in agriculture, natural resources, and related fields.
<ul style="list-style-type: none"> • Identify the raw ingredients of beer and understand the molecular transformations that take place during brewing. 	
<ul style="list-style-type: none"> • Apply scientific principles and methodologies as they relate to the brewing process. 	
<ul style="list-style-type: none"> • Recognize techniques used by brewing scientists. 	
<ul style="list-style-type: none"> • Appreciate beer and brewing in relation to the larger world. 	
<ul style="list-style-type: none"> • Apply current industrial brewing practices and identify alternative methodologies. 	

<ul style="list-style-type: none"> Describe findings of independent research, orally and in writing. 	<ul style="list-style-type: none"> Communicate effectively, both in writing and orally, agriculture and natural resource concepts.
Identify which course outcome aligns to individual institutional learning outcomes (ILOs). It is possible that all ILOs may not be address by the course outcomes.	
Course Outcomes	ILOs
<i>Students who complete this course should be able to:</i>	
1. Recognize the expansive variety of beer styles and how differences in ingredients and process lead to this diversity.	ILO #8 Analyze and evaluate information to address issues and solve problems. ILO #13 Demonstrate the knowledge, skills, and professional attitude necessary to enter and succeed in a defined profession or advanced academic program.
2. Identify the raw ingredients of beer and understand the molecular transformations that take place during brewing.	
3. Apply scientific principles and methodologies as they relate to the brewing process.	
4. Recognize techniques used by brewing scientists.	
5. Appreciate beer and brewing in relation to the larger world.	
6. Apply current industrial brewing practices and identify alternative methodologies.	
7. Describe findings of independent research, orally and in writing.	ILO #4 Write purposefully, capably, and ethically in a variety of contexts. ILO#5 Speak with clarity, skill, and appropriateness before a variety of audiences.

Lesson Plan: Beer Styles Lesson

Objectives:

- Understand the various beer styles, and which areas of the world have prominent style preferences
- Describe the difference between ale and a lager
- Describe a hybrid style of beer
- Understand the variations of ingredients that affect style

References:

<http://www.beeradvocate.com/beer/style/>

The screenshot shows the BeerAdvocate website interface. At the top, there is a navigation bar with links for Home, Forums, Beers, Places, Events, Trading, and Magazine. Below this is a search bar and a 'Sign Up Now!' button. The main content area is titled 'Beer Styles' and contains a definition of a beer style, a note about its use as a reference, and two columns of links for 'Ale Styles' and 'Lager Styles'. The 'Ale Styles' column lists 'American Ales' and 'American Amber / Red Ale'. The 'Lager Styles' column lists 'American Lagers' and 'American Adjunct Lager'. On the right side, there are two sections: 'What's an Ale?' and 'What's a Lager?', each with a brief description of the beer style.

Log in or Sign up

Beeradvocate

YOUR KEY TO THE CITY IS A FORK

Portland IS HAPPENING Now
MARCH IS DINING MONTH

Home Forums **Beers** Places Events Trading Magazine Log in

Your Beers Add Beer Top 250 Beers Beer Styles Beer 101 Respect Beer

Search...

Sign Up Now!

Home > Beers

Tickets for American Craft Beer Fest are on sale now! (May 30 & 31 in Boston, MA)

BA mobile American Craft Beer Fest

Beer Styles

What's a beer style? Simply put, a beer style is a label given to a beer that describes its overall character and often times its origin. It's a name badge that has been achieved over many centuries of brewing, trial and error, marketing, and consumer acceptance. Our styles reflect our spin on the constantly evolving world of beer, with non-geek descriptions broken down for all to understand. Click on any of the styles below to find out more about them, including our recommendations for Food Pairings, Glassware, and Cellaring/Serving Temperatures.

Note: This is not the bible for beer styles, but should be viewed as a work-in-progress and a fun reference that's open to change and interpretation.

Ale Styles

American Ales
American Amber / Red Ale

Lager Styles

American Lagers
American Adjunct Lager

What's an Ale?

This category of beer uses yeast that ferments at the "top" of the fermentation vessel, and typically at higher temperatures than lager yeast (60°-75°F), which, as a result, makes for a quicker fermentation period (7-8 days, or even less). Ale yeast are known to produce by-products called esters, which are "flowery" and "fruity" aromas ranging, but not limited to apple, pear, pineapple, grass, hay, plum, and prune.

What's a Lager?

The word *lager* comes from the German word *lagern* which means, "to store". A perfect description as lagers are brewed with bottom fermenting yeast that work slowly at around 34 degrees F, and are often further stored at

Assignment: Creating a Beer Recipe

Thinking like a home-brewer, create two different 5-6 gallon all-grain beer recipes. The recipe should include:

- Step-by-step instructions, including mash schedule, times, etc. (someone who has never brewed should be able to make beer with these instructions)
- Detailed ingredient list
- Temperature and abv targets

Lesson Plan: Mash and Wort Production

Objectives:

- Define the terms: wort, mash, sparge, lautering, and grainbed in beer production
- Describe the process of creating a mash
- Describe the process of creating wort
- Understand the various processes associated with creating the “perfect” beer

References:

<http://howtobrew.com/intro.html>

CONTENTS

[Site Map](#)

[Introduction](#)

[Section 1](#)

[Brewing Your First Beer With Malt Extract](#)

[Section 2](#)

[Brewing Your First Extract and Specialty Grain Beer](#)

[Section 3](#)

[Brewing Your First All-Grain Beer](#)

[Section 4](#)

[Formulating Recipes and Solutions](#)

Introduction

There are many good books on homebrewing currently available, so why did I write one you ask? The answer is: a matter of perspective. When I began learning how to brew my own beer several years ago, I read every book I could find; books often published 15 years apart. It was evident to me that the state of the art had matured a bit. Where one book would recommend using baking yeast and covering the fermenting beer with a towel, a later book would insist on brewing yeast and perhaps an airlock. So, I felt that another point of view, laying out the hows and whys of the brewing processes, might help more new brewers get a better start.

Here is a synopsis of the brewing process:

1. Malted barley is soaked in hot water to release the malt sugars.
2. The malt sugar solution is boiled with Hops for seasoning.
3. The solution is cooled and yeast is added to begin fermentation.
4. The yeast ferments the sugars, releasing CO₂ and ethyl alcohol.
5. When the main fermentation is complete, the beer is bottled with a little bit of added sugar to provide the carbonation.

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Sounds fairly simple doesn't it? It is, but as you read this book you will realize the incredible amount of information that I glossed over with those five steps. The first step alone can fill an entire book, several in fact. But brewing is easy. And it's fun. Brewing is an art as well as a science. Some people may be put off by the technical side of things, but this is a science that you can taste. The science is what allows everyone to become the artist. Learning about the processes of beer making will let you better apply them as an artist. As my history teacher used to chide me, "It's only boring until you learn something about it. Knowledge makes things interesting."

As an engineer, I was intrigued with the process of beermaking. I wanted to know what each step was supposed to be doing so I could understand how to better accomplish them. For instance, adding the yeast to the beer wort: the emphasis was to get the yeast fermenting as soon as possible to prevent unwanted competing yeasts or microbes from getting a foothold. There are actually several factors that influence yeast propagation, not all of which were explained in any one book. This kind of editing was an effort by the authors to present the information that they felt was most important to overall success and enjoyment of the hobby. Each of us has a different perspective.

Fortunately for me, I discovered the Internet and the homebrewing discussion groups it contained. With the help of veteran brewers on the Home Brew Digest (an Internet mailing list) and Rec.Crafts.Brewing (a Usenet newsgroup) I soon discovered why my

first beer had turned out so brilliantly clear, yet fit only for mosquitoes to lay their eggs in. As I became more experienced, and was able to brew beer that could stand proudly with any commercial offering, I realized that I was seeing new brewers on the 'Net with the same basic questions that I had. They were reading the same books I had and some of those were excellent books. Well, I decided to write an electronic document that contained everything that a beginning brewer would need to know to get started. It contained equipment descriptions, process descriptions and some of the Why's of homebrewing. I posted it to electronic bulletin boards and homebrewing archive computer sites such as Sierra.Stanford.edu . It was reviewed by other brewers and accepted as one of the best brewing guides available. It has been through four revisions as comments were received and I learned more about the Why's of brewing. That document, "How To Brew Your First Beer" is still available and free to download and/or reproduce for personal use. It was written to help the first-time brewer produce a fool-proof beer - one they could be proud of. That document has apparently served quite well, it has been requested and distributed world-wide, including Europe, North America, Australia, Africa, and Asia- the Middle East and the Far East. Probably several thousand copies have been distributed by now. Glad I could help.

As time went by, and I moved on to Partial Mashers (half extract, half malted grain) and All-Grain Brewing, I actually saw requests on the 'Net from brewers requesting "Palmer-type" documents explaining these more complex brewing methods. There is a lot to talk about with these methods though, and I realized that it would be best done with a book. So, here we go...

Oh, one more thing, I should mention that Extract Brewing should not be viewed as inferior to brewing with grain, it is merely easier. It takes up less space and uses less equipment. You can brew national competition winning beers using extracts. The reason I moved on to Partial Mashers and then to All-Grain was because brewing is FUN. These methods really let you roll up your sleeves, fire up the kettles and be the inventor. You can let the mad-scientist in you come forth, you can combine different malts and hops at will, defying conventions and conservatives, raising your creation up to the storm and calling down the lightning...Hah hah HAH....

But I digress, thermo-nuclear brewing methods will be covered in another book. Okay, on with the show...



next
page



Buy the print edition
Appendix A - Using
Hydrometers

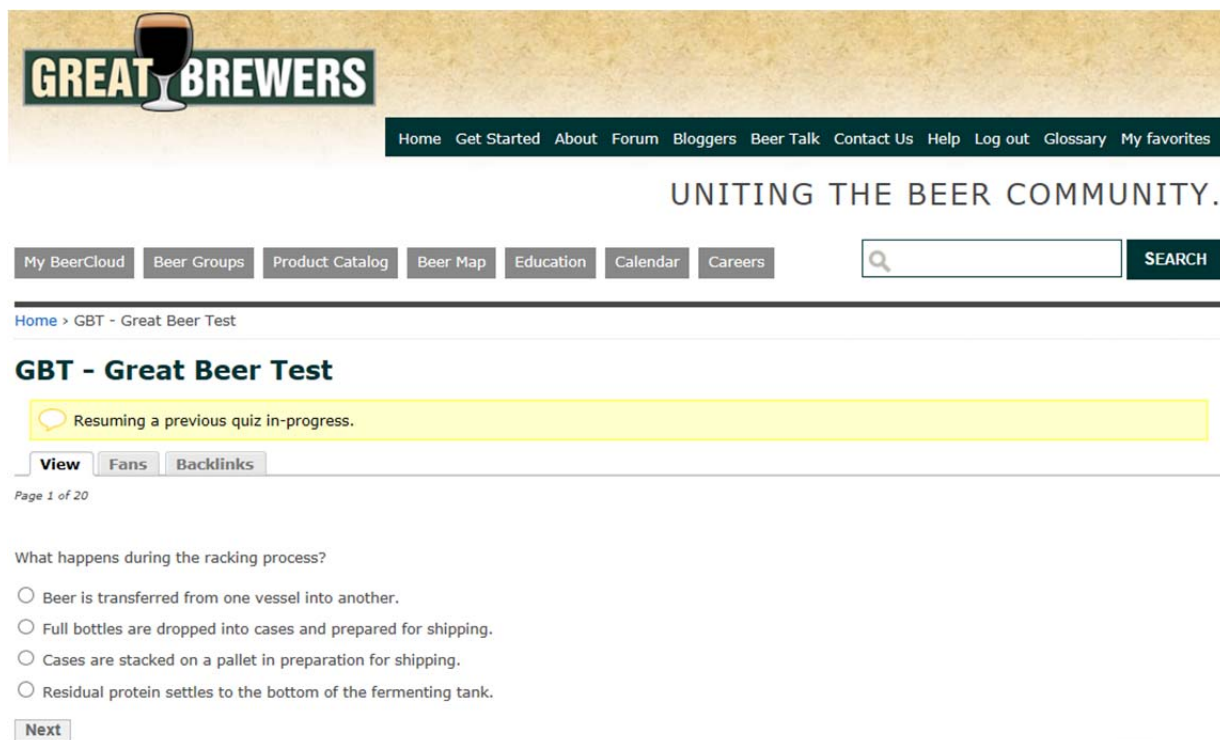
Search How To Brew:

Assessment: The Great Beer Test

Take the “Great Beer Test” (link below), screenshot your results at the end of the test, and send to the instructor.

<http://greatbrewers.com/quiz/gbt-great-beer-test>

Please note: you will need to create an account with the Great Brewers website before being able to access this test. Personal information required is minimal.



The screenshot shows the Great Brewers website interface. At the top left is the logo for "GREAT BREWERS" featuring a glass of beer. To the right of the logo is a navigation menu with links: Home, Get Started, About, Forum, Bloggers, Beer Talk, Contact Us, Help, Log out, Glossary, and My favorites. Below the navigation menu is the tagline "UNITING THE BEER COMMUNITY." and a search bar with a "SEARCH" button. A secondary navigation bar contains links for My BeerCloud, Beer Groups, Product Catalog, Beer Map, Education, Calendar, and Careers. The main content area shows the breadcrumb "Home > GBT - Great Beer Test" and the title "GBT - Great Beer Test". A yellow notification bar states "Resuming a previous quiz in-progress." Below this are buttons for "View", "Fans", and "Backlinks". The page number "Page 1 of 20" is displayed. The first question is "What happens during the racking process?" with four radio button options: "Beer is transferred from one vessel into another.", "Full bottles are dropped into cases and prepared for shipping.", "Cases are stacked on a pallet in preparation for shipping.", and "Residual protein settles to the bottom of the fermenting tank." A "Next" button is located at the bottom of the page.

GREAT BREWERS

Home Get Started About Forum Bloggers Beer Talk Contact Us Help Log out Glossary My favorites

UNITING THE BEER COMMUNITY.

My BeerCloud Beer Groups Product Catalog Beer Map Education Calendar Careers

SEARCH

Home > GBT - Great Beer Test

GBT - Great Beer Test

Resuming a previous quiz in-progress.

View Fans Backlinks

Page 1 of 20

What happens during the racking process?

- Beer is transferred from one vessel into another.
- Full bottles are dropped into cases and prepared for shipping.
- Cases are stacked on a pallet in preparation for shipping.
- Residual protein settles to the bottom of the fermenting tank.

Next

Assignment: Brewing Research Summary

In a one page summary, describe a brewing research project which you have read about. Also provide your perceived justification for the project (what is the impact on industry?).

Assessment: Beer Research Project

	"A" Paper	"B" Paper	"C" Paper	"D" Paper	"F" Paper
Grammar and Punctuation	Perfect grammar and punctuation	A few minor edits	Edits needed	Obvious lack of grammar and punctuation	Complete absence of grammar and punctuation
Sources accurately cited	Yes	--	In bibliography, but not text	--	No
Overall structure of the paper	Student clearly understand the research and is able to articulate the applications in industry	One page paper described the research and relates back to industry	One page paper discussed research and mentioned application	One page paper covered research	Complete lack of assignment understanding

Equal Employment Opportunity

CASE is a WIA Title I- financially assisted program and is therefore an equal opportunity employer/program which provides auxiliary aids and services upon request to individuals with disabilities by calling 711 or 800.648.3458 TTY.

US Department of Labor

The CASE grant project (\$18,679,289) is 100% funded through the US Department of Labor's Trade Adjustment Assistance Community College and Career Training program.

DOL Attribution

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