



THE CHEMISTRY OF WINEMAKING COURSE OUTLINE

A. GENERAL INFORMATION:

Complementary Course: Domain – Science and Technology – Ensemble 2
Course Title: The Chemistry of Winemaking

Course Code:	202-DBA-03	Time:	
Semester:		Labs:	
Ponderation:	3-0-3	Classroom:	AME-429
Credits:	2		
Pre-requisites:	none		
Competency Code:	000Y		

Competency: Students learn to apply the scientific method to a range of fermentation processes in order to optimize the resulting product.

Instructor:

Office: Email: Phone: Office hours:
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John Abbott College is located on unceded Indigenous lands, the traditional territory of both the Kanien'kehá:ka ("Mohawk") and the Anishinabeg ("Algonquin") peoples.

B. INTRODUCTION

Complementary courses provide an opportunity for students to explore subjects outside their field of concentration. The techniques of winemaking and beer brewing are presented in this course from a chemical perspective. The chemistry of fermentation is examined against a backdrop of wine and beer culture, including the history of wine and beer, the cultivation of grapes, and modern scientific winemaking and beer brewing practices.

In this course the focus will be on the science of winemaking and beer brewing, which can be carefully and precisely analysed. Cultivating grapes can be optimised by scientific agricultural practices. Knowing and understanding the science involved in the subsequent winemaking allows winemaking parameters to be manipulated to optimise the quality of the resulting wine. This approach can also apply to beer brewing. Furthermore, the ingredients of beer are much more varied, and therefore can be manipulated to a greater degree.

Generally speaking, scientists investigate topics in the sciences, following what is known as the **scientific method**, a protocol comprised of several well-defined steps.

1. Identifying a scientific problem or **question**
2. Suggesting a **hypothesis** to answer the question
3. Devising and carrying out **experiments** to test the hypothesis
4. Collecting and analysing the **data** from the experiments
5. Drawing **conclusions** from the data about the hypothesis
6. Forming a **theory**, or returning to do more experiments

In this course, we will apply the scientific method in an attempt to produce and refine a batch of wine and/or a batch of beer. Controlling the parameters in winemaking and beer brewing when possible, we will examine the effect of this control and draw conclusions about the results. The link between this process and the scientific method is outlined in more detail below.

SCIENTIFIC METHOD	WINE	BEER
QUESTION	Can one make consistently make good wines (with good acid, alcohol and sugar balance) despite the vagaries of the weather if one follows stringent scientific winemaking techniques?	Can one make consistently good beers (with a suitable bitterness, and sufficient alcohol and sugar balance) if one follows stringent scientific beer brewing techniques?
HYPOTHESIS	There is a link between the high quality of a wine and the ratio of acid, alcohol, and residual sugar that it contains	There is a link between a pleasingly flavoured beer and the ratio of hops and alcohol, and the degree of roasting of the grains
EXPERIMENTS	Make several litres of both red and white wine in which the acid and sugar level are adjusted prior to fermentation. Analyse the wine to determine the alcohol and residual sugar content, and the acid content	Make a batch of beer with grains of selected darkness, and a predetermined amount of hops. Control the alcohol by the initial amount of sugar
DATA	Taste and evaluate the wine!	Taste and evaluate the beer!
CONCLUSIONS	Do adjustments need to be made to any of the parameters analysed?	Do adjustments need to be made to any of the parameters analysed?
THEORY	The control of acid and alcohol proportions in wine allows the quality of the wine to be optimized.	Manipulation of the amount of hops and alcohol, and the degree of roasting of the grains allows the quality of the beer to be optimized.

C. COURSE OBJECTIVES

The Chemistry of Winemaking and Beer Brewing is designed primarily for Social Science and other Non-Science students who want to learn about wines and beers, and how to successfully make them at home. No pre-requisite is required. Optimal winemaking and beer brewing will be explored using *the scientific method*, as described above.

D. EVALUATION PLAN – *all elements will link to the Objectives described in C.*

2 term tests	50% (Weeks ~ 8 and ~ 15)
Assignments	10% (biweekly - alternate weeks based on scheduled Experiments)
Class Activities	10% (weekly)
Experiments	30% (biweekly)

- *The two term tests will comprise the final evaluation.*

The term tests will be written in class. The **Class Activities** (listed below in “Class Activities”) will involve various in-class evaluations such as quizzes and/or tasting exercises, held on a weekly basis. The **Experiments** (listed below in “Experiments”) will be done in class, and evaluated based on a completed data sheet handed in at the end of class.

E. COURSE CONTENT

The course consists of 3 hours per week divided between lecture time and lab time. The following topics will be discussed in the lectures, in the order given below. (Note: The order of class topics may be altered).

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|---|---|
| a) <u>History and geography of winemaking</u> | f) <u>Wine tasting</u> |
| b) <u>Alcoholic fermentation</u> | g) <u>History of beer brewing</u> |
| c) <u>Composition of grapes, grape juice, must and wine</u> | h) <u>Ingredients used in beer brewing</u> |
| d) <u>Wine preparation details</u> | i) <u>Small scale scientific beer brewing</u> |
| e) <u>Small scale scientific winemaking</u> | j) <u>Beer tasting</u> |

Class Activities

The following activities are planned to be held on an approximate weekly basis, and their corresponding evaluations will make up the Class Activities portion of the final grade.

- Identification of distinct aromas in wine
- Climate change activity
- Wine tasting and comparison of home and commercial wines
- Beer tasting and comparison of home and commercial beers
- Viewing of short videos covering the history of winemaking

Experiments/Laboratories

The following experiments are planned to be held on an approximate biweekly basis*, and their corresponding evaluations will make up the Experiments portion of the final grade.

- How to use a hydrometer (on-line)
- Determination of specific gravity using a hydrometer (in-class)
- Refractive Index to Assess Sugar Content (in-class)
- Determination of total acidity of Fruit Juice (in-class)
- Determination of total acidity of Wine (in-class)
- Determination of fixed and volatile acidity of wine or beer (in-class)

* Five experiments (excluding Lab 1) will occur every second week (as assigned) where you will perform the experiment and collect the data. The students will be allocated to either a Group A or Group B and that will be the week that the student will perform their “wet” lab.

Safety Information: This course uses chemicals as part of its normal teaching practices. Because of the lab work involved in this course, no **eating or drinking during class is allowed**. If any student has experienced allergic reactions in the past to any particular chemical or chemicals, he/she must inform the teacher. Safety glasses must be worn during lab exercises. These will be provided to the students.

F. REQUIRED TEXTS; COURSE COSTS IN ADDITION TO TEXTS

There is no text book for this course; however, there **are** course notes and laboratory experiments that will be made available on LEA throughout the course of the semester.

Note: If the student chooses to make a batch of wine or beer at home, this would cost around \$110 (~\$60 for equipment and ~\$50 for ingredients).

G. BIBLIOGRAPHY

- a) The Sommelier Prep Course. An introduction to the wines, beers and spirits of the world by Michael Gibson.
- b) Other online links will be provided as necessary.

H. TEACHING METHODS

The course consists of a combination of lectures and laboratory exercises that highlight techniques that are useful in scientific winemaking. In addition, other audiovisual material such as short films will be used.

The course will be 45 hours, divided into Lecture and Laboratory components.

Lectures (See section E for course content):

The lectures will mainly be given using PowerPoint slides. They will consist of an introduction of new material. A series of handouts may be provided in addition to material presented from the course notes. The use of various film documentaries will be an integral part of the course. In addition, preparation for upcoming laboratory sessions may be discussed during lecture time (as needed).

Laboratories (See section E for Experiment titles):

These sessions will take place in class and will include experiments related to wine and/or beer chemistry as presented in class. These sessions will consist of 6 in-class “wet” experiments. You will have an in-class wet lab every second Wednesday where you will perform the experiment and collect the data. The other alternate Wednesday where the student does not have a scheduled lab, will be used for data analysis and completion of the lab report. In addition, assignments will be given at that alternate time and will be required to be completed during the same week. The given assignments will be evaluated and graded separately from labs (See section D).

Students will also have the option of making their own wine at home, with instructor guidance. Although not mandatory, this enhances the experience of the course and is highly recommended.

I. DEPARTEMENTAL POLICIES:

- a) Attendance policy: (*Policy 6*) Students are expected to attend all lecture and laboratory sessions. Students are responsible for all assigned work, lecture material and other course related material announced or assigned during class. Attendance for laboratory periods is mandatory. Missing a lab period without a valid reason may result in a grade of zero being assigned to any work assigned during that period.

However, please do not come to in-person labs or tests if you are sick or showing any COVID-19 related symptoms. Be assured that we will arrange make up work or some alternative.

- b) Policy relating to late submission: (*Policy 7*) All assigned work is to be submitted on time. Late submission may be accepted, with or without penalty, and will be determined on a case by case basis.

- c) Policy dealing with the use of cell phones, laptops and other technology: (*Policy 13*) Use of personal electronic devices is permitted in the classroom or laboratory with teacher's permission.

Please Note:

1. If you miss an evaluation session or deadline due to illness or other valid reason, you must notify your instructor as soon as possible. A valid medical note is required to prove absence for a medical reason. If a test is missed for a valid reason, then a make-up test/assignment will be arranged to be used as a basis for a substitute for the missed test mark.
2. A special note concerning the use of chemicals: this course uses chemicals as part of its normal teaching practices. If a student has experienced allergic reactions in the past due to any particular chemical or chemicals he or she must inform the instructor. In the event that an allergic reaction is experienced at the college, the student should report to Campus Security immediately (local 6911, or 9-514-457-6911).
3. Students are expected to behave respectfully towards their classmates and teachers. In case of inappropriate behavior, a student will be asked to leave the class or the lab session. If an assessment is planned for this session, a mark of zero will be given in that case.

J. COLLEGE POLICIES:

Policy No. 7- IPESA, Institutional Policy on the Evaluation of Student Achievement

<http://departments.johnabbott.qc.ca/wp-content/uploads/2017/08/Policy-7-IPESA.pdf>

- a) **Changes to Evaluation Plan in Course Outline (Article 5.3).** All changes to evaluation plan in the course outline must have documented unanimous consent from the regularly attending students affected by the change(s) before submission.
- b) **Evaluation (Article 6)**
Teachers should evaluate and enter grades for a sufficient number of assessments in Gradebook in order that the College may advise DEC students of their progress by mid semester as per the ACADEMIC PROCEDURE: Academic Progress by Mid Semester.
- c) **Religious Holidays (Article 3.2)**
Students who wish to miss classes in order to observe religious holidays must inform their teacher of their intent, in writing, within the first two weeks of the semester.
- d) **Student Rights and Responsibilities (Article 3.2 and Article 3.3)**
It is the responsibility of students to keep a copy of all assessed material returned to them and/or all digital work submitted to the teacher for at least four (4) weeks past the grade submission deadline (See current Academic Calendar) in the event that they request a Final Grade Review (Refer to Article 8)
Students have the right to receive graded evaluations, for regular day division courses, within two weeks after the due date or exam/test date, except in extenuating circumstances. A maximum of three (3) weeks may apply in certain circumstances (ex. major essays) if approved by the department and stated on the course outline

e) **Cheating and Plagiarism** (Article 9)

Cheating and plagiarism are serious infractions against academic integrity which is highly valued at the College; they are unacceptable at John Abbott College. Students are expected to conduct themselves accordingly and must be responsible for all of their actions.

Cheating means any dishonest or deceptive practice relative to examinations, tests, quizzes, lab assignments, research papers or other forms of evaluation tasks. Cheating includes, but is not restricted to, making use of or being in possession of unauthorized material or devices and/or obtaining or providing unauthorized assistance in writing examinations, papers or any other evaluation task and submitting the same work in more than one course without the teacher's permission. It is incumbent upon the department through the teacher to ensure students are forewarned about unauthorized material, devices or practices that are not permitted.

Plagiarism is a form of cheating. It includes copying or paraphrasing (expressing the ideas of someone else in one's own words), of another person's work or the use of another person's work or ideas without acknowledgement of its source. Plagiarism can be from any source including books, magazines, electronic or photographic media or another student's paper or work.

K. PROVISIO:

- Due to the COVID-19 health crisis, attendance policies may need to be adjusted by your teacher. The normal attendance expectations are outlined below and your teacher will inform you of any modifications as needed. Please note that attendance continues to be extremely important for your learning, but your teacher may need to define it in different terms based on the way your course is delivered during the fall semester.
- Please note that course outlines may be modified if health authorities change the access allowed on-site.
- In addition to LEA, Teams and Moodle, additional software may be used for the submission of essays or projects or for testing. Further details will be provided if applicable.
- Classes on Teams may be recorded by your teacher and subsequently posted on Teams to help for study purposes only. If you do not wish to be part of the recording, please let your teacher know that you wish to not make use of your camera, microphone or chat during recorded segments. Any material produced as part of this course, including, but not limited to, any pre-recorded or live video is protected by copyright, intellectual property rights and image rights, regardless of the medium used. It is strictly forbidden to copy, redistribute, reproduce, republish, store in any way, retransmit or modify this material. Any contravention of these conditions of use may be subject to sanction(s) by John Abbott College.