# Providence Extension Program - Organic Chemistry
## 2018/ 2019 - Class Syllabus

**Instructor**
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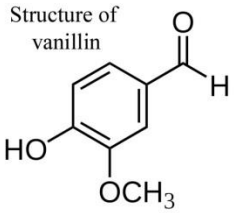


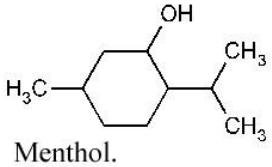

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**Course Materials**
√ *Organic Chemistry – Principles and Mechanisms*, by Joel Karty
√ *Organic Chemistry – Principles and Mechanisms Solutions Manual*
√ *The Mystery of Life's Origin: Reassessing Current Theories*, by Charles B. Thaxton, Walter L. Bradley, and Roger L. Olsen (free link for the pdf file for this book will be provided)
√ Binder (2-inch ring capacity)
√ About 15 dividers, one for each chapter covered in textbook
√ Paper for taking notes, and completing homework problems
√ Internet access at home for watching YouTube videos and screencasts as assigned
√ Laboratory notebook – will discuss in class – hold off on purchase!

**Grading**
Please refer to the PEP Student Information System (SIS) for current grades. Depending on assignments, allow up to one week for grades from the time they are turned in. Your total course grade will be based upon your performance in these key areas, as follows:

Chapter take-home tests – 35%
In-class Quizzes – 15%
Homework Assignments – 25%
Special Topics/ Assignments (one per quarter) – 10%
Laboratory/ Projects – 15%

***Chapter Tests***
You will have a chapter test *about* every two to three weeks. These tests are to be closed-book, closed-note tests. You will complete these at home *under the supervision of a parent*. Please allow yourself up to two hours for each test. Completed tests are to be signed by your parents – since they will be many pages in length, they do not need to be placed in envelopes.

***In-class Quizzes***
Once a week, on Wednesdays, I will give you a quiz on your reading for the week, and perhaps over content we covered in the class prior. You will have about five to ten minutes to complete these quizzes.

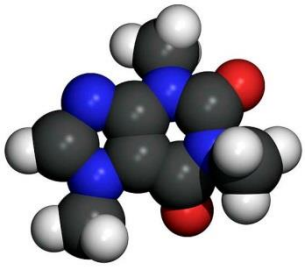
***Homework Assignments***
These will be graded on completion and neatness. This course will require that you write thousands of chemical symbols over the next year (Lewis structures, line drawings of compounds, dash and wedge notations, Newman and Fischer projections, etc.), so please write these neatly for your own notes. This practice will better assist you to process the content. All in-text and end of chapter *Problems* and *Your Turns* are to be completed. You may want to complete these as you come across them in your reading.

***Special Topics/ Assignments***
Once a quarter, a reading will be required on the topic of chemical evolution and organic synthesis, along with a response paper, written in APA format. Darwinian evolution – as a theory for life's origins and species diversity, is experiencing some significant cracks and fissures at the highest levels of academia: in peer-reviewed journals and conferences. Of course, these cracks and fissures are not making their way down to the high school level textbook, or in popularized science. The purpose of this section of the course is so that you become a well-versed skeptic of Darwinism on the basis of its very marginal science. There is also much to learn about organic chemistry itself in these readings.

For these assignments, you will read articles by Rice University synthetic organic chemist, Dr. James Tour, along with a few other scientists. These articles will be provided as pdf files.

***Laboratory***
You will get the most out of lab if you read the entire experiment and complete the pre-lab questions (where applicable). You will be working in partners, so part of being a good partner is coming to the lab session well prepared. For any *synthesis* or *extraction* labs, you will need to write the protocols down in a laboratory notebook. I will go over protocols for keeping a laboratory notebook at the time of our first synthesis or extraction lab. For the year, you will need to write up two or three labs in APA and IMRAD format. We will go over the protocol in lab class for your success in this form of technical writing. These labs are for your own experience and portfolio.

**Course Pre-requisites**
General Chemistry (or special permission by instructor)
Willingness to endure pain



Please bring to every class:
- √ Organic Chemistry textbook
- √ Binder and paper
- √ writing utensils
- √ homework assignments and tests (on days they are due)
- √ Printed out laboratories (when applicable)

**Final Exam**
All PEP Juniors and Seniors are required to take a final exam in the chemistry class. This exam will be included in your fourth quarter grade. If you do not show up for the final, your grade will be a zero – there are no make-ups for this exam. The final for this class will be comprehensive.

**Organizational Materials**
I have prepared the following materials to keep you organized throughout the course of the year:
(1) *Week-at-a-Glance* – this is for you to tack to your cork-board at home, and place in your binder, so you can see at a glance, what assignments are due during each week.
(2) *Weekly Weebly Update* – by the end of the day every Friday, I will update my Weebly webpage with a summary of material we covered that week, an introduction to material coming up, along with a checklist for assignments due the next week. Once the website is updated, I will send you a notification.

Organic Chemistry – you should attempt reading assignments as shown in Week-at-a-Glance prior to class. Please attempt to answer the Problems and Your Turns as you come across them in the reading. These will all be due when you turn in your Tests.

## Note to the Student

Several summers ago, I spent considerable research on organic chemistry education. My curiosity stemmed from the fact that I wanted to know *why* students have so much difficulty with this course; why is it such a "major-changer?" I came across a huge body of chemical education research, with very actionable solutions for making organic chemistry more accessible to you. In this course, I plan to implement all the best ideas of research I was able to read and digest.

Please read the sections below. I wanted to share with you a summary of what I discovered about organic chemistry education. The reason I am asking this is simple – since most of you will more than likely take organic chemistry in college, I want you to know what the researchers attribute student difficulty to, and to avoid these very pitfalls in both this course and the one you'll take in college. I placed in-text citations as a matter of courtesy to these researchers because these conclusions are not my own – they belong to those cited. The journal articles from which these notions originated are in the references section at the end of this syllabus. It is not an exaggeration to surmise that *thousands* of articles have been written on organic chemistry education, and fortunately, in the last ten years some real progress has been made in making this course understandable and accessible to students.

<u>Why students fail.</u>

Organic chemistry is a notorious class among college undergraduates, with failure and withdrawal rates of 30 to 50% in many universities (Grove, Hershberger & Bretz, 2008). The reasons for failure are complex, but Grove and Bretz (2012) stated, **"**We believe that many of the difficulties that students encounter in learning organic chemistry ultimately stem from an over-reliance on rote memorization without using more meaningful techniques." Many researchers concur, that rote memorization is an extremely ineffective strategy for success. Karty (2007) expresses his annoyance with the idea that students perceive organic chemistry to be so difficult because of an overwhelming amount of memorization! In his book, *Get Ready for Organic Chemistry*, Karty under no uncertain terms gives these admonitions: "Memorization is attractive. But if you want to succeed in this course, you must keep it to an absolute minimum" (p.4), and again warns, "…think of the various ways in which you might be tempted to memorize – and then avoid them!" (p. 158).

Please do not employ memorization strategies for this class. Joel Karty - who adamantly admonishes students to not memorize - is the author of the text we are using. He maintains that students memorize because they are confused by the organization of traditional textbooks, which organize content around *functional groups*, rather than *mechanisms* - in a month, you will know exactly what that means. Karty organized his text around *mechanisms* in order to minimize memorization demand – I believe you will find his text to be very readable and its sequence is quite logical. I contacted him through email, and he is intrigued at the idea of high schoolers learning organic chemistry and is interested in our class progress.

Other researchers have suggested that students perform poorly because they don't integrate new information with things they already know, so they find much of the content to be irrelevant (Grove, et. al., 2008). As you learn the material, please do your best to relate it to things you are already familiar with.

Flipped course format

Because you have had the blessings of a homeschool education, you may not be aware of the "traditional" classroom format that is contrasted with a "flipped" course format. In a traditional classroom whether we are talking about college or high school, the teacher lectures the student on introductory and basic principles of given topics; it is requisite then for the student in their own time to apply these basic concepts in more advanced ways - such as solving problems - with little added input from the teacher. By contrast, in a flipped course format, the *students teach themselves basic concepts*, and come to the discussion hour to address the more advanced application of those basics. It seems that most homeschool courses by necessity are taught by this method.

Research in the flipped format as applied to college level courses has shown results that are promising, especially in organic chemistry. Professors are reporting reductions in the failure and drop-out rates of students (Flynn, 2015) because class time can be dedicated to the more difficult concepts, since students teach themselves the basics. Joel Karty – the author of your text - similarly uses a flipped-course format

Please make sure you come to class *already having read the material for the day*. Even if you don't understand everything, you will certainly understand much. By doing this, we can address misunderstandings and more advanced applications of the material during the discussion hour.

Laboratory

Laboratory sessions are designated for (1) digging deeper into certain topics we can't address fully in discussion hour, (2) for working with molecular models, and (3) for organic laboratory techniques in several synthesis and extraction projects. You will get the most out of these labs if you read the protocols thoroughly before class.

Please know that I am in your corner and anticipating your success. There is no getting away from the fact this is a difficult class and will require lots of study time on all our parts. Most of you will have to take this course in college, and unlike your future peers, you have the chance to master much of the organic chemistry content this year, so you needn't be one of the many students who have to change their majors because the subject is too abstract and difficult.

## References


Grove, N.P., Hershberger, J.W., & Bretz, S. L. (2008). Impact of a spiral organic curriculum on student attrition and learning. *Chem. Educ. Res. Pract.*, 9, 157-162.

Grove, N.P., & Bretz, S. L. (2012). A continuum of learning: from rote memorization to meaningful learning in organic chemistry. *Chem. Educ. Res. Pract.*, 13, 201–208.

Karty, J.M., Gooch, G., & Bowman, B.G. (2007). Teaching a modified Hendrickson, Cram, and Hammond curriculum in organic chemistry: curriculum redesign to turn around student performance. *J. Chem. Educ.*, *84* (7), 1209-1216.

Karty, J. (2012). *Get Ready for Organic Chemistry* (2nd ed.). Boston, MA: Pearson Education.

Karty, J. (2014). *Organic Chemistry: Principles and Mechanisms*. New York, NY: W.W. Norton & Company.