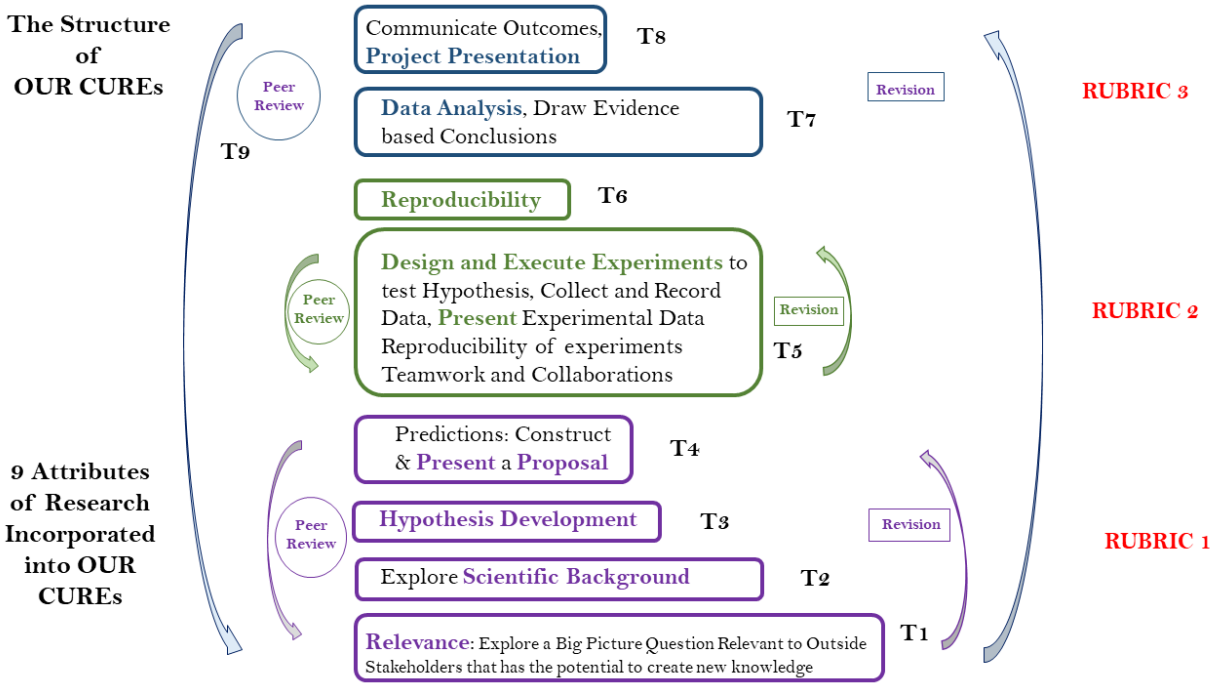
Generic Full Semester CURE Syllabus Calendar With Activities_and_Grading_ Alignment



Week of	Pre-Lab/ PostLab	Activity	CURE Element
W0 Thursday Jan 26th		No Lab Safety Training & Quiz: must be completed before Lab in W1, February 2nd..	
W1 Thursday February 2nd.		Introduction to the Project: PyMol and Molecular Visualization Relevance: Reading a scientific paper & background. Accessing & Using Appropriate Data Bases The importance of record keeping: using your Template Library and Padlet **T1 & T2** L1: **Intro technique**	Relevance Scientific Background
W2 Thursday February 9th		**Relevance & Scientific Background Presentation** L2: Intro Techniques **T3 & T4**	Background & Hypothesis Development Presentation
W3 Thursday February 16th	Lab Math 1, Hypothesis Post Lab	L3: Ist Experiments Introducing the Model System etc Computational Approaches to Explore the model system	Hypothesis Development, Presentation

		Designing appropriate assays to explore the project **T5** **Hypothesis Overview Presentation**	
W4 Thursday February 23rd.	Proposal Post Lab	L4: Experiments relating foundational concepts of Chemistry to the project Hypothesis Development **T5 continued**	Proposal
W5 Thursday March 2nd.	Initial Rate Kinetics PreLab	**Proposal Presentations & Peer Review** L5: Project related Experiments: control situation Quiz 1 **T9**	Proposal Presentation, Peer Review Experiments
Thursday March 9th.	**Spring Break**	**– No Lab**	
W6 Thursday March 16th.	Data Analysis Post Lab	**Revised Proposal Due** : L5: Project Related Experiments: control situation	Experiments Reproducibility Data Analysis
W7 Thursday March 23rd.	Experimental Design PreLab	L6: **T5,T6**	Experiments
W8 Thursday March 30th.	Data Analysis Presentation Post Lab	L6: Project Related Experiments- treatment situation(two weeks) Quiz 2	Experiments Data Analysis Presentation
Thursday April 6th.	**Easter Break**	No Lab.	Experiments Data Analysis
W9 **Thursday April 13th**	Titration Curve PreLab	L7 – Project Related Experiments- extending the research questions **T5, T6**	
W10 Thursday April 20th..	Data Analysis Post Lab	L8 – Project Related Experiments- extending the research questions	Experiments Data Analysis Presentation
W11 Thursday April 27th		L7 – **Data Analysis Presentation** Prepare for Poster Presentations: Displaying Data **T12**	Data Analysis Conclusions
W12 Thursday May 4th	Experimental Design PreLab	T5 – Repeat Key Experiment T8, Prepare for Poster Presentations Quiz 3	Data Analysis Conclusions Future Plans
W13 Thursday May 11th		L11 – Final project presentations and discussion **T8, T9: Peer Review**	Presentation Peer Review

Grading Elements in the Course are embedded throughout the Semester and consist of the following elements, aligned with the 9 essential elements of research incorporated into the course.

Relevance & Background	**(presentation)**	**5%**	
Hypothesis Development	**(presentation)**	**10%**	
Proposal	**(presentation)**	**20%**	**Rubric 1**
Experimental Design & Execution (Badges)		**20%**	
Reproducibility	**(Lab Record Keeping)**	**10%**	
Data Analysis	**(Data Presentations)**	**10%**	**Rubric 2**
Final Project Presentation		**10%**	
Peer Review (of proposal and final presentation, revisions etc)		**10%**	**Rubric 3**
NCI Foundational Concepts	**(Quizzes)**	**5%**	**Rubric 4**
Total		100%	

Badges:

1. Making up a Solution
2. Checking Reagent Concentration
3. Preparing a Buffer
4. Titration Set up and Calculations
5. Measurement using TOTALS Approach

The TOTALS Approach in Science

Try Something

Observe what happens

Think

Adjust and try again

Leave Lab

Smiling and Satisfied

An Example: How do you decide how much enzyme to use?
The TOTALS Approach:
When dealing with an enzyme where you do not know the specific activity, it is important to establish the correct amount of enzyme to use in assays. The trial and error approach is the only option you have. USE the **TOTALS** approach: make up your cuvette and for the first attempt at measuring the reaction, **Try some amount** (say 10µL of the enzyme solution you have) and **Observe** what happens..Then **Think**: measure the "rate"- there are three possible outcomes of this experiment- too much was

added, too little was added, or approximately the right amount was added, as shown in figure 1- curve d. After you have observed and thought about what the data told you**, Adjust** the amount of enzyme and repeat. If too much was added you can make a best guess as to how much too much from the shape of the resultant curve- if by the time you initiated the measurement the reaction was already at, or close to equilibrium you added much too much and probably need to dilute the enzyme 50-100 fold (curve a). If you added too little of the enzyme to get a reasonably measurable rate (curve b) you need to concentrate the enzyme
or simply add more volume of the enzyme until
you get a

reasonably measurable rate. If you added approximately the right amount the issue is whether or not it extrapolates back to the starting absorbance (usually about 0.6 in an MDH assay) at t = zero, in which case it is fine to continue with your experiment (curve d), or whether the enzyme needs some dilution- curve c- (by either adding a smaller volume- this depends upon how small a volume you are comfortable being able to add accurately, or by diluting maybe an additional 5-10 fold). At this point you can **Leave Lab Smiling**, knowing that you have established how much enzyme to use to get great initial rate data!